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ESTES LANDFILL RI/FS

REMEDIAL INVESTIGATION
REPORT

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Volume I of V

Text, Tables, Figures & Appendix A - J

Prepared for

Arizona Department of Environmental Quality

By

Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

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2

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Estes Landfill RI/FS
Remedial Investigation
Final Report

Prepared for
Arizona Department of Environmental Quality

ESE Project No. 6699030

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7/30/99

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Remedial Investigation
Final Report

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ACKNOWLEDGMENTS

This report presents the results of the Remedial Investigation (RI) portion of the RI/Feasibility Study (RI/FS) conducted at the Estes Landfill (Estes). This report was modified by Environmental Science and Engineering, Inc. (ESE), formerly known as QST Environmental, Inc. (QST), from the September 5, 1997 "Estes Landfill RI/FS RI Draft Report" prepared by Harding Lawson Associates (HLA) for the City of Phoenix (City) and Bank One Arizona, N.A. (Bank One). This report was generated under the direction of ADEQ, and summarizes the investigations, results and conclusions of previous RI performed at Estes by HLA and other consultants and contractors. In addition, this report summarizes more current RI results and conclusions from additional investigative data that was obtained and/or collected after the date of the draft RI report. All work has been conducted in substantial compliance with the National Contingency Plan (NCP), promulgated pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), and the Arizona Water Quality Assurance Revolving Fund (WQARF).

NOTE: groundwater sample analytical reporting by HLA in the Phase I Groundwater Quality Investigation (GQI) Report (September 19, 1990) did not differentiate between cis- and trans-1,2-Dichloroethene(DCE).

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EXECUTIVE SUMMARY

Introduction

This report presents the results of the Remedial Investigation (RI) portion of the RI/Feasibility Study (RI/FS) conducted at the Estes Landfill (Estes). This report was modified by Environmental Science and Engineering, Inc. (ESE), formerly known as QST Environmental, Inc. (QST), from the September 5, 1997 "Estes Landfill RI/FS RI Draft Report" prepared by Harding Lawson Associates (HLA) for the City of Phoenix (City) and Bank One Arizona, N.A. (Bank One). This report was generated under the direction of ADEQ, and summarizes the investigations, results and conclusions of previous RI performed at Estes by HLA and other consultants and contractors. In addition, this report summarizes more current RI results and conclusions from additional investigative data that was obtained and/or collected after the date of the draft RI report. All work has been conducted in substantial compliance with the National Contingency Plan (NCP), promulgated pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), and the Arizona Water Quality Assurance Revolving Fund (WQARF).

Location

The Estes Landfill is presently located adjacent to and south of the Salt River between 40th and 45th Streets in Phoenix, Arizona (Figure 1.1). The Estes Landfill study area is shown in Figure 1.2. The study area includes a network of groundwater monitor wells that extends beyond the portion of the aquifer, which is impacted by the Site. The Estes Landfill was privately owned and operated from the early 1950s until 1972, when it was permanently closed to landfill operations. Neither the City nor Bank One operated the Landfill. The Bradley, or Fortieth Street Landfill, a newer landfill which is also privately owned and operated, lies south of the Estes Landfill. The two are separated by a 50-foot east/west utility easement.

Background

In 1978, 1979 and 1980, flooding along the Salt River caused substantial damage to both public and private property along the river, including the Phoenix Sky Harbor International Airport. As a result, the City, in conjunction with local, State and Federal flood control and transportation agencies, developed a program of river channelization and bank stabilization. In order to complete the project, a large portion of the Estes Landfill that was located in the riverbed needed to be relocated. In 1982, the City acquired the Estes Landfill through eminent domain to complete this joint project.

Between 1980 and 1982, groundwater contamination was discovered in two industrial water supply wells; one located on the Bradley Landfill, and one located on the former Tanner property west of 40th Street. The primary contaminants detected were 1,2-dichloroethene (1,2-DCE) and vinyl chloride (VC), which are degradation byproducts of the industrial solvent trichloroethene (TCE). Lower concentrations of other volatile organic compounds (VOCs) and metals were also detected. Groundwater sampling of eight monitor wells, four on the Estes Landfill and four on the Bradley Landfill, conducted by the Arizona Department of Health Services (ADHS) through the mid 1980s, confirmed the presence of groundwater contamination in the area. The greatest concentrations of VOCs were detected in monitor well EW-E, located near a former liquid waste disposal pit on the Estes Landfill.

Since 1987, the City has conducted several phases of remedial investigation, with oversight from ADEQ. Since 1993, Bank One has participated in the investigation. Technical activities have included: the drilling and installation of numerous groundwater monitor wells and piezometers; the collection of hundreds of soil and groundwater samples and thousands of water level measurements; the completion of soil gas surveys, geophysical surveys and several aquifer tests; and the performance of both bench scale and pilot scale treatability tests. Two comprehensive Groundwater Quality Investigation (GQI) reports as well as multiple technical and project related documents have been prepared for the City and approved by ADEQ. This high level of technical activity and resulting data allowed for the development of a detailed Site Conceptual Model (SCM) that was presented in the Draft RI report.

After the submittal of the September 5, 1997, RI Draft Report to the ADEQ, on February 25, 1999, ADEQ provided written comments to the Draft RI report to the City based on a technical review of the draft document performed by ADEQ and ESE. The major comments requested additional investigation to identify other potential sources of VOCs within the former and current landfill, and to determine the lateral and vertical extent of impacted groundwater. In addition, further assessment of the production of methane gas was also requested, along with further evaluation of soil and groundwater components that would support the natural attenuation claim made in the

Draft RI report. Based on the comments provided, ADEQ retained ESE to complete the additional RI activities to address the major concerns and to finalize the RI report.

ESE's modification of this report was based on multiple sources, including the City's and HLA's response to comments provided in the February 25, 1999, letter, and additional information that was obtained from data collected by ESE from the most recent RI field activity conducted from May through June 1999. Other activities conducted as part of this investigation included: performing an ecological screening to determine if an ecological assessment would be required; geophysical screening of the landfill; downhole geophysical logging of the deepest groundwater monitoring well installed by ESE; and an evaluation of the integrity of the existing landfill cover.

The results of the 1999 investigation allowed ESE to refine the SCM in the draft RI. The Site Conceptual Model is a detailed working hypothesis of the geology and hydrogeology and how these are interrelated with the fate and transport of contaminants associated with past disposal practices at the Site. The major components of that SCM are described in detail throughout the RI report. A summary is provided below.

Hydrogeology

The Site is underlain by 115 to 175 feet of heterogeneous alluvial sediments followed by several hundred feet of consolidated sedimentary bedrock. The major hydrologic feature in the study area is the Salt River immediately adjacent to the Site. The Salt River is normally dry, but during periods with above average precipitation, releases from upstream reservoirs have caused flows to occur that have exceeded 100,000 cubic feet per second (cfs). These river flows cause rapid recharge to the underlying aquifer.

Groundwater generally occurs under unconfined conditions, with localized exceptions. Groundwater flow is generally west during no river flow and southwest during large river flow events. Water levels fluctuate between 25 and 65 feet below ground surface (bgs) beneath the Site and are significantly impacted by river flow. These dynamic groundwater conditions create a complex flow regime that alters the advective transport of groundwater contaminants.

The alluvium beneath the Site contains sediments of similar composition with differing hydraulic properties, which result from differences in the degree of sorting of the sediments. Therefore, for the purposes of this RI, three distinct alluvial hydrostratigraphic units have been designated, in descending order from surface, as units F1, F2, and F3. The differences in sorting are related to variations in the fluvial depositional environments of the sediments. The F1 unit is composed of cobbles, gravel, sand and some fines and, when saturated, is considered a highly permeable unconfined alluvial aquifer above approximately 60 feet bgs. The hydraulic conductivity of unit F1 is calculated to be $2x10^{-1}$ centimeters per second (cm/sec) (HLA, 1992c and HLA, 1992d). The F2 unit is also composed of cobbles, gravel, sand and silt with some clay and is considered a semi-confined alluvial aquitard between approximately 60 to 90 feet bgs with very low primary permeability. The hydraulic conductivity of unit F2 is calculated to be $1x10^{-7}$ cm/sec. The F3 unit is composed of the same fluvial material as units F1 and F2, but is considered a moderately permeable, semi-confined alluvial aquifer between the base of unit F2 and the underlying sedimentary bedrock. The hydraulic conductivity of unit F3 is calculated to be $2.5x10^{-2}$ cm/sec (HLA, 1992c).

The sedimentary bedrock, also referred to as unit F4 in the SCM, is well-consolidated and appears to correlate with the Tertiary Tempe Beds. The hydraulic conductivity of unit F4 is calculated to be $4x10^{-6}$ cm/sec (HLA, 1992c). Contacts between the three alluvial units are gradational, whereas, the alluvial/bedrock contact is readily apparent. Unit F2 is not continuous throughout the study area. Where unit F2 is absent, units F1 and F3 are considered to be one unconfined alluvial aquifer.

Groundwater VOC Plumes

In the vicinity of the Site, two plumes of dissolved VOCs in groundwater have been identified through the evaluation of groundwater quality data. One plume is located onsite and generally defined as the Estes Landfill Site, as shown on the ADEQ WQARF Registry Map (Figure 1.2). The other plume is located to the south and southwest of the Estes Landfill.

The Site plume is suspected of originating from an onsite former liquid waste disposal pit (primary source). Dissolved concentrations of VC, cis-1,2-DCE, TCE, and other VOCs in groundwater define this plume. The south plume is defined by dissolved concentrations of TCE, 1,1-DCE, and other VOCs in the groundwater.

At the onsite source, releases of solvent waste such as TCE probably occurred. This waste TCE was likely mixed with other liquid wastes including septage, greases, and waste oils. The precise quantities, character and nature of the liquid wastes are unknown, although considerable historic evidence confirms solvent disposal in the source area. The primary contaminant migration pathway included infiltration of the mixed wastes and solvents through the bottom of the pit, and then percolation through the underlying unsaturated zone to the aquifer. The parent solvent, TCE, has subsequently been degraded to cis-1,2-DCE and VC. There are no indications of the existence of DNAPLs at the Site. Where detected, TCE makes up less than 1% of the total mass of contaminants. Concentrations of dissolved cis-1,2-DCE are generally less than 0.1% of its respective solubility, and VC exists as a gas at the pressures and temperatures found at the Site.

Landfill Soil Conditions

Metals in the form of Aresenic and Thallium were present in both the former landfill and the western and central portions of the existing landfill that exceeded their appropriate action level. In addition, Lead was present in the eastern portion of the existing landfill that also exceeded the SRL. Because these metals are present in subsurface soils, direct human exposure is not a concern at this time. However, the potential of these metals to leachate into the groundwater, and potential future exposure during site redevelopment are of concern. Consequently, further evaluation on the potential risks to human health and the environment of these metals present in the subsurface soils will have to be conducted in the form of a risk assessment.

Landfill Methane Production

Based on comparing methane results of all three rounds, there is no apparent trend of methane production. However, it has been concluded that the highest concentrations of methane production are within the relocated portions of the landfill. It has also been established that methane is not migrating west or east offsite. In addition, the presence of methane and methane production along the southern portion of the landfill is likely influenced by the presence of the Bradley Landfill, which is also a source of methane. The current concentrations of methane could create explosive conditions if low-lying areas or enclosed structure were present. However, because these types of site conditions are not present explosion potential due to build up of methane is currently not an issue. Should future site redevelopment be planned which includes the construction of enclosed structures, the potential of methane creating an explosive condition would be an issue of concern. Consequently, methods to recover methane in landfills should be evaluated during the performance of the FS.

Groundwater Chemistry

VC, TCE, cis-1,2-dichloroethene (cis-1,2-DCE) are signature chemicals for the Site, and accordingly, were used to define the extent of impacts to groundwater. The lateral and vertical extent of contamination from the Site is relatively stable as evidenced from nearly seven years of groundwater monitoring. The limiting factor in this contaminant migration is the rate at which these dissolved phase breakdown products diffuse from unit F2.

The groundwater plume from the Site is stable and not migrating. A review of over seven years of groundwater analytical data indicate that the western or downgradient lateral extent of the plume is defined by wells EW-1 and EW-12. Concentrations of VC and cis-1,2-DCE in groundwater samples collected from both of these wells have been very low to below detection, regardless of river flow conditions. To the south and southwest, the lateral extent fluctuates a few hundred feet in response to river flow. However, the southern lateral extent is generally defined by wells north of University Drive, in particular Wells BW-SD and EW-14. The northern/northwestern lateral extent is characterized by groundwater data from Wells EW-9, EW-11, EW-22, and newly installed Wells EW-23 and EW-24. Based on recent data from these wells, there appears to be a northwest migration component to the primary signature compounds from the Estes Landfill. June 1999 concentrations of VC at Wells EW-22 (2.7 μg/l) and EW-23 (12 μg/l), northwesternmost wells, were above the ADEQ AWQSs.

Based on inferred westerly to southwesterly groundwater flow in the area of the Estes Landfill, Wells EW-NE and EW-3 are upgradient of the inferred source of VOC contaminants identified at the Site. No VOCs have been reported in groundwater samples at these wells, which were initially sampled in September 1988 and June 1989, respectively. It can therefore be inferred that no VOC contaminants have migrated onto the Site from an upgradient source. Based on inferred westerly to southwesterly groundwater flow indicated since groundwater monitoring began at Estes Landfill, the Bradley Landfill is downgradient to cross-gradient of the Estes Landfill. Based on these inferred groundwater flow conditions, it is not likely that any potential VOCs in groundwater from the Bradley Landfill have migrated north onto the Estes Landfill boundary.

The vertical extent of groundwater contamination is generally limited to the alluvial hydrostratigraphic units F1, F2 and F3. Three wells have been completed in the bedrock and geologic coring was completed at a number of locations. Both VC and cis-1,2-DCE have been detected in groundwater samples collected from the unit F4 monitoring well EW-15, located near the source area. Only cis-1,2-DCE was detected in the June 1999 groundwater sample collected at Well EW-26, also located near the source area, but screened approximately 100 feet deeper than EW-15. VC and cis-1,2-DCE have not been detected, or have been detected at concentrations less than 1 ug/l, in groundwater samples collected from the downgradient F4 monitoring well EW-8. Given the hydrogeologic characteristics of F4 and the lack of groundwater contamination at the downgradient location, the vertical extent appears to be limited.

Contaminant concentrations in groundwater decline over time and with distance from the source area. Since the last major river flow event in 1993, concentrations have declined up to two orders of magnitude at some locations. It was noted that during large river flow events, groundwater concentrations of VC tend to spike near the source area. This concentration spike is immediately followed by a rapid decline. These spikes do not appear to affect the lateral extent of groundwater contamination over either the short or long term. From the source area to the western edge of the landfill, approximately 1,700 feet, groundwater concentrations generally decline by about two orders of magnitude. Groundwater concentrations of VC and DCE decline another order of magnitude to generally below detection in an additional 1,600 feet from the western edge of the Site.

The two primary mechanisms controlling the attenuation of VOCs at the Site are physical and biological. The main physical attenuation mechanisms are dissolution and advection. Dissolution occurs primarily in F2 beneath the source and results in the creation of highly contaminated groundwater. This highly contaminated groundwater slowly migrates vertically to the more permeable adjacent units F1 and F3, where it can migrate laterally via advective transport. During periods of river flow, rapid recharge causes hydraulic loading and upsets the established equilibrium. This effect contributes to the observed VC and DCE concentration spikes at source area wells during or immediately after a major river flow event.

An evaluation of concentration spikes over time indicates that the magnitude of the spikes is declining as a result of the reduction in contaminant mass in unit F2. In addition, after a spike event occurs, the concentrations rapidly decline to pre-spike levels or lower. The attenuation mechanism responsible for the rapid decline in concentrations appears to be primarily related to the presence of a unique set of environmental conditions that creates a sequential anaerobic/aerobic groundwater system. Strong evidence of the natural attenuation of TCE, cis-1,2-DCE, and VC through biodegradation is present at the Site.

Natural attenuation of TCE, cis-1,2-DCE, and to a limited extent, VC, is occurring at the Site. The presence of biologically-formed cis-1,2-DCE (daughter product of TCE) and VC (daughter product of the biodegradation of DCE) suggests that microbial reductive dechlorination is occurring at the Estes Landfill. In addition, supporting data have shown that appropriate geochemical conditions exist for reductive dechlorination to occur, especially near the source area.

However, daughter products of vinyl chloride, such as ethane and ethene, while detected at the site, do not occur in significant concentrations to suggest that vinyl chloride is being reductively dechlorinated, nor are the concentrations of chloride and carbon dioxide (ultimate end products in the mineralization of VC) significantly above background levels to indicate that VC mineralization is occuring. An alternative explanation for the lack of VC accumulation in the system may be other biodegradation mechanisms, such as direct oxidation or cometabolism with a primary organic substrate. At this time, insufficient evidence is available to conclusively determine the exact mechanism acting on VC to reduce concentrations over time.

Risk Assessment

Two risk assessments (RAs) have been completed. A Baseline RA was completed by the ADHS in 1995 and a Human Health RA was completed by Harding Lawson Associates (HLA), also in 1995. The results of the two RAs were similar in that they concluded that the media of concern was groundwater and the chemical of concern was VC. Both RAs also concluded that there are no current public health risks associated with the Site, as there is no complete exposure pathway for groundwater. The closest domestic supply wells are 1.5 miles north-northwest and 2 miles south-southwest of the Site. Due to the relative stability of the detected VOC plume, neither of these wells is considered close enough to be impacted by the Site. Differences in the RAs were primarily related to the hypothetical potential future use of groundwater. ADHS's RA included future onsite ingestion of groundwater, a pathway deemed to be incomplete by United States Environmental Protection Agency [EPA] guidance in the characterization of future onsite risks (EPA, 1990). HLA did not consider that future onsite ingestion of groundwater is likely to occur. The differences in RA approaches resulted in significantly different estimates of risk. In the ADHS RA, the greatest excess cancer risk was 2×10^{-3}, associated with theoretical potable use of groundwater from a specific monitor well located onsite. In the HLA RA, the greatest excess cancer risk, associated with potential potable use of offsite groundwater, was 1×10^{-4}. From the date of this report both risk assessments have not been finalized. Prior to the completion of the FS, the draft RA prepared by ADHS should be finalized. The final RA should not only address the most recent collected groundwater data, it should also address the potential risks to human health and the environment of Arsenic, Thallium, and Lead present in the subsurface soils that exceed ADEQ's residential soil remediation levels (SRLs).

Community Involvement Activities

Community involvement at the Site began in the early 1980's, after the ADHS discovered contaminated groundwater in wells downgradient of the Site. The Site and associated remedial activities have been discussed at public meetings including: City Council meetings, meetings of the Phoenix Environmental Quality Commission, and meetings of the Phoenix City Council's Environmental and Natural Resources Subcommittee. Copies of technical reports, including quarterly status reports and proposed technical tasks, have been submitted to the ADEQ for review and submission into public files. An information repository was established at the Ocotillo Library and contains various technical documents about investigative activities at the Site. The City also published a series of advertisements in local papers. The City and ADEQ also prepared and mailed an informational fact sheet about the Site to neighbors, businesses, and interested parties in February 1995.

Included as part of the RI is the *Community Involvement Plan, Estes Landfill State Superfund Site.* The community involvement plan was prepared in conjunction with ADEQ, the City, and Bank One to describe what community involvement activities should occur regarding the Site. The plan is based upon a series of 20 community interviews, which were jointly conducted by the City, its contractor, and ADEQ representatives. The plan discusses the historical activities at the Site, objectives of the plan and issues of concern. The plan provides the framework for future community involvement activities at the Site, including issuance of fact sheets and public notices, and timing of public meetings.

1.0 INTRODUCTION

This report has been modified by Environmental Science and Engineering, Inc. (ESE), formerly known as QST Environemental, Inc. (QST), from the September 5, 1997 "Estes Landfill RI/FS Remedial Investigation (RI) Draft Report" prepared by Harding Lawson Associates (HLA) for the City of Phoenix (City) and Bank One Arizona, N.A. (Bank One). This report summarize the investigations, results and conclusions of previous Remedial Investigations (RI) performed at the closed Estes Landfill (Estes) by HLA and other consultants and contractors. In addition, this report summarizes more current RI results and conclusions from additional investigative data that was obtained and/or collected after the date of the draft report prepared by HLA.

This report is organized into the following sections:

• Sections 1.0	Introduction - provides Site description, ownership and use history, and a brief summary of RI activities.
• Section 2.0	Site Conceptual Model (SCM) - describes the key elements of the SCM.
• Section 3.0	Physical Setting - discusses land use, hydrogeologic and environmental settings and presents a general overview of groundwater use in the area.
• Section 4.0	Overview of RI and Feasibility Study (FS) activities - presents a synopsis of previous technical activities conducted as part of the Site investigation.
• Section 5.0	Hydrogeology - includes a brief regional discussion followed by a detailed analysis of the study area using supporting data.
• Section 6.0	Site Characterization and Nature and Extent of Contamination - discusses site characterization activities and details the nature and extent of contamination.
• Section 7.0	Contaminant Fate and Transport - provides detailed Site information on the effects of recharge, biodegradation of volatile organic compounds (VOCs), and the effect of these on contaminant migration.
• Section 8.0	Assessment of Risk - presents a summary of the hazard identification, toxicity assessment, exposure assessment, and risk characterization.
• Section 9.0	Community Involvement - presents a summary of community involvement activities that have been conducted at the Site and outlines plans for continued community involvement detailed in the *Community Involvement Plan - Estes Landfill State Superfund Site.*
• Section 10.0	Summary and Conclusions - briefly summarizes the components of the RI SCM and provides conclusions from which the consideration of technologies and

alternatives for groundwater remediation can be based.

Section 11.0	References - presents a list of references cited throughout this report.
Section 12.0	Glossary - presents definitions of various technical terms used throughout this report.

During the completion of the RI, a number of interim or topical reports were generated, including quarterly reports provided to the Arizona Department of Environmental Quality (ADEQ). Other RI documents include various types of work plans, project specifications and guidance documents which describe how a particular phase of the investigation or task would be conducted. A complete list of these documents is provided in Table 1.1 and copies of these documents are available at ADEQ or the City. A repository for major project reports has also been established by the City of Phoenix at the Ocotillo Public Library at 102 West Southern Avenue, Phoenix, Arizona.

1.1 Site Description

The Estes Landfill (Landfill) is located along the south bank of the Salt River (the River) between 40th and 45th Streets in Phoenix, Arizona (Figure 1.1). The Landfill lies in Township 1 North, Range 4 East and occupies portions of the southwest and southeast quarter sections of Section 18, Gila and Salt River Baseline and Meridian. The Landfill presently occupies approximately 40 acres along the river in an area dominated by newer commercial developments and older light industrial properties. The Landfill is bounded on the west by 40th Street, on the north by the Salt River and the Phoenix Sky Harbor International Airport, on the south by the Waste Management Regional Waste Transfer Station and the Bradley Landfill, and on the east by vacant land owned by the City and State Route 153. The properties to the south are separated from the Landfill by a 50-foot east/west utility easement.

The Landfill is fenced on all four sides with gated access off 40th Street. The Landfill is covered with one to several feet of native fill material, typically silt, sand and cobbles, and sparse vegetation. Other than the items related to the environmental work being conducted, the Landfill is generally vacant. Several large diameter concrete culvert pipe sections are located near the central portion of the Landfill. Two steel high voltage power line towers located in the utility easement near the southeast and southwest corners of the Landfill, and the old Estes groundwater production well and associated wooden power poles are also found onsite. The structures related to the environmental work include various groundwater monitor wells, an inactive air stripper used for pilot tests, Baker tanks, and several permanent methane monitoring probes.

The Estes Landfill site (Site) was defined, by the Arizona Department of Environmental Quality (ADEQ) in April 1988, as the Estes Landfill Water Quality Assurance Revolving Fund (WQARF) Registry Site. The current boundaries of the Site are shown on Figure 1.2, and were based on inferred distribution of dissolved contaminants in groundwater that were identified as signature compounds to the Estes Landfill.

1.2 Ownership and Use History

The Estes Landfill property was owned by members of the Wilbur Calvin Estes family from approximately 1945 through 1965 except for two years (1957 to 1959) when the property was transferred to and owned by Lyle Stanley Shawler. In 1965, the property was transferred to John Lattimore and Paul Van Leer. On June 1, 1966, legal title to the property was acquired by The Valley National Bank of Arizona N.A., predecessor to Bank One Arizona, N.A., via a warranty deed that identified Valley National Bank "as trustee" of the Estate of Mr. Estes. In 1982, the Landfill was acquired through the exercise of eminent domain by the City for the joint public purpose project described below.

It is believed that the Landfill was operated almost continuously from 1953 to 1972. The Estes Landfill was used by commercial trash haulers, septic tank effluent haulers, and other private users. At various times, other portions of the Landfill were used for agricultural purposes, a hog feeding operation, and a scrap metal operation.

Landfill operations were inspected by the Maricopa County Health Department (MCHD) on a fairly continuous basis between 1959 and 1972. The Estes Landfill was operated by Garbage Service Co. Inc., a refuse hauling and landfill operating company of which Mr. Estes was the principal. According to records from the MCHD, the Estes Landfill was officially closed in February 1972. Data collected from borings drilled along the northern boundary of the Landfill (Sergent et al., 1988 and HDR, 1982) indicated that refuse was encountered at depths up to 45 feet below ground surface (bgs).

During its operation, the Landfill was occasionally referred to as the 40th Street Landfill, as was the adjacent Bradley Landfill (discussed further below). During flooding of the Salt River in 1978, 1979, and 1980, flood waters closed and damaged the east end of the south runway at the Sky Harbor International Airport. Also damaged during the flood were several road crossings, bridges, and much public and private land. The Landfill was among some of the private land that was inundated with surface water during these floods.

Under the direction of the Federal Aviation Administration (FAA), the City, in conjunction with the Arizona Department of Transportation (ADOT), the Arizona Water Commission (AWC) (precursor to the Arizona Department of Water Resources [ADWR]), the Maricopa County Flood Control District (MCFCD), the City of Tempe, the United States Corps of Engineers, and private engineering consultants, proposed to channelize and stabilize the banks of the Salt River in this area to eliminate future flood damage. At this time, the Arizona legislature appropriated $1 million to help fund this effort. The FAA also provided funding. To complete this channelization, the City agreed to obtain certain property located in the then existing Salt River bed. In 1981, a portion of this property, including the Landfill, was acquired by the City through eminent domain. Acquisition was completed in 1982.

In order to implement the flood control channelization project, it was necessary to remove approximately 30 acres of the Estes Landfill from the riverbed. (The northern boundary of the Landfill now consists of the stabilized river bank.) The channelization project was ultimately approved by the FAA, the United States Corps of Engineers, and the Federal Emergency Management Agency as well as state and local agencies. In July 1981, the City and the predecessor to ADEQ, Arizona Department of Health Services (ADHS), entered into a Memorandum of Understanding regarding the Estes Landfill relocation project. The relocation of the 30 acres of the Estes Landfill in the river bed was conducted in 1982 under the guidance of ADHS. The material was relocated to the remaining 40 acres of the Landfill. The environmental activities associated with the relocation were overseen by Henningson, Durham & Richardson Engineers (HDR) under contract with the City. The 30 acres of refuse in the planned alignment of the river channel was removed and screened to determine whether it contained hazardous constituents.

The screening activities consisted of site reconnaissance prior to excavation, a subgrade contamination investigation initiated few days after refuse excavation began, and visual inspection and sampling (if required) of the excavated material on a daily basis by HDR field engineers (HDR, 1982). The subgrade contamination investigation was overseen by Western Technologies, Inc. (WTI), and consisted of drilling test holes over the northern portion of the Landfill which required excavation and removal. Using an expanded grid methodology, approximately ninety (90) test holes were drilled in the area of the Landfill that is currently occupied by the Salt River (Figure 1.3). More than 306 soil samples were collected from the test holes, of which approximately 124 underwent Fingerprint Analysis and Complete Profile. The Fingerprint analysis consisted of measurements of pH, flashpoint, cyanide content, and explosivity. The Complete Profile consisted of EP toxicity testing, solvent screening, and miscellaneous analyses (i.e., phenolic compounds, ammonia, and total solids). The results of the subgrade investigation (HDR, 1982) indicated that none of the collected samples were determined to be hazardous. Also, the results of the solvent screening did not show the presence of any solvents above the method detection limit for any of the soil samples collected. However, the solvent scan did not include, cis-1,2-Dichloroethene or Vinyl Chloride. After screening, if the refuse was determined to be nonhazardous, it was relocated onto the southern 40 acres.

During relocation, about 20 cubic yards of material were found to contain hazardous waste. These materials consisted of several severely deteriorated 55-gallon drums in which the remaining contents and surrounding contaminated soil met hazardous waste characteristics, as defined by Resource Conservation and Recovery Act (RCRA). The contents of four drums were considered ignitable because the flashpoints of the contents were less than 140 degrees Fahrenheit. The contents of five other containers were classified as toxicity characteristic wastes because the EP-toxicity limits exceeded the hazardous waste limit for lead. Ultimately these materials were shipped as hazardous waste under RCRA regulations to a United States Environmental Protection Agency (EPA)-permitted hazardous waste disposal facility in California (HDR, 1982). No other information was available on whether or not confirmatory soil and groundwater samples were collected upon removal of the wastes. Consequently, there was no documentation, which demonstrated that all hazardous materials had been removed, and that no residual hazardous constituent concentrations remained in the subsurface soil that could serve as a potential on-going source of VOCs in the soil and groundwater. The estimated original boundary of the Estes Landfill, the estimated extent of the excavation in the Salt River bed, and the current boundaries of the Landfill are shown on Figure 1.3. The boundaries of the Site, as defined by the ADEQ WQARF Registry, are shown on Figure 1.2.

Between 1980 and 1982, groundwater contamination by VOCs was discovered in two industrial supply wells located near the Landfill. The first well, the Bradley production well (BW-P), was located on the adjoining Bradley Landfill (also known as the Fortieth Street Landfill). The Bradley Landfill, south of the Estes Landfill and separated by a 50-foot easment, was reportedly opened in 1972 and used mainly by commercial trash haulers (Graf, 1986). In 1974, the Bradley Landfill was purchased by Mr. John Bradley, who is the current owner and operator. The western portion of the Bradley property was sold to Waste Management of Arizona and has been converted to a waste transfer station. According to Bradley Landfill management (HLA, 1997), the western portion of the property was not actively used as a landfill. The second impacted well was the Tanner production well (TW-P) located west and southwest of the Bradley and Estes Landfills, respectively (Figure 1.3).

In 1987, in response to the observed groundwater contamination, the City developed a Phase I Groundwater Quality Investigation (GQI) that was approved by the ADEQ, successor agency to the ADHS, and initiated by the City under the newly created state WQARF program. To ensure that the work carried out by the City under the plan met with agency approval, a Technical Committee (TC) was established to oversee the progress of the investigation. The TC initially consisted of members of ADEQ, the ADWR, the City, and HLA. In 1993, Bank One joined the TC.

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Prior to the development of the September 5, 1997, RI Draft Report, numerous investigations have been conducted at the Site and multiple investigative techniques have been used to characterize the nature and extent of contamination. Some of this information has been documented in other reports previously submitted to ADEQ (Table 1.1).

The RI process was designed to provide a stepwise evaluation of the presence, magnitude and extent of groundwater contamination and to assess potential source areas, both onsite and offsite. Early investigations established and defined the presence of groundwater contamination by VOCs above federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs), those levels having since been adopted as Aquifer Water Quality Standards (AWQS) in the State of Arizona. Vinyl chloride (VC) was detected above the AWQS of 2 micrograms per liter (µg/l) in wells at and near the Site. Cis-1,2-dichloroethene (cis-1,2-DCE) and trichloroethene (TCE) were also detected in the groundwater collected from select wells above the current AWQS of 70 and 5 µg/l, respectively.

As part of the Site characterization, the environmental media evaluated have included soil, air and water. Surface soils over the Landfill have been evaluated through a program of surface soil sampling and chemical analyses. Twenty-two surface soil samples have been analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Subsurface soils have been evaluated through lithologic logging, surface geophysics, sampling and chemical and physical analyses. Numerous soil borings have been conducted and test pits have been installed. In addition, two rounds of soil gas sampling for VOCs at over 83 locations across the Landfill have been conducted. Because the results of the soil gas sampling indicated concentrations of VOCs were very low, ambient air monitoring was found unnecessary. Also, 34 permanent landfill gas monitoring probes have been installed at 17 locations on and around the Landfill.

The hydrogeology has been evaluated through several methods including: drilling and geologic logging of drill cuttings and continuous core samples at over 30 locations; downhole geophysical logging and permeability testing of core samples; construction of monitor and aquifer test wells; and completion of several short and long term aquifer tests. In addition, data obtained through the collection and evaluation of more than 100 monthly rounds of hydraulic head data, extensive groundwater modeling efforts, and the collection and analysis of nearly 700 groundwater samples have greatly contributed to the development of a site conceptual model (SCM), discussed in detail in Section 2.0.

There are more than 60 wells installed by the City and other property owners in the vicinity of the Site. The study area is generally defined by the monitor well network which extends beyond the area impacted by the Site and is primarily contained within the boundaries of the Salt River on the north, 48th Street on the east, Interstate 10 (I-10) on the south and the I-10 bridge over the Salt River on the west. The current monitor well network is shown on Figure 1.3. The quarterly groundwater sampling and monthly groundwater monitoring program has changed over time to reflect changes in both the monitor well network and data needs. In general, groundwater quality samples have been collected on a quarterly basis since September, 1988. Select groundwater samples have been analyzed for VOCs, SVOCs, pesticides, metals, inorganics, radionuclides, coliforms, and dissolved gasses. The results of these analyses are presented in the water quality database which is included in Appendix A.

Water-level or hydraulic head measurements have been collected on a monthly basis since the onset of quarterly sampling. In addition, two Stevens Type F continuous water level recorders were installed to gather continuous water-level measurements from various locations across the Site. In 1996, three transducer-type data loggers (Trolls) were installed in select piezometers to continuously record hydraulic head variations between hydrostratigraphic units. These results are presented in the water level database which is included in Appendix B.

Much of the work conducted as part of RI is described in further detail in major project reports, including Phase I and Phase II Groundwater Quality Investigation Reports, a Remedial Data Acquisition Report, and risk assessments conducted by HLA and ADHS. The major findings of these reports are summarized in Section 4.0; a complete list of project submittals appears in Table 1.1.

Since 1993, activities at the Site have focused on further RI work to refine the SCM, complete site characterization activities, and evaluate various remedial alternatives with an emphasis on the more innovative technologies such as air sparging and intrinsic bioremediation. With the acquisition of additional data, the SCM has been further refined, is an integral part of the site characterization, and can be used extensively in the evaluation of remedial alternatives. During this time, the following tasks were completed to provide additional data:

Performed and evaluated a unit specific aquifer test;

Performed and evaluated unit specific continuous water levels;

Completed a three-dimensional groundwater flow model;

Conducted quarterly monitoring and reporting;

Analyzed soil samples for chemical, physical and biological properties including VOC analyses, detailed lithologic logging, sieve analysis, vertical permeability testing, and microbial populations;

Performed groundwater sampling and testing for dissolved oxygen (DO), redox potential, carbon oxygen demand (COD), biological oxygen demand (BOD), phosphate, nitrite, sulfate, ferrous and ferric iron and the C1-C4 range hydrocarbons (ethene, ethane, and methane); and

Performed a laboratory bench scale biodegradation test to evaluate intrinsic biodegradation rates and the potential effects of enhancement.

Also during this time, two risk assessments (RA) were prepared for the Site, one by ADHS (draft only) and the other by HLA. In general, the results of both RAs indicate that VC in the groundwater is the primary chemical of concern, that soil vapor and surface soils do not pose a health risk, and that the overall current public health risk posed by contaminated groundwater at the Site is negligible due to the lack of receptors.

After the submittal of the September 5, 1997, RI Draft Report to the ADEQ, on February 25, 1999, ADEQ provided written comments to the Draft RI report to the City based on a technical review of the draft document performed by ADEQ and ESE. The major comments requested additional investigation to identify other potential sources of VOCs within the former and current Landfill, and to determine the lateral and vertical extent of impacted groundwater. In addition, further assessment of the production of methane gas was also requested, along with further evaluation of soil and groundwater components that would support the natural attenuation claim made in the Draft RI report. Based the comments provided, ADEQ retained ESE to complete the additional RI activities to address the major concerns and to finalize the RI report.

ESE's modification of this report is based on multiple sources, including the City's and HLA's response to comments provided in the February 25, 1999, letter, and additional information that was obtained from data collected by ESE from the most recent RI field activity conducted from May through June 1999. Other activities conducted as part of this investigation included: performing an ecological screening to determine if an ecological assessment would be required; geophysical screening of the Landfill; downhole geophysical logging of the deepest groundwater monitoring well installed by ESE; and an evaluation of the integrity of the existing Landfill cover. The results of this investigation are summarized in appropriate subsections of Sections 4.0 and 6.0.

1.0 INTRODUCTION

This report has been modified by Environmental Science and Engineering, Inc. (ESE), formerly known as QST Environemental, Inc. (QST), from the September 5, 1997 "Estes Landfill RI/FS Remedial Investigation (RI) Draft Report" prepared by Harding Lawson Associates (HLA) for the City of Phoenix (City) and Bank One Arizona, N.A. (Bank One). This report summarize the investigations, results and conclusions of previous Remedial Investigations (RI) performed at the closed Estes Landfill (Estes) by HLA and other consultants and contractors. In addition, this report summarizes more current RI results and conclusions from additional investigative data that was obtained and/or collected after the date of the draft report prepared by HLA.

This report is organized into the following sections:

•	Sections 1.0	Introduction - provides Site description, ownership and use history, and a brief summary of RI activities.
•	Section 2.0	Site Conceptual Model (SCM) - describes the key elements of the SCM.
•	Section 3.0	Physical Setting - discusses land use, hydrogeologic and environmental settings and presents a general overview of groundwater use in the area.
•	Section 4.0	Overview of RI and Feasibility Study (FS) activities - presents a synopsis of previous technical activities conducted as part of the Site investigation.
•	Section 5.0	Hydrogeology - includes a brief regional discussion followed by a detailed analysis of the study area using supporting data.
•	Section 6.0	Site Characterization and Nature and Extent of Contamination - discusses site characterization activities and details the nature and extent of contamination.
•	Section 7.0	Contaminant Fate and Transport - provides detailed Site information on the effects of recharge, biodegradation of volatile organic compounds (VOCs), and the effect of these on contaminant migration.
•	Section 8.0	Assessment of Risk - presents a summary of the hazard identification, toxicity assessment, exposure assessment, and risk characterization.
•	Section 9.0	Community Involvement - presents a summary of community involvement activities that have been conducted at the Site and outlines plans for continued community involvement detailed in the *Community Involvement Plan - Estes Landfill State Superfund Site.*
•	Section 10.0	Summary and Conclusions - briefly summarizes the components of the RI SCM and provides conclusions from which the consideration of technologies and

alternatives for groundwater remediation can be based.

- Section 11.0 References - presents a list of references cited throughout this report.
- Section 12.0 Glossary - presents definitions of various technical terms used throughout this report.

During the completion of the RI, a number of interim or topical reports were generated, including quarterly reports provided to the Arizona Department of Environmental Quality (ADEQ). Other RI documents include various types of work plans, project specifications and guidance documents which describe how a particular phase of the investigation or task would be conducted. A complete list of these documents is provided in Table 1.1 and copies of these documents are available at ADEQ or the City. A repository for major project reports has also been established by the City of Phoenix at the Ocotillo Public Library at 102 West Southern Avenue, Phoenix, Arizona.

1.1 Site Description

The Estes Landfill (landfill) is located along the south bank of the Salt River (the River) between 40th and 45th Streets in Phoenix, Arizona (Figure 1.1). The landfill lies in Township 1 North, Range 4 East and occupies portions of the southwest and southeast quarter sections of Section 18, Gila and Salt River Baseline and Meridian. The landfill presently occupies approximately 40 acres along the river in an area dominated by newer commercial developments and older light industrial properties. The landfill is bounded on the west by 40th Street, on the north by the Salt River and the Phoenix Sky Harbor International Airport, on the south by the Waste Management Regional Waste Transfer Station and the Bradley Landfill, and on the east by vacant land owned by the City and State Route 153. The properties to the south are separated from the landfill by a 50-foot east/west utility easement.

The landfill is fenced on all four sides with gated access off 40th Street. The Landfill is covered with one to several feet of native fill material, typically silt, sand and cobbles, and sparse vegetation. Other than the items related to the environmental work being conducted, the Landfill is generally vacant. Several large diameter concrete culvert pipe sections are located near the central portion of the Landfill. Two steel high voltage power line towers located in the utility easement near the southeast and southwest corners of the Landfill, and the old Estes groundwater production well and associated wooden power poles are also found onsite. The structures related to the environmental work include various groundwater monitor wells, an inactive air stripper used for pilot tests, Baker tanks, and several permanent methane monitoring probes.

The Estes landfill site (Site) was defined, by the Arizona Department of Environmental Quality (ADEQ) in April 1988, as the Estes Landfill Water Quality Assurance Revolving Fund (WQARF) Registry Site. The current boundaries of the Site are shown on Figure 1.2, and were based on inferred distribution of dissolved contaminants in groundwater that were identified as signature compounds to the Estes Landfill.

1.2 Ownership and Use History

The Estes Landfill property was owned by members of the Wilbur Calvin Estes family from approximately 1945 through 1965 except for two years (1957 to 1959) when the property was transferred to and owned by Lyle Stanley Shawler. In 1965, the property was transferred to John Lattimore and Paul Van Leer. On June 1, 1966, legal title to the property was acquired by The Valley National Bank of Arizona N.A., predecessor to Bank One Arizona, N.A., via a warranty deed that identified Valley National Bank "as trustee" of the Estate of Mr. Estes. In 1982, the Landfill was acquired through the exercise of eminent domain by the City for the joint public purpose project described below.

It is believed that the Landfill was operated almost continuously from 1953 to 1972. The Estes Landfill was used by commercial trash haulers, septic tank effluent haulers, and other private users. At various times, other portions of the Landfill were used for agricultural purposes, a hog feeding operation, and a scrap metal operation.

Landfill operations were inspected by the Maricopa County Health Department (MCHD) on a fairly continuous basis between 1959 and 1972. The Estes Landfill was operated by Garbage Service Co. Inc., a refuse hauling and landfill operating company of which Mr. Estes was the principal. According to records from the MCHD, the Estes Landfill was officially closed in February 1972. Data collected from borings drilled along the northern boundary of the Landfill (Sergent et al., 1988 and HDR, 1982) indicated that refuse was encountered at depths up to 45 feet below ground surface (bgs).

During its operation, the Landfill was occasionally referred to as the 40th Street Landfill, as was the adjacent Bradley Landfill (discussed further below). During flooding of the Salt River in 1978, 1979, and 1980, flood waters closed and damaged the east end of the south runway at the Sky Harbor International Airport. Also damaged during the flood were several road crossings, bridges, and much public and private land. The Landfill was among some of the private land that was inundated with surface water during these floods.

Under the direction of the Federal Aviation Administration (FAA), the City, in conjunction with the Arizona Department of Transportation (ADOT), the Arizona Water Commission (AWC) (precursor to the Arizona Department of Water Resources [ADWR]), the Maricopa County Flood Control District (MCFCD), the City of Tempe, the United States Corps of Engineers, and private engineering consultants, proposed to channelize and stabilize the banks of the Salt River in this area to eliminate future flood damage. At this time, the Arizona legislature appropriated $1 million to help fund this effort. The FAA also provided funding. To complete this channelization, the City agreed to obtain certain property located in the then existing Salt River bed. In 1981, a portion of this property, including the Landfill, was acquired by the City through eminent domain. Acquisition was completed in 1982.

In order to implement the flood control channelization project, it was necessary to remove approximately 30 acres of the Estes Landfill from the riverbed. (The northern boundary of the Landfill now consists of the stabilized river bank.) The channelization project was ultimately approved by the FAA, the United States Corps of Engineers, and the Federal Emergency Management Agency as well as state and local agencies. In July 1981, the City and the predecessor to ADEQ, Arizona Department of Health Services (ADHS), entered into a Memorandum of Understanding regarding the Estes Landfill relocation project. The relocation of the 30 acres of the Estes Landfill in the river bed was conducted in 1982 under the guidance of ADHS. The material was relocated to the remaining 40 acres of the Landfill. The environmental activities associated with the relocation were overseen by Henningson, Durham & Richardson Engineers (HDR) under contract with the City. The 30 acres of refuse in the planned alignment of the river channel was removed and screened to determine whether it contained hazardous constituents.

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2.0 SITE CONCEPTUAL MODEL

This section describes the major components of the SCM. This information is intended to facilitate understanding of the more detailed site investigation data, found in the remaining sections of this report and in previous reports (Table 1.1). This discussion will assist the reader in better understanding the major Site features which control contaminant fate and transport. The presence of VOCs in groundwater is the primary concern at the Site. Key interrelated elements of the SCM are: Landfill source(s) contributing to Site groundwater impact; hydrogeology, and groundwater chemistry. These elements, the supporting data, and their significance are briefly described in Section 2.1.

Groundwater contamination has been identified at the Site, and in the vicinity of the Site, through various investigative techniques, but primarily through analysis of groundwater quality data. The major source of Site groundwater contamination is the former liquid waste disposal pit (hereinafter referred to as "the source area"), located in the south-central portion of the Estes Landfill (Figure 2.1). Due to the inconsistent nature of landfill disposal practices, other minor sources of VOCs may be present within the Estes Landfill footprint. Releases of solvents, such as TCE, apparently occurred at the source area. Aerial photographs indicate that this pit was operated from 1966 to 1972. This is supported by the groundwater quality data collected from the monitor wells immediately downgradient of the source area. Groundwater samples from these wells, EW-E, EW-6, EW-15, EW-PZ1, EW-PZ2 and EW-PZ3, have historically contained the highest concentrations of VOCs, of all of the wells located at the Landfill. A block diagram which illustrates the major components of the SCM including hydrologic and geologic features, the source area and other Site related features is included as Figure 2.1.

The depth and elevation of the pit are not precisely known, but may have extended to 40 feet or more bgs (HLA, 1990). Aerial photography analysis showed little visible solid waste in the pit. Releases of solvents likely occurred from disposal of waste material by liquid waste haulers, which likely was intermixed with other liquid waste commonly disposed of at the time, including septage, greases, and waste oils. The precise amount, character, nature, and periods of original disposal are unknown, although considerable historic evidence confirms solvent disposal in the source area. The type of waste solvents released likely includes TCE, primarily as a spent product, that was commingled in some mixture with the other wastes. The parent solvent, TCE, has subsequently been degraded to cis-1,2-dichloroethene (cis-1,2-DCE) and VC.

The primary contaminant migration pathway at the Site was infiltration of the liquid wastes through the bottom of the former disposal pit, which then percolated through the underlying unsaturated zone, to the aquifer. The majority of the resulting contamination lies within the aquifer and not above the water table. Generation of additional groundwater contamination through infiltration and percolation from the surface may be a factor, but is probably negligible due to relatively low annual rainfall amounts and high evaporation rate in the Phoenix area. However, significant rainfall events have been observed to influence water level elevations, as measured on continuous water level recorders at the site. At the Site, potential VOC sources, other than the liquid disposal pit, may be present. However, based on previous (HLA and Hargis) and recent (ESE) investigation data, no other substantial VOC sources have been identified.

There are no indications of the existence of dense non-aqueous phase liquids (DNAPLs) in soils or groundwater at or from the site. EPA guidance (EPA/600/R-92/030) suggests that dissolved concentrations within 10 percent (%) of the solubility of the solvent indicate the presence of a DNAPL in the groundwater system. Thus, for TCE, dissolved concentrations of approximately 1,100 milligrams per liter (mg/l) or 1,100,000 micrograms per liter (μg/l) would indicate the presence of a DNAPL. Based upon the Site's observed data (highest TCE concentration of 120 μg/l), a source of the primary solvent no longer appears to exist within the soils or groundwater near the source area.

VOC groundwater contamination (plume) has been identified about one half mile to the south of the Site. This south plume is characterized by concentrations of TCE in wells due south of the Site that typically exceed those of wells at the Site. In general, wells due south of the site, but north of south plume, have had concentrations of TCE that are at, or close to, laboratory reporting limits. In addition, groundwater elevation monitoring of wells at the Site and in the area of the south plume indicate (local) groundwater flow to fluctuate between southwest and west, between 45th and 40th Streets, and southwest to northwest, west of 40th Street . Based on the inferred groundwater flow and historical TCE concentrations, it does not appear that this south plume is contributing to the TCE impact at the Site. Conversely, it does not appear that Site TCE impact has migrated due south to the south TCE plume. It is possible that TCE has migrated southwest of the site and has co-mingled with the south TCE plume, in an area west of 40th Street. This however, may never be verified or quantified based on the dynamics of groundwater flow in the area.

Localized areas of groundwater contamination also exist south of the Site. These areas are defined by the presence of VOCs that have not been detected at the Site, for example 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), various freon compounds and carbon tetrachloride (CCL_4) (ADEQ 1997, HLA 1992b, HLA 1993c, HLA 1994b, HLA 1995b, and HLA 1996d).

Based on inferred groundwater flow and limited investigative data, it is possible that the Bradley Landfill is contributing to VOC concentrations reported in wells south, southwest and west of the Estes Landfill, such as Wells BW-S, BW-W, EW-18, EW-14, and EW-4. However, there is no evidence that would indicate any contribution to the Site VOC concentrations from the Bradley Landfill. This observation is based on inferred groundwater flow directions, and VOC concentration trends, that indicate the Bradley Landfill to be down and cross hydraulic gradient of the Estes Landfill.

The hydrogeology, in the area of the Site and vicinity, has been conceptualized as an alluvial system composed of four hydrostratigraphic units (referred to as units F1, F2, F3, and F4) with a vertically downward hydraulic gradient between the units. The generalized groundwater flow direction is to the west with the flow direction temporarily shifting to south of west during and after recharge from river flow events. Following recharge, the gradient shifts back to the west. The lateral extent of groundwater contamination originating from the Site is defined. While contaminant distribution and transport is affected by river flows, the extent has remained stable over time. The vertical extent of groundwater contamination beneath the source area has been identified to the sedimentary bedrock (unit F4). West of the source area, where alluvial groundwater concentrations are still elevated, the bedrock is not impacted, suggesting that impact to the bedrock is limited.

In the twenty-five years since Landfill operations ceased, biological activity within the aquifer, as evidenced by groundwater and soil gas sampling, has degraded the released solvents (TCE), creating VC and other "daughter" products. For example, at monitor well EW-E, the overall mean concentration for TCE (through December 1996) is 9.6 μg/l whereas the mean concentrations for the daughter products for cis-1,2-DCE and VC are 581.9 μg/l and 1,094.4 μg/l, respectively. This data indicates that the parent compound TCE accounts for 0.6% of the total volume and the daughter products account for more than 99% of the total volume. Similarly, at monitor well EW-W, the overall mean concentration for TCE is 1.3 μg/l compared to 43.7 μg/l for cis-1,2-DCE and 336.7 μg/l for VC. The overall mean concentrations (through December 1996) for all VOCs for the majority of the Site wells are shown on Figure 2.2.

It is likely that the initial anaerobic biological transformation occurred principally in the vicinity of the source area, with the majority of the contaminant transport occurring from this area. VC and cis-1,2-DCE were likely the principal breakdown products transported from the source area. Elevated dissolved concentrations of VC and cis-1,2-DCE remain in the groundwater in the low permeablity F2 unit near the original source area, and this contamination is rapidly subject to additional biodegradation and attenuation.

2.1 Site Conceptual Model Matrix

The following pages present a matrix of the major elements of the SCM, originally generated by HLA and modified here by ESE:

MODEL ELEMENT	SUPPORTING DATA	SIGNIFICANCE
Landfill Source:		
· Wastes, including solvents, discharged to pit source area located near southeast corner of Site.	· Interviews with former operators, haulers, etc. · Historical aerial photographs. · Greatest groundwater concentrations of VOCs in wells immediately down-gradient. · Outline of the former pit boundaries confirmed through surface geophysics.	· Indicates the pit was major cause of VOC contamination to groundwater.
· No DNAPLs have been detected at the Site. · No significant "parent" solvents remain present at the Site.	· DNAPLs not encountered during drilling or groundwater sampling. · Contaminant concentrations are too low to indicate presence of DNAPL. · Vinyl chloride is a gas at standard temperature and pressure. · Low concentrations of VOCs in soil gas at pit. · Soil gas concentrations are very low to non-detect across the entire Site.	· DNAPLs are not part of the SCM. · Free phase parent solvents are not part of the SCM. · Remedies will not be required for DNAPLs.
· The highest levels of dissolved contamination are present within the soil matrix directly beneath pit source area in F2.	· Immediately downgradient wells and piezometers completed in F2 have greatest VOC concentrations. · Soil gas concentrations too low to indicate source above the water table or in unit F1. · Groundwater contaminant concentrations vary more in units F1 and F3 than in unit F2. · Contaminant concentrations increase in unit F3 during river flow events. · No VOCs present in surface or subsurface soils of unit F2 immediately downgradient of the pit, showing limitations of unit F2 source area.	· Beneath the source area, F2 acts as continuing "source" for groundwater VOC contamination to units F1 and F3. Relatively higher levels of dissolved daughter products are probably released to F1 and F3 because of hydraulic loading and changes in equilibrium. · Causes spikes in VOC concentrations after river flow events.

MODEL ELEMENT	SUPPORTING DATA	SIGNIFICANCE
Groundwater Chemistry:		
· VC, cis-1,2-DCE, and TCE are signature chemicals for Estes Landfill.	· VC and cis-1,2-DCE are the two VOCs with the greatest onsite concentrations and are present in lesser concentration in downgradient groundwater wells. · TCE is the parent product of cis-1,2-DCE and VC, and is present in groundwater at the Landfill at concentrations exceeding AWQSs	· VC and cis-1,2-DCE are used to identify the extent of the Estes Landfill groundwater contamination. · TCE has gerally been characterized within the Site boundaries
· Site extent of VC , cis-1,2-DCE and TCE is stable.	· Downgradient wells EW-1 and EW-12 consistently show very low levels (if any) of signature chemicals. · Wells downgradient of EW-1 and EW-12 do not contain signature chemicals VC and cis-1,2-DCE. · Presence of natural attenuation mechanisms including biodegradation. · Onsite concentrations vary with river flow, but not enough to increase the lateral extent. · No disposal occurred after 1972.	· Further contaminant migration not expected.
· Plume of impacted groundwater south of Site.	· Presence of TCE in groundwater from offsite wells to the south and southwest.	· Independent plume impacts large area of aquifer south and southwest of Site.
· VC and cis-1,2-DCE concentrations vary with river flow events.	· VC and cis-1,2-DCE concentrations in groundwater from wells closest to the river generally decline during river flow event. · VC and cis-1,2-DCE concentrations in groundwater from wells southwest of Estes generally increase during river flow events and then rapidly decline, as seen in monitor wells EW-18 and EW-14.	· Linear recharge along river causes contaminant transport to shift to the southwest. This trend is reversed after flow has stopped. · Concentrations vary, but not enough to extend plume beyond observed westernextent, which is defined by EW-1 and EW-12.

MODEL ELEMENT	SUPPORTING DATA	SIGNIFICANCE
South TCE Plume:		
· TCE is present due south, and southwestof Site.	· TCE generally very low or not present in groundwater from onsite wells. · TCE concentrations are greater in wells located south and southwest of the Site. · TCE present in groundwater from offsite wells that do not contain the Estes signature chemical, VC.	· Sources other than Estes Landfill impact a large area of groundwater south and southwest of the Site. · Impacts some offsite wells impacted by Estes Landfill.
Hydrogeology:		
· Site is underlain by 115 to 175 feet of heterogeneous alluvial sediments followed by several hundred feet of consolidated sedimentary bedrock.	· Structural and depositional history of Salt River Valley. · Lithologic logging of drill cuttings from over 30 borings. · Soil core samples from three Rotosonic™ borings. · Analysis of multiple geotechnical samples from several locations. · Continuous core samples of the bedrock from seven different locations. · A geologic log of the 757-foot Central Arizona Project (CAP) test hole across the river.	· Primary groundwater flow is through the alluvium. · Alluvium has high hydraulic conductivity. · Due to heterogeneities within the geologic materials, preferential pathways may be present. · Depth of contamination limited by underlying bedrock.
· Near the source area, alluvium beneath the Site has three distinct hydrostratigraphic units, designated as F1, F2 and F3, with F2 acting as a localized aquitard.	· Groundwater production from EW-RW1 is only 80 gallons per minute (gpm) when water level is at or below F1/F2 interface, but increases to >400 gpm when water level above F1/F2 interface. · Unit F2 wells do not produce appreciable water. · Unit F2 has slightly higher percent fine grained material than units F1 and F3. · Water levels in F2 and F3 respond more to barometric pressure changes indicating semi-confined conditions. · Results from aquifer tests indicate that F3 responds like a semi-confined aquifer and that leakage from F2 is very low. · Vertical permeability testing of drive samples from F2 and F3 show several orders of magnitude difference.	· Creates a complex groundwater flow system with both vertical and horizontal flow components. · The permeability of unit F-2, where the highest levels of dissolved contamination remain, is one of the limiting factors in contaminant migration.
· Flows in the adjacent Salt River cause linear recharge to the aquifer on the north side of the Site.	· Groundwater level rises during river flow events. · Greater and faster water level fluctuations in wells closest to the river. · Shifts in groundwater flow directions from west to southwest during river flow events.	· River flow changes saturated thickness of aquifer. · River flow increases hydraulic loading on F2. · River flow alters contaminant transport.

MODEL ELEMENT	SUPPORTING DATA	SIGNIFICANCE
· Dissolved concentrations of TCE, cis-1,2-DCE and VC in groundwater have been generally decreasing over time at the site, with the exceptions being concentration spikes attributable to Salt River flow events. The presence of cis-1,2-DCE and vinyl chloride are a substantial indicator that reductive dechlorination of TCE and DCE is occurring at the site, however, the sporadic detection of the daughter products of either reductive dechlorination or oxidation of vinyl chloride (i.e., methane, ethane and ethene) do not conclusively support the biodegradation of vinyl chloride.	· No indication of DNAPLs in source area. · Plume is stable as shown by quarterly monitoring. · TCE was the solvent most likely disposed of at the source area and therefore, the probable parent product. · DCE detected at the site is mostly cis-1,2-DCE, the biologically produced form, formed during the reductive dechlorination of TCE. · Cis-1,2-DCE and VC, daughter products of the reductive dechlorination of TCE and DCE, respectively, are significant components of the constituents detected at the site. · VC exists as a gas at standard pressure and temperature and therefore could not have been disposed of directly. · DO and redox measurements indicate that appropriate conditions exist for reductive dechlorination to occur near the source area and immediately downgradient of the source. · Ethane, methane and ethene have been detected at various locations across the site during several monitoring rounds, but their presence may be attributable to generation of normal Landfill gasses and not to the biodegradation of VC. · Generally decreasing concentrations over time.	· Concentrations of most VOCs will generally continue to decline over time. · Lateral extent will not increase. · Mechanism in place that is actively degrading TCE and daughter product, cis-1,2-DCE. · Biodegradation of VC not conclusively established, though may be occurring on a location-specific basis across the site.
· Large portion of natural attenuation is due to ongoing bioactivity.	· Water quality parameters indicate onsite anaerobic reductive environment capable of reducing remaining parent compounds (TCE and cis-1,2-DCE) to daughter compounds (VC and ethene). · Water quality parameters indicate offsite aerobic oxidation environment capable of oxidizing remaining daughter compounds to ethene and CO_2. · Concentrations always decline rapidly after spike due to river flow event. · Declines in concentrations across the Site and to the west cannot be attributed to physical and chemical reactions alone. · Concentrations of inorganic constituents are relatively stable, in contrast to the signature VOCs, providing additional support to biodegradation as the primary cause of VOC reduction, not dilution.	· Reduces VOC concentrations and maintains plume stability.

3.0 PHYSICAL SETTING

This section provides detailed information on the environmental setting of the Site including land use and zoning, hydrogeology, climate and precipitation, topography and drainage, and overall ecology. The section also provides a detailed discussion of episodic surface water flows in the Salt River and area groundwater use.

3.1 Land Use

During the 1950s and 1960s, several sand and gravel mining operations were located in the riverbed in the proximity of the site. During the mining operations, large excavations were formed as the material was removed for sorting or crushing. These excavations or pits were commonly infilled with various types of wastes from construction debris to municipal and industrial waste. Sand and gravel operations have been documented in the vicinity of the Site on both the Tanner and Bradley properties. Other nearby land uses during this period consisted of cattle stock yards, agriculture, residential and the Phoenix Sky Harbor International Airport.

During the 1970s and early 1980s, agricultural and residential land uses surrounding the Site were replaced with light and heavy industrial and commercial uses. Channelization of the Salt River near the site during 1981 and 1982 was conducted to mitigate the flooding of properties along its banks during future flooding events. This paved the way for more commercial developments to be added in the area in the late 1980s and 1990s, including the larger Hewson and Southbank commercial developments. Development continues today with a new commercial/warehouse development on the former Tanner property located across 40th Street from the Site and State Route 153 immediately east of the Site. Figure 3.1 is an aerial photograph from October 1996, showing the Landfill and surrounding developments.

Current zoning for the Site area is primarily A-2 (heavy industrial) and A-1 (light industrial); however, a few residences are still located in the area. The closest known residence is on Magnolia Street, just south of the Bradley Landfill. While no residential zoning is present in the area, other residential type structures have been observed, usually apartment type, combined with businesses. In addition to zoning, a noise restriction area is in effect around the airport. This area is considered to be in the Sky Harbor flight path, thus prohibiting new residential use. While newer commercial developments have been built, there is still an abundance of older light industrial facilities, some abandoned, in the area. In addition, the Bradley Landfill is still operating and a Waste Management waste transfer station is located just south of the Estes Landfill on 40th Street. These factors, combined with noise from the airport, make future residential land use an extremely unlikely scenario.

In recent years, there have been several plans proposed to develop multiple use recreational projects along the Salt River by creating mixed use areas combined with park-like green belts along its banks. In Tempe, a Salt River development project called Tempe Town Lake has been recently completed. Other plans are under consideration for habitat restoration in the Salt River in Phoenix, as part of the Rio Solado Project, from the I-10 bridge over the Salt River around 32nd Street west to 19th Avenue. Currently, there are no plans for development of the Salt River within a mile of the landfill.

3.2 Hydrogeologic Setting

The Site is located in the Salt River Valley (SRV), an alluvial basin within the Basin and Range Physiographic province of the United States. Generally, rocks of the SRV are divided into six units. These units can be further subdivided into consolidated bedrock and unconsolidated alluvial basin fill. The bedrock units include crystalline rocks composed of Tertiary granites and Precambrian metamorphic rocks, Tertiary extrusive volcanic rocks, and Tertiary sedimentary rocks. The crystalline rocks comprise the mountains surrounding the SRV and form the hydrologic boundary at the margins of the SRV. The sedimentary rocks were initially derived from the crystalline rocks and deposited with the onset of the Basin and Range faulting. Volcanism produced extrusive volcanic rocks that were interbedded with and frequently cap the later sedimentary rocks. The sedimentary bedrock and volcanic rocks also outcrop at the margins of the basin and at localized bedrock highs. The remaining three units are subdivisions of the alluvial basin fill and were deposited in conjunction with and following late stages of the Basin and Range faulting. These unconsolidated to semiconsolidated alluvial deposits have particle sizes ranging from clays to sand to boulders and form the present day alluvial sediments within the basin. The alluvium in the SRV has been subdivided into the lower alluvial unit (LAU), middle alluvial unit (MAU), and the upper alluvial unit (UAU) (US Bureau of Reclamation, 1976 and Brown and Pool, 1989). Where basin fill alluvium has been deposited, portions of some or all of the alluvial units may be present.

Aquifer characteristics vary substantially between the different alluvial units. The primary causes are changes in the amount of cementation and the degree of sorting. Recharge to the aquifer occurs from many sources. Near the Site, recharge is largely due to infiltration of surface water in the river channel into the alluvium which comprises the river channel deposits. Infiltration along the river is evident by rapidly rising groundwater levels and changes in groundwater flow directions.

Groundwater quality within the SRV basin varies significantly both areally and with depth. A long period of sustained groundwater overdraft has altered the direction of groundwater flow and groundwater quality in many areas. Due to its proximity to potential sources of contamination, and the typically higher permeability of the upper alluvium, shallow groundwater degradation has occurred from a number of sources throughout the basin including onsite industrial disposal, infiltration of nitrate-rich irrigation water, leaching from septic systems, improper use of dry wells, leaking underground storage tanks, and landfills.

3.3 Topography

The Site lies at the eastern edge of the West Salt River Valley (WSRV). The WSRV is characterized as a broad, relatively flat alluvial basin that slopes gently to the west towards the outlet of the basin. Prior to urbanization, the topographic gradient was approximately 20 to 30 feet per mile to the west. The Site is located adjacent to the east-west trending Salt River, which, as the primary drainage for the entire WSRV, is a topographic low. Prior to channelization, the river was characteristic of a braided ephemeral stream channel with elevations ranging between 1100 and 1130 feet above mean sea level (msl) adjacent to the Site.

Currently, the base of the river is relatively flat with the exception of a low flow channel which occupies the northern third of the channel across from the Estes Landfill. The elevation of the river bottom adjacent to the Site ranges between 1105 to 1110 feet above msl. Areas north of the river slope gently to the southwest while areas south of the river slope gently to the northwest. The closest topographic highs are:

- Outcrops of Tertiary volcanics (Twin Butte and Bell Butte) located approximately two miles southeast at an elevation of 1334 and 1369 feet above msl, respectively;
- Tempe Butte, consisting of Tertiary volcanic and sedimentary rocks, located approximately three miles due east of the Site at an elevation of 1495 feet above msl; and,
- The Papago Buttes, consisting of Precambrian conglomeratic sandstone, located approximately three miles northeast at elevations ranging from 1350 to 1745 feet above msl.

The Site has two predominant elevations, one associated with the original landfill and the other associated with the relocated refuse. The original landfill slopes gently to the west and has an average elevation of 1120 to 1125 feet above msl. The southern boundary, adjacent to a 50-foot wide utility easement and further south Bradley Landfill, has been built up, and in some places reaches over 1130 feet above msl. Similarly, the south bank along the river is slightly higher, averaging 1122 to 1123 feet above msl. Low points are also present on the Site, below 1117 feet above msl, primarily where subsidence has occurred.

During the landfill relocation effort, approximately 30 acres of the original 70 acre Site were removed from the river channel and relocated on top of the remaining portion of the landfill and on adjacent property east of the original landfill. The relocated refuse lies at an elevation of between 1150 feet above msl and 1160 feet above msl, or approximately 30 to 40 feet above the original landfill. The relocated refuse or mound has steep slopes at a 1:1 grade. The entire mound is fenced off separately from the rest of the landfill. Access to the top of the mound is present at the northwest corner via a gated access road. A contour map utilizing a 1-foot contour interval is included as Plate 1.

3.4 Climate and Ecology

The Site is located within the Sonoran Desert Section of the Basin and Range Physiographic Province. The climate is characterized as arid to semi-arid with the area receiving an average of just under eight inches of rain annually. The majority of this rain falls during two periods; the summer monsoon season which typically extends from the beginning of July through early September, and the winter rainy season which occurs during January and February. While the amount of precipitation is divided fairly equally between these two seasons, the storm patterns are significantly different. During the summer, tropical air from the Gulf of Mexico causes localized high intensity, short duration thunderstorms frequently producing localized areas of flooding. During the winter months slow-moving storms from the northwest bring precipitation events of lesser intensity, wider areal distribution and longer duration than summer storms (Wickham and Corkhill, 1989). Summer daytime temperatures are hot with daytime highs typically averaging more than 100 degrees Fahrenheit (°F) (Table 3.1). Winter daytime high temperatures average between 60°F to 70°F.

Pan evaporation rates in the area are estimated to range between 70 and 75 inches per year, or more than nine times the average annual precipitation (US Department of Commerce [USDC], 1968) (Linsey, et al., 1982). Because rainfall events are generally infrequent, and rainfall amounts are small relative to evaporation, rainfall may not contribute significantly to aquifer recharge. Most aquifer recharge from precipitation is considered to occur in the major stream or wash channels. Because of the Site's proximity to the Salt River and because several large storm drains (Figure 3.1) discharge into the river near the Site, rainfall events can and do recharge the aquifer in the area. Occurrences of recharge to the aquifer after a rainfall event have been recorded on the continuous water level recorders at the Site even in the absence of visible flow in the river. Storm water recharge is discussed further in the next section.

This portion of the Sonoran Desert is characterized by sparse vegetation with creosote bush and mesquite the predominate vegetation type in the desert lowlands. In several areas immediately adjacent to the Salt River, where flow is more consistent either due to natural or man-made conditions, riparian plant communities are present. Most of the Site has been altered, and vegetation onsite is minimal with limited amounts of grasses, weeds and the occasional bush and tree. There are no known endangered plant or animal species onsite and riparian areas do not exist within the river bed adjacent to the Site.

3.5 Surface Water

Flow in the Salt River channel can have a significant effect on the regional and local groundwater system. Prior to the river channelization in 1982, surface water flows from rain events and releases of water from upstream dams had directly affected the Site because of landfill debris that was then buried beneath the river channel and in the floodplain. With the removal of the Estes Landfill material buried beneath the stream channel and the streambank protection completed in 1982, the impact of river flows on the Site is restricted to recharge which causes groundwater levels to rise beneath the Site. Large water level rises have been associated only with substantial flow in the river resulting from releases from upstream dams.

Surface water flow in the ephemeral Salt River occurs from releases from upstream dams which are operated by the Salt River Project (SRP), and uncontrolled flows from Indian Bend Wash (IBW), canals and storm water drains.

The most significant features which affect surface water flow are the man-made reservoir dams on the Salt River including Roosevelt, Horse Mesa, Morman Flat and Stewart Mountain, with Roosevelt being the largest of the four. These four dams are used to store millions of acre-feet of water along the upper reaches of the Salt River. During wetter years, when the reservoirs are at capacity, SRP will release more water to the lower stretches of the Salt River. These releases will exceed the needs of downstream users, allowing water to run freely in the lower reaches of the Salt past the Granite Reef Diversion Dam (GRD). The GRD, which is located approximately 18 miles upstream from the Site, is normally used to divert water in the Salt River into the Arizona and Southern Canals. Normally these releases from GRD are relatively short, although there have been periods, such as in 1993, when flows have lasted as long as six months. Long term releases from GRD to the riverbed are not common and are usually the result of abnormal weather conditions resulting in above average moisture to the upstream watershed.

Flow rates associated with these releases have approached 100,000 cubic feet per second (cfs). Because of additional inflows from storm drains along the river and from IBW, flow rates at the Mill Avenue Bridge, approximately two miles east of the Site, have been estimated at 125,000 cfs or higher. These flows can last from days to months and groundwater levels along the river respond within hours and can rise five feet or more in a week. The monthly release volumes of surface water into the Salt River channel at the GRD for the period between 1965 and 1996 is provided in Table 3.2.

In general, releases from GRD greater than 2,000 cfs are required before surface water will reach the river adjacent to the Site. On a monthly time frame this equates to about 118,000 acre feet per month. A review of the release data indicate that flows of this volume have occurred only eleven times in the past 30 years and that these flow events have generally been three months or less in duration. The largest flow event occurred in January, 1993 when over 2 million acre-feet of water was released in one month. Part of this release was due to limited storage while construction occurred on Roosevelt Dam, and future releases may be smaller and/or less frequent due to increased capacity of the upstream reservoirs. Release data from GRD are presented visually with a corresponding groundwater level response in the USGS-Tovrea Well (Figure 3.2).

The Verde River drains the central highland areas and empties into the Salt River below the major SRP dams and just above GRD. While two reservoirs are present along the Verde River, their capacity is limited and thus flow along the Verde River can be relatively unrestricted during high moisture years. Flows along the Verde River, as high as 50,000 cfs, have been recorded. Therefore, significant flows in the lower reach of the Salt River can occur even during periods when there are no releases from the Salt River reservoirs. Because of the large geographic area which influences Verde and Salt River flow, the larger flows are typically seen in the winter or spring months, when the precipitation events are of the more areally extensive type.

Smaller and more localized sources of water that can generate minor amounts of surface water flow adjacent to the Site, and thus localized recharge, are IBW, the Old Cross Cut Canal and storm drains. The IBW is a north/south oriented natural stream channel that has been converted to a flood control feature with a series of parks and recreation areas, approximately four miles east of the Site. Flows in the IBW are intermittent and result from significant storms in Phoenix and Scottsdale. The confluence of IBW and the Salt River is approximately four miles upstream of the Site. The Old Cross Cut Canal has an outlet to the Salt River approximately one mile upstream of the Site. The Old Cross Cut Canal connects the Arizona Canal on the north and the Grand Canal on the south along 48th Street. The Old Cross Cut Canal also transports storm water runoff to the Grand Canal. When the Grand Canal is at capacity, storm water may be discharged to the Salt River. There are also three large storm drains which collect storm water from street drains and convey storm water to the river near the Site. Two large storm drains are located on the south side of the river, one at 40th Street, and one just east of the Site. Another large drain is present on the north side of the river roughly opposite the one on 40th Street. Except for IBW, all of the features can convey relatively small quantities of water to the Salt River where the water recharges to the groundwater system. Because all of these features produce water only during rainstorms, their input to the Salt River is minimal.

3.6 Groundwater Use

Groundwater use in the study area has been limited historically and has decreased in recent years. Based on review of the ADWR Well Registry Report, there are no drinking water wells within 1.5 miles of the Site. The closest wells to the Site with domestic use listed in ADWR records are ADWR Nos. 55-639522 and 55-639512, which are registered to R.F. Kingston and G. Sorenson, respectively (see below).

Name	ID	Location	ADWR Registration	Well Depth (feet)	Case Diameter (inches)	Case Depth (feet)	Year Installed
Kingston	Kingston	A(1-3) 12A	55-639522	60	12	80	1942
Sorenson	Sorenson	A(1-3) 25	55-639512	300	6	0	UN

UN - Unknown

The Kingston well is located at Township 1 North, Range 3 East Section 12 Northeast Quarter, A(1-3) 12A, which is southwest of 40th Street and Van Buren Street, approximately 1.5 miles north-northwest of the Estes Landfill. The Sorenson well is located at Township 1 North, Range 3 East Section 25, A(1-3) 25, which is located between 32nd and 40th Streets and between Broadway Road and Southern Avenue, approximately two miles south-southwest of the Estes Landfill. Neither of these wells are considered close enough to be impacted by the Estes/Bradley Landfills (HLA, 1995b).

Five industrial production wells are known to exist currently or have existed historically in the study area. These wells are no longer used for water production. These are summarized below and their general locations are shown on Figure 1.1. Specific locations of Wells TW-P, BW-P, TW-USGS, and EW-OE are presented on Figure 1.3:

Name	**ID**	**Location**	**ADWR Registration**	**Well Depth (feet)**	**Case Diameter (inches)**	**Case Depth (feet)**	**Year Installed**
Tanner production	TW-P	A(1-3) 13DDA	55-605122	291	16	280	1961
Bradley production	BW-P	A(1-4) 18CCA	55-800536	300	12	UN	UN
Tovrea/USGS	TW-USGS	A(1-4) 18DAD	UN	200	20	UN	1951
Old Estes prod.	EW-OE	A(1-4) 18CAD	UN	125	16	125	UN
SRP No. 18.6E-2.5N	SRP	A(1-4) 19ACC	55-608357	438	20	438	1951

UN - Unknown

The Tanner well, which was located on the former Tanner facility, was used as an industrial supply well to wash sand and gravel when the facility was in operation. The Tanner facility ceased operation in 1991. The Tanner facility also received potable water from the City of Phoenix. Reportedly, the well pumped an estimated 700 gpm for approximately 8 hours per business day until 1991 when the facility closed. The yearly total pumpage in acre-feet reported to ADWR for 1989, 1990 and 1991 was 363.1, 215.87 and zero, respectively. Reported pumpages have been zero since that time. The well was formally abandoned by Weber Environmental, Inc. on September 28, 1994. The well was abandoned by removing the top 20 feet of casing and grouting the well from bottom to top with neat cement.

Previously, water from the Bradley well was used for dust suppression at the operating Bradley Landfill and for a backup water source in case of fire. The well is located on the property boundary between Bradley and Waste Management just south of the Site. Reportedly, this well was pumped at under 200 gpm for 20-minute periods, four to five times each business day (approximately 20,000 gallons per day). The well was used to fill a 5,000 gallon water truck. Usage during the summer was slightly higher. The total pumpages reported to ADWR for the years 1989 through 1994 were each 1.0 acre-feet per year. However, if one assumed an average of 20,000 gallons per day, five days per week, 50 weeks per year, the calculated per year usage would be closer to 15 acre-feet. This well was reportedly taken out of service in 1995. The total pumpage in acre-feet reported to ADWR in 1995 was zero acre-feet. The Bradley facility also receives potable water from the City of Phoenix.

The Tovrea/USGS well is located about a half mile east of the Site. The well was apparently owned by the Tovrea Meat Packing Company. Reportedly, the well was unused and capped after its installation in 1951. Using this well, the US Geological Survey (USGS) recorded annual water level measurements from 1951 until 1986. In addition, daily water level measurements were recorded at this well by the USGS from 1979 until 1986. It is unknown if the well was ever used as a production well. The well is currently capped and used for water level monitoring for this project.

The Old Estes well, located on the southern edge of the Site, was apparently installed in the 1950s or early 1960s. No information is available on the operation of the well prior to the landfill closure, but it has not been used except to monitor groundwater since the landfill closed in 1972. The well was likely used to irrigate onsite agriculture that was visible in historical aerial photography. According to ADWR records, two drillers logs were filed for the well, with one log reporting a total depth (TD) of 140 feet while the other indicating a TD of 400 feet. To verify the completion of the well, the pumping equipment from the well was removed in 1989 and the well was video surveyed. The results from the video survey indicated that the well had a TD of 125 feet and was millsknife slotted from approximately 47 feet bgs to 116 feet bgs.

The SRP well (No. 18.6E-2.5N) is an old production well located about one mile south of the Site that was used to supplement irrigation water supplied by the Western Canal. Reportedly, this well is not being used. The yearly total pumpage as reported to ADWR for 1989, 1990 and 1991 was 4.79, 18.38 and 0.05 acre-feet, respectively. Between 1992 and 1995, total reported pumpage ranged from 3.40 to 5.22 acre-feet.

The Southbank Lake is a teardrop-shaped, man-made lake of approximately 18 acres located just south of the Salt River approximately one-half mile west, and slightly south, of the Site (Figures 1.2 and 3.1). The Southbank Lake was constructed as part of the Southbank Development. The lake was created sometime prior to 1987 by excavating a large pit below the water table. In 1989, the bottom of the lake was measured at between 20 and 30 feet below the surface water level. Assuming that the level of the lake was roughly equivalent to the water table elevation, which was approximately 1053 feet above msl at that time, then the bottom of the lake would range in elevation from 1023 to 1033 feet above msl, which is 70 to 80 feet bgs.

There is no documented groundwater withdrawal from the lake; however, groundwater does evaporate from the lake. Given that the lake surface is roughly 18 acres in area, and assuming a conservative evaporation rate of 70 inches per year, the total evaporation would equate to approximately 105 acre-feet per year. One hundred and five acre-feet per year of evaporation is equivalent to a well pumping at a continuous rate of 65 gpm (HLA, 1996b). The lake is also used to collect storm water runoff from the Southbank Development and so acts as a location of aquifer recharge.

There are no documented domestic uses of groundwater in the study area. In addition, the only industrial use that appeared in the past to have an impact on the Site was pumpage from the Tanner and Bradley production wells. These groundwater uses are no longer applicable as the Tanner well has been abandoned and use from the Bradley well has been discontinued. Information on wells registered with ADWR near the Site, as of 1996, is summarized in Table 3.3.

4.0 OVERVIEW OF RI AND FS ACTIVITIES

The Landfill has been the subject of a number of technical investigations since it was identified in 1982 as a possible source of groundwater contamination. The City initiated a comprehensive groundwater quality investigation in 1987 that involved a broad range of activities culminating in this report. These activities generated substantial information about the operational history of the Site and the nature and amount of hazardous substances disposed there, which is summarized in Section 1.0. This section summarizes the major components of the technical investigation conducted by the City through 1998 (after 1993, in partnership with Bank One), and by the ADEQ in May and June 1999.

4.1 Previous Activities and Initiation of Groundwater Quality Investigations (1981 to 1982)

In 1980 the ADHS discovered contaminants in the groundwater at an industrial well at the Bradley Landfill (ADHS, 1982a). In July 1981, the City and ADHS entered into a Memorandum of Understanding regarding relocation of a portion of the Estes Landfill as part of the Salt River channelization and bank stabilization project. The relocation of approximately 30 acres of landfill material was conducted in 1982 under the supervision of the ADHS. The landfill material was relocated to the remaining Estes Landfill that was outside the channelization and bank stabilization area. The excavation activities, which were overseen by HDR, are summarized in HDR's report, *Salt River Channelization and Landfill Relocation, Final Report,* dated July 1982. Refuse underlying the 30 acres in the newly aligned river channel was removed and screened to determine whether it contained hazardous constituents.

The screening activities consisted of site reconnaissance prior to excavation, a subgrade contamination investigation initiated few days after refuse excavation began, and visual inspection and sampling (if required) of the excavated material on a daily basis by HDR field engineers (HDR, 1982). The subgrade contamination investigation was overseen by Western Technologies, Inc. (WTI), and consisted of drilling test holes over the northern portion of the Landfill which required excavation and removal. Using an expanded grid methodology, approximately ninety (90) test holes were drilled in the area of the Landfill that is currently occupied by the Salt River (Figure 1.3). More than 306 soil samples were collected from the test holes, of which approximately 124 underwent Fingerprint Analysis and Complete Profile. The Fingerprint analysis consisted of measurements of pH, flashpoint, cyanide content, and explosivity. The Complete Profile consisted of EP toxicity testing, solvent screening, and miscellaneous analyses (i.e., phenolic compounds, ammonia, and total solids). The results of the subgrade investigation (HDR, 1982) indicated that none of the collected samples were determined to be hazardous. Also, the results of the solvent screening did not show the presence of any solvents above the method detection limit for any of the soil samples collected. However, the solvent scan did not include, cis-1,2-Dichloroethene or Vinyl Chloride.

Once screened material was determined to be nonhazardous, it was relocated onto the remaining portion of the Estes Landfill. Initial estimates of the quantity of refuse to be relocated were low, and approximately 415,000 cubic yards of additional refuse required relocation. In order to accommodate the additional material, the City excavated a pit immediately east of the existing landfill material, but within the area originally planned for refuse relocation (HDR, 1982). The records were unclear as to the exact size of the pit, but it was estimated to cover approximately 11 acres. Material from the pit was used as clean fill in the channelization area and to cap the relocated refuse. During the relocation, approximately 20 cubic yards of material were identified as containing hazardous constituents. These materials consisted of several severely deteriorated 55-gallon drums in which the remaining contents and surrounding contaminated soil met hazardous waste characteristics, as defined by Resource Conservation and Recovery Act (RCRA). The contents of four drums were considered ignitable because the flashpoints of the contents were less than 140 degrees Fahrenheit. The contents of five other containers were classified as toxicity characteristic wastes because the EP-toxicity limits exceeded the hazardous waste limit for lead. Ultimately these materials were shipped as hazardous waste under RCRA to an EPA-approved hazardous waste facility in California. No intact barrels or drums were recovered. No other information was available on whether or not confirmatory soil and groundwater samples were collected upon removal of the wastes. Consequently, there was no documentation, which demonstrated that all hazardous materials had been removed, and no residual hazardous constituent concentrations remain in the subsurface soil that could serve as a potential on-going source of VOCs in the soil and groundwater. Based on these findings further source characterization of the former Landfill was completed (See Section 6.2.5). The estimated original boundary of the Estes Landfill, the estimated extent of the excavation in the Salt River bed, and the current estimated boundaries of the Landfill are shown on Figure 1.3.

In the Spring of 1982, the City installed four monitor wells on or near the Estes Landfill pursuant to an agreement with ADHS (Figure 1.2). The wells, referred to herein as Estes East, Estes West, Estes NE, and Estes NW, are described in a report compiled by the ADHS Bureau of Waste Control in February, 1982, entitled *Open Dump Inventory of 40th Street Landfill* (ADHS, 1982a). Additional data related to this investigation was released in a second report by ADHS in June 1982, and titled *Supplemental Data to the Uncontrolled Site of Estes Landfill and the Open Dump Inventory of 40th Street Landfill* (ADHS, 1982b). The supplemental data showed groundwater samples taken from the wells that contained VC contaminant levels of up to 4,970 μg/l in the Estes East well and 3,060 μg/l in the Estes West well. These results prompted continued ADHS investigation at the Site.

In the early 1980's, ADOT began evaluating the proposed alignment of a new freeway across the Salt River, State Route 153. As part of the evaluation, Sergent, Hauskins and Beckwith (SH&B) was contracted by the ADOT to conduct a study of the problems associated with relocating the eastern portion of the Bradley Landfill within the proposed right-of-way of the planned highway (SH&B, 1988). The purpose of this study was to evaluate different scenarios for the removal of wastes from the Bradley Landfill, as well as problems and costs associated with final disposal of waste. Additionally, the study discussed engineering concerns for the various scenarios. As part of this study, SH&B conducted a series of soil borings, pit excavations, aerial photograph analyses and soil gas sampling for the Bradley Landfill and the northern boundary of the Estes Landfill. On the basis of data presented to ADOT by SH&B, the alignment of State Route 153 was eventually moved eastward to avoid relocation of the eastern portion of the Bradley Landfill.

A 1986 ADHS report (Graf, 1986) included available hydrogeologic information pertaining to the Estes Landfill as well as historical water quality analyses from 1982, 1983, and 1984 from water samples obtained from area wells. The ADHS report concluded that the Estes Landfill was likely a source of groundwater contamination. The ADHS determined that it would be necessary to gather information on vertical and lateral extent of groundwater contamination in the vicinity of the Bradley and Estes Landfills. The ADHS did not evaluate the nature and location of any source areas, nor did it develop sufficient information to assess the need for or feasibility of any remedial actions.

On September 24 and 25, 1986, ADEQ and U.S. EPA, Region IX collected samples of groundwater from wells at or near the Estes and Bradley Landfills. The wells sampled included BW-SE, BW-S, BW-W, BW-NE, EW-NE, EW-W, EW-NW, EW-E, the former Tanner production well, and the Bradley production well (See Figures 1.1 and 1.3 for well locations). Sampling results showed elevated concentrations of vinyl chloride in monitor wells BW-W, EW-E, EW-NW, EW-W, the Tanner production well, and the Bradley production well. These concentrations ranged from 56 μg/l to 1,436 μg/l in monitor wells BW-W and EW-NW, respectively. Analytical results of the VOCs from this sampling event were determined to be usable for qualitative purposes only, because the holding times were exceeded by several weeks. Therefore, these data were never included in a report.

4.1.1 Phase I Groundwater Quality Investigation (1989 to 1990)

The City retained the consulting firm of Dames & Moore to draft a work plan to conduct additional groundwater quality investigations at the Estes Landfill. After review and comment by ADHS and ADWR, Dames & Moore produced an October 17, 1986 report entitled *Final Work Plan, Estes Landfill.* The Final Work Plan detailed a Phase I groundwater quality investigation, intended to identify the nature and extent of groundwater contamination in the upper alluvial aquifer. The scope of work, which was reviewed and approved by ADHS, included an evaluation of historical data consisting of aerial photography; a review of the suitability of existing wells for monitoring; preparation of project planning documents; the installation of six new monitor wells (EW-1 through EW-6) both onsite and offsite; quarterly groundwater sampling and monthly water level monitoring; and preparation of the Phase I report.

The City thereafter sought bids from consulting firms to conduct the Phase I groundwater quality investigation. HLA was selected from the consultant selection process. On July 1, 1987, the City and HLA entered into Agreement No. 46267, which provided for HLA to begin evaluating the impact of the Estes Landfill on the upper alluvial aquifer, as specified in the Final Work Plan prepared by Dames & Moore.

In accordance with the ADHS-approved work plan, six monitor wells were installed during January and February 1989. These new wells, along with the original four wells installed on Estes and select Bradley Landfill monitor wells, were sampled during April, June, September, and December 1989. Groundwater quality investigation activities were performed under ADEQ supervision.

The HLA report, *Estes Landfill, Groundwater Quality Investigation, Phoenix, Arizona* (Phase I GQI), dated September 19, 1990, presents the results of this phase of work conducted under ADEQ supervision. The results of the Phase I GQI sampling effort confirmed the presence of groundwater contamination by VOCs, primarily VC and 1,2-DCE, above MCLs, and AWQS in onsite wells. VC and 1,2-DCE were thought to be degradation products of other parent compounds such as TCE and possibly tetrachloroethene (PCE). Concentrations of some inorganic compounds such as iron, manganese, and TDS were also detected at elevated levels in groundwater collected from several wells (HLA, 1990).

A review of historical aerial photographs which illustrated Site activities from 1954 through 1972, (Appendix B of HLA, 1990), was conducted during the Phase I GQI. These aerial photographs suggested the presence of a pit source area near the southeast corner of the original Site from approximately 1966 through 1971. Corresponding water quality data from wells located downgradient from this area supported the possibility that this pit was a suspected source area. Subsequent investigation confirmed this suspicion.

Limited information pertaining to the vertical extent of groundwater contamination in the upper aquifer was obtained from deeper monitor wells (EW-5 and EW-6). Monitor well EW-5 was located adjacent to the shallower EW-W, and monitor well EW-6 was located adjacent to the shallower EW-E. Water levels from these shallow and deep monitor wells indicated the presence of a downward vertical gradient. Water quality data, however, indicated a decrease of contaminant concentrations with increasing depth. This was illustrated on Plate 36 of the Phase I GQI (HLA, 1990), where the VC concentrations from EW-6 (170 μg/l) were nearly nineteen times lower than those from EW-E (3,200 μg/l) during June 1989. A similar trend was noted at wells EW-5 and EW-W, where the VC concentrations from EW-5 (20 μg/l) were sixty-five times less than those from EW-W (1,300 μg/l). The vertical extent of contamination was not determined; however, a lower permeability unit was discovered during drilling of the exploratory boring EW-3. A lithologic unit of lower hydraulic conductivity was encountered beneath the eastern portion of the Site at approximately 140 feet bgs. It was believed that if this unit were continuous across the site, it could limit the vertical and lateral extent of groundwater contamination beneath the Site.

The Phase I GQI indicated that the aquifer in the vicinity of the former Tanner production well had a relatively high hydraulic conductivity, characteristic of the regional upper alluvial unit. This well was capable of pumping several hundred gallons per minute with only a few feet of drawdown. However, it wasn't until the Phase II investigation, when an onsite aquifer test well (EW-RW1) was installed and tested, that the presence of a zone of low permeability within the alluvium beneath the Site became apparent.

The northern lateral extent of groundwater contamination appeared to be defined by monitor well EW-2, in which concentrations of VOC were not above analytical detection limits. Monitor well EW-2 is located just north of the Site within the Salt River channel. To the south, the lateral extent appeared to be limited to the area between the two Bradley monitor wells, BW-W and BW-S.

June 1989 sampling results (Plate 36, HLA, 1990) showed levels of VC (2.3 μg/l) and TCE (7.6 μg/l) that exceeded their respective ADEQ AWQSs in monitor well EW-1. 1,2-DCE (9.2 μg/l) was also detected in monitor well EW-1 below the ADEQ AWQSs. Based on the concentrations of VC and TCE, this well appeared not to define the downgradient extent of contaminant migration from the Site. Monitor well EW-1 is located approximately 1,600 feet west of 40th Street, near the northwest corner of the former Tanner property. As shown in the Water Quality Database (Appendix A), VC was detected at monitor well EW-1 in only two of the four sampling rounds conducted in 1989 and other detected contaminants had relatively low concentrations. VC was detected at 11 μg/l and 2.3 μg/l in April and June, respectively (Plates 35 and 36, HLA, 1990) that exceeded ADEQ AWQSs. TCE was detected in all four sampling rounds during 1989 at concentrations of 9 μg/l, 7.6 μg/l, 4.4 μg/l and 5.3 μg/l in April, June, September, and December, respectively. Except for the sample collected during September 1989, all of the TCE concentrations exceeded ADEQ AWQSs (5 μg/l). Concentrations of 1,2-DCE were detected at monitor well EW-1 in each of the four sampling rounds during 1989. The 1,2-DCE detections were reported at 13 μg/l, 9.2 μg/l, 5.1 μg/l and 3.5 μg/l in April, June, September, and December, respectively (Plates 35, 36, 37 and 38, HLA 1990) which were below ADEQ AWQSs. Other VOCs were also detected during these rounds of sampling which were below respective ADEQ AWQSs or EPA Region IX Preliminary Remediation Goals (PRGs).

NOTE: groundwater sample analytical reporting in the Phase I GQI did not differentiate between cis- and trans-1,2-DCE.

The Phase I GQI report concluded that the presence of VC and 1,2-DCE were apparently the result of biodegradation of the parent compound TCE. VC is a gas at standard temperature and pressure, so it would not have been directly disposed of at the Site. Cis-1,2-DCE is not in common industrial use. This and other site characterization data were presented in the Estes Landfill Groundwater Quality Investigation (HLA, 1990) draft report, which was submitted to ADEQ for review and approval.

4.2 Phase II Groundwater Quality Investigation (1990 to 1992)

Under the oversight of ADEQ, the City commenced a Phase II GQI to continue the RI work begun under Phase I. The primary objectives of the Phase II GQI were to further evaluate the lateral and vertical extent of groundwater contamination at the Site. In addition, the approved Phase II GQI work plan included a preliminary evaluation of potential remedial treatment options for extracted groundwater. Phase II activities included the following:

- Prepare and update project planning documents;
- Install downgradient monitor wells (EW-7 and EW-9 through EW-14) to further define the lateral extent of groundwater contamination;
- Complete three exploratory borings with continuous coring for geologic logging, permeability testing, and correlation of the lower fine-grained unit to the west;
- Install one deep monitor well in the lower fine-grained unit (EW-8) to further define the vertical extent of groundwater contamination;
- Install an aquifer test well (EW-RW1) and perform long-term aquifer testing to evaluate hydraulic properties of the aquifer;
- Perform bench-scale treatability studies on extracted groundwater using ultraviolet (UV) peroxidation (UV/Perox), ozonation and enhanced bioremediation;
- Perform subsequent pilot testing on extracted groundwater using UV/Perox and ozonation;
- Conduct an onsite soil-gas survey;
- Continue groundwater sampling and water level monitoring;
- Review regulatory agency files regarding other potential sources of groundwater contamination in the vicinity of the Site; and
- Evaluate the data and prepare a comprehensive report.

The results from the Phase II GQI were presented in a report by HLA titled *Estes Landfill, Phase II Groundwater*

Quality Investigation, Draft Report dated December 24, 1992. The results of that report are summarized in the following sections: 4.2.1 Hydrogeology, 4.2.2 Groundwater Chemistry, 4.2.3 Sources of Contamination, 4.2.4 Fate and Transport, and 4.2.5 Pilot Testing.

4.2.1 Hydrogeology

Prior to conducting the Phase II GQI, the local alluvial sediments underlying the landfill were described as undifferentiated and unconsolidated silt, sand, gravel and boulders. However, results from the Phase II GQI (HLA, 1992e) identified three relatively distinct layers or facies within the alluvium underlying the Site. The shallow alluvial facies beneath the Site was described as unconsolidated sand, gravel, cobbles, and boulders to an average depth of 50 to 60 feet bgs and was designated as unit F1. The middle alluvium beneath the Site was described as a 30-to-40-foot thick sequence of unconsolidated to semiconsolidated gravel and cobbles supported in a clayey silt matrix and was designated as unit F2. Unit F2 was also referred to as a clayey gravel lens. The areal extent of unit F2 was shown to be present under much of the Site and possibly to the south and east of the Site. However, unit F2 was shown to pinch out to the west and northwest and was not present west of 40th Street or at monitor wells EW-9 or EW-NW. The deeper alluvial facies beneath the Site was described as unconsolidated sand, gravel and cobbles that ranges from 15 to 60 feet thick and was designated as unit F3. This layered alluvial sequence was shown to be underlain by a sedimentary bedrock of low permeability as described below.

A lower fine-grained sedimentary unit initially identified as the "red unit" in the Phase I GQI was further investigated during this phase of work by continuous coring during the drilling of monitor wells EW-7, EW-8, and EW-12. Core samples at the three locations ranged from reddish brown, moderately to well sorted, moderately bedded, fine grained sandstone to a sandy conglomerate consisting of 3 millimeter (mm) to greater than 750 mm angular to subangular granitic, metamorphic, and mudstone clasts supported in a fine to medium grained sandy matrix. These data combined with information from the CAP test hole, drilled approximately 2,000 feet north of EW-12, and the Tovrea well, drilled approximately 2,000 feet east of the southeastern boundary of the Site, identified a sedimentary bedrock unit believed to correlate with the Tertiary Tempe Beds (HLA, 1992e). Subsequent to the Phase II GQI, this sedimentary bedrock was identified as unit F4.

During the Phase II GQI, an aquifer test/recovery well, EW-RW1 (Figure 1.3), was installed in the vicinity of the major suspected source area on the Site. Aquifer testing at the Site was required to evaluate the hydraulic properties of the aquifer in the vicinity of the major suspected source area. This evaluation was necessary to further evaluate the hydraulic properties of the aquifer for refinement of the SCM and to begin evaluating remedial alternatives including pump and treat (HLA, 1992e). On the basis of the aquifer test data, hydraulic conductivities were calculated to be approximately 1.8×10^{-1} centimeters per second (cm/sec) for unit F1 and approximately 7.2×10^{-2} cm/sec for unit F3. Insufficient data were available to calculate the hydraulic conductivity of unit F2. However, based on its low water production, the hydraulic conductivity for unit F2 was believed to be orders of magnitude less than that for units F1 and F3. Permeability tests on core samples were used to calculate a vertical hydraulic conductivity of 4×10^{-6} cm/sec for the sedimentary bedrock.

The differences in the hydraulics of these multiple layers were found to alter the direction of groundwater flow between the layers, thus creating a complex three dimensional hydraulic system with both vertical and horizontal flow components. This layering effect was compounded by the presence of the sedimentary bedrock beneath the alluvium. The vertical hydraulic conductivity of the sedimentary bedrock (Tempe Beds) was determined to be low when compared with the sand and gravel layers of the alluvial units. This formation is significant in that it acts as a hydraulic bedrock to limit the vertical migration of groundwater contamination.

During the Phase II investigation, HLA also determined that this layering may cause portions of the groundwater to occur under semi-confined conditions and that a downward vertical gradient was present beneath the Site. HLA also confirmed that sustained flows in the river from upstream releases would recharge to the aquifer, increasing the downward vertical gradient and causing the horizontal direction of groundwater flow to shift from west to southwest. Recharge events were also determined to cause temporary changes in organic and inorganic water quality in groundwater from onsite and offsite wells.

4.2.2 Groundwater Chemistry

In the vicinity of the Estes Landfill, VC and cis-1,2-DCE were the two VOCs detected at the greatest concentration levels during Phase II. During the Phase I study, the cis and trans isomers of 1,2-DCE were not analytically distinguished, but were reported as total 1,2-DCE in the Phase I report. For the Phase II study, the analytical laboratory was asked to report the concentrations of both the cis and trans isomers for 1,2-DCE. Based upon this analysis, the predominant isomer was determined to be cis-1,2-DCE. For example, eight rounds of analytic results from monitor well EW-E showed the percentage of cis-1,2-DCE to range from 93 to 100% of the total 1,2-DCE present (Table 1, HLA, 1992e). Cis-1,2-DCE is not commercially available, and is a known degradation product formed from the parent compound, TCE.

Groundwater beneath the Estes Landfill has also been impacted by inorganic contaminants, primarily metals. Concentrations of arsenic and barium were greater in groundwater samples collected from wells located on the Landfill than in groundwater samples collected from upgradient and downgradient wells. Also, concentrations of iron and manganese appeared to increase somewhat during periods of river flow. It did not appear that these metals were migrating offsite, as offsite metals concentrations were all below the applicable AWQS.

4.2.3 Sources of Contamination

Potential source areas for VOCs in groundwater were identified at the Estes Landfill and south of the Estes Landfill through various investigative techniques, but primarily through analysis of groundwater quality data. The major identified onsite source area was the former liquid waste disposal pit located near what was then the southeast corner of the Site. However, the distribution of the VOC concentration of soil gas results (HLA, 1992e), while showing elevated concentrations near the the former liquid waste disposal pit, also showed elevated VOC concentrations in other areas of the current Landfill. Although VOCs in groundwater beneath the Landfill may have some correlation on the distribution of VOC found in the soil gas results, the depth to groundwater, the types of wastes, and soil conditions beneath the Landfill, would conclude that other potential sources of VOCs exist outside of the liquid waste disposal pit. Based on these findings further source characterization of the Landfill was completed in 1999 (See Section 6.2.5).

Groundwater data also demonstrated the presence of VOC groundwater contamination to the south of the Site, as possibly a separate VOC plume. TCE was the primary constituent of this offsite contamination. Low levels of 1,1-DCE also appeared to be present. The offsite contamination appears to be migrating west at areas due south of the

Site, and then migrating more north of west, west of 40th Street. More discussion of groundwater VOC concentrations, in the vicinity of the Site, is presented in 6.4.5.

4.2.4 Fate and Transport

The lateral extent of groundwater contamination in the vicinity of the Estes and Bradley Landfills appeared to have been defined based on the groundwater sample VC and cis-1,2-DCE results of the Phase II investigation. Ten rounds of quarterly monitoring were conducted during the Phase II GQI, spanning 1990, 1991 and the first two quarters of 1992. Figures illustrating detected VOC concentrations for each round were included in Appendix C of the Phase II GQI report (HLA, 1992e).

The downgradient extent of groundwater contamination appeared to be defined by monitor wells EW-1 and EW-12 to the west and southwest of the Site. Monitor well EW-1 is located approximately 1,600 feet west of 40th Street near the northwest corner of the former Tanner property. Concentrations of cis-1,2-DCE (total 1,2-DCE prior to September 1990) were reported in five out of ten rounds at monitor well EW-1. The detected concentrations ranged from 1.1 μg/l to 7.4 μg/l in September 1991 and March 1991, respectively. Detected concentrations of VC were identified in two of the ten rounds of data, with VC reported at 7.4 μg/l in March 1991 and 0.40 μg/l in December 1991.

Monitor well EW-12 is located approximately 1,800 feet west of 40th Street and 700 feet south of monitor well EW-1. Monitor well EW-12 was installed in early 1991 and VC was not detected in the six subsequent rounds of monitoring. Detectable concentrations of cis-1,2,-DCE were reported in each of the six rounds of data and ranged from 5.3 μg/ in June 1991 to 0.42 μg/l in June 1992. It should be noted that TCE was consistently reported at Well EW-12 at concentrations that exceeded those reported at Well EW-1 during the same sampling events.

Figure 4.5 presents groundwater TCE concentrations and inferred groundwater flow direction for data collected in December 1991. This data indicates groundwater flow of west to southwest, and significantly higher concentrations of TCE at wells south and southwest of the Site compared to wells at the Site, and immediately west of the Site. This appears to support the contention that a separate TCE groundwater contaminant plume is located south of the

Site, and may be impacting Well EW-12. However, based on this data, it does not appear that this south TCE plume is contributing to TCE concentrations reported at the Site.

The northern extent of groundwater contamination appeared to be defined by monitor wells EW-9 and EW-11 to the northwest of the source area. Monitor wells EW-9 and EW-11 are located in the river bed, approximately 1,200 feet and 2,400 feet, northwest of the source area. Concentrations of cis-1,2-DCE and VC were reported in groundwater samples from monitor well EW-9 in four of the six rounds analyzed. The reported concentrations of cis-1,2-DCE ranged from 3.3 μg/l to 17 μg/l in March and September 1991, respectively. The detected concentrations of VC ranged from 0.58 μg/l to 11 μg/l in December and March 1991, respectively. Five rounds of data were collected from monitor well EW-11 and VC was only detected once at 0.99 μg/l in June 1991. Cis-1,2-DCE was detected in two of the five sampling rounds at EW-11. Detected concentrations of cis-1,2-DCE were reported at 2.0 μg/l and 1.0 μg/l in June and September 1991, respectively.

To the southwest of the Site, groundwater contamination was shown to extend to monitor well EW-14, which is located approximately 2,000 feet southwest of the source area along 40th Street. Groundwater data from this well identified detectable concentrations of cis-1,2-DCE and VC in each of the six rounds analyzed. Detectable concentrations of cis-1,2-DCE from groundwater data at monitor well EW-14, ranged from 5.9 μg/l to 30 μg/l in March and June 1991, respectively. Detectable concentrations of VC, from groundwater data at monitor well EW-14, ranged from 2.0 μg/l to 15 μg/l in December 1991 and both March and June 1992, respectively.

The vertical extent of groundwater contamination was further assessed by evaluating water quality data from clustered wells. Clustered wells are wells completed in the same general location but at different depths. Water quality data from these well clusters indicated that groundwater contamination decreased substantially with depth. This was supported by data collected from the western portion of the Site where monitor wells EW-8, EW-5 and EW-W are clustered. Concentrations of cis-1,2,-DCE were not detected and concentrations of VC were reported in two groundwater samples from the deepest monitor well EW-8. This was illustrated in Figure C22 (Appendix C, HLA, 1992e) from June 1991, when the detected concentration of VC at EW-8 (5.5 μg/l) was 10 times lower than the VC concentration at EW-5 (55 μg/l) and 29 times lower than the VC concentration at EW-W (160 μg/l). A similar trend of decreasing concentrations with depth was seen at deep and shallow monitor wells EW-7 and EW-14. At this location, VC was not detected in samples from the deeper well, EW-7, but was detected in each of the six rounds from EW-14 at concentrations ranging from 2.0 μg/l to 15 μg/l. Concentrations of cis-1,2-DCE were detected in each of the six sampling rounds at EW-14, but only in two of the sampling rounds from EW-7. The decreasing concentrations with depth at this location were illustrated in Figures 42 and 43 of the Phase II GQI, when the detected concentrations of cis-1,2-DCE from EW-7 (2.9 μg/l) were nearly 4 times lower than the concentrations of cis-1,2-DCE from EW-14 (11 μg/l).

4.2.5 Pilot Testing

Initial pilot bench scale testing of contaminated groundwater collected from an onsite monitor well was conducted using three treatment methods: UV/Perox, ozonation and bioremediation. The results of bench scale testing suggested that all three methods could be used to reduce concentrations of VOCs in groundwater to acceptable levels. Therefore, field scale pilot testing of two treatment methods, UV/Perox and ozonation, was completed during aquifer testing. Field scale testing of bioremediation was not performed due to excessive costs for setup of a temporary facility.

Field scale pilot testing demonstrated that contaminated groundwater could be successfully treated for VOCs using UV/Perox. Testing also revealed that pretreatment of contaminated groundwater was necessary when water levels were elevated, due to greater than normal concentrations of metals in the groundwater. The field scale pilot testing results for Ozonation of the contaminated groundwater produced lesser reductions of VOCs than the UV/Perox (HLA, 1991e). Further detailed evaluation of these and other remedial technologies will be conducted during the Feasibility Study.

4.3 Evolution of Potential Groundwater Containment/Pilot Treatment System (1991 to 1993)

Prior to completion of the Phase II GQI, the ADEQ requested that the City evaluate the potential for hydraulic groundwater containment in the vicinity of the suspected source area. In response to ADEQ's request, the City developed a work plan for the evaluation and development of a groundwater containment/pilot treatment system (GWC/PTS). The conceptual GWC/PTS work plan (HLA, 1991a) was submitted to and approved by ADEQ. This work plan outlined a number of tasks associated with the completion of the Phase II GQI and development of the GWC/PTS. Specific activities included the following:

- Complete Phase II GQI activities, as discussed above under Section 4.2 Phase II Groundwater Quality Investigation;
- Preparation of a final GWC/PTS work plan (HLA, 1991c) for ADEQ review and approval;
- Development of a new Quality Assurance Project Plan covering activities planned for the Site (HLA, 1992a);
- Preparation of a Groundwater Monitoring and Sampling Plan for ADEQ review and approval (HLA, 1992b), preparation of analytical bid specifications and continuation of water level monitoring and groundwater sampling activities;
- Installation of a second aquifer test/recovery well near the western well cluster (EW-RW2); conduct of additional aquifer testing and groundwater treatability testing using air stripping; and performance of air stripper air dispersion modeling to evaluate air stripper off gas treatment options;
- Preparation of a National Pollution Discharge Elimination System (NPDES) and Poor Quality Groundwater Withdrawal (PQGWWP) permits;
- Preparation of a Monitor Well Installation Work Plan for ADEQ review and approval (HLA, 1993a), preparation of drilling bid specifications and installation of four additional monitor wells (EW-15 through EW-18) and six piezometers (EW-PZ1 through EW-PZ6) and one exploratory boring EX-B1 designed to evaluate the depth of the F3/F4 interface; and
- Preparation of a Groundwater Modeling Work Plan for ADEQ review and approval (HLA, 1993), and commencement of groundwater modeling activities.

4.3.1 Groundwater Monitoring

In accordance with the ADEQ approved work plan, quarterly groundwater monitoring and sampling was continued under the GWC/PTS for the last two quarters of 1992 through the end of 1994. Prior to the start of this period, the Salt River had sustained flow from January 1992 through early June 1992, which had elevated water levels and shifted the general groundwater flow direction from west to southwest at the Landfill. In general, a southwesterly groundwater flow direction at the Landfill was maintained by periodic river flows and flood flows that occurred from July 1992 through the end of 1993 (HLA, 1992 and HLA, 1993). Water levels declined as the river flows subsided in late 1993, and the overall groundwater flow direction shifted back to the west in 1994 (HLA, 1994).

Following the river flow events that lasted through much of 1993, concentrations of VC in groundwater from wells near the source area reached a peak in December 1993 (HLA, 1994) and rapidly declined throughout 1994 (HLA, 1994 and HLA, 1995). For example, the concentrations of VC in unit F2 and F3 declined by approximately 92% and 99% , respectively, from December 1993 through December 1994. Because of the declining water levels at the Site in 1994, unit F1 was not saturated in September and December 1994, but concentrations of VC still showed a reduction of 46% from December 1993 to June 1994 in unit F1. Concentrations of cis-1,2-DCE exhibited slightly different trends, with concentrations peaking in unit F2 in March 1994, but still declining by 72% from March 1994 to December 1994. The concentrations of cis-1,2-DCE in unit F3 showed a decline of 89% from December 1993 to September 1994 and then increased in December 1994 to 91% of the December 1993 concentration. The concentrations of cis-1,2-DCE in unit F1 declined by 98% from December 1993 to June 1994.

Contaminant concentrations from groundwater samples at select monitor wells at the downgradient extent of the contaminant plume showed minimal increases that lagged somewhat behind the source wells, probably due to the increased travel time associated with distance from the source. For example, at monitor well EW-1, the VC concentrations gradually increased from less than the method detection limit in March 1994 to 6.4 µg/l in December 1994. However, at monitor well EW-12, VC was not detected during the quarterly sampling associated with the GWC/PTS, indicating that the lateral extent of VC was remaining stable. The concentration of cis-1,2-DCE followed a similar trend to that of VC in the two downgradient monitor wells. At monitor well EW-1 the concentration of cis-1,2-DCE peaked in December 1994 at 17 µg/l. At monitor well EW-12 the concentration of cis-1,2-DCE ranged from a high concentration of 9.6 µg/l in December 1993 to a low of 1.8 µg/l in December 1994. It should be noted that TCE was consistently reported at Well EW-12 at concentrations that exceeded those reported at Well EW-1 during the same sampling events.

4.3.2 Aquifer/Pilot Testing

Two additional aquifer tests were performed to further evaluate the hydraulic properties of the underlying formation. After the second aquifer test/recovery well EW-RW2 was installed, a three day aquifer test was conducted in January, 1992, at a constant pumping rate of 410 gpm. Due to unexpected river flows, the test was discontinued after 49.5 hours because of observed recharge effects from the flowing river. Results from this aquifer test were similar to findings from previous aquifer testing which indicated that the lower sand and gravel unit F3 responded as a confined or semi-confined aquifer. The results also provided additional evidence of a lower permeability unit corresponding to unit F2.

In May, 1992, a short term pump test was performed on aquifer test/recovery well EW-RW1. As noted above, river flows early in 1992 caused recharge to the aquifer, which in turn caused water levels to rise beneath the Site. Based on observations noted during the March 1992 groundwater sampling, the production capability of EW-RW1 appeared to have increased in response to the increased saturated thickness of the aquifer. The pump test revealed that well EW-RW1 was now capable of producing over 400 gpm as compared with a maximum of 80 gpm during June, 1991. The increased capacity of the well was attributed to the saturation of the lower portion of unit F1. These results were significant in that they provided further evidence of the presence of vertical hydraulic conductivity variations within the alluvium.

During the aquifer tests performed at EW-RW1 and EW-RW2, an air stripper was used to treat the effluent prior to disposal into the sanitary sewer. The results from the aquifer tests and general effectiveness of the air stripper were presented in the Phase II GQI. Also as part of the GWC/PTS, air dispersion modeling was performed to evaluate whether the off gas from a permanent air stripper would need to be treated prior to discharge to the atmosphere. Results from the modeling showed that concentrations of VC would be in excess of the annual Arizona Ambient Air Quality Guidelines (AAAQG) limit of 0.012 micrograms per cubic meter ($\mu g/m^3$) at the Landfill boundary. On the basis of air dispersion modeling, it was concluded that offgas treatment of air stripper emissions would be required.

4.3.3 Permitting

An application for a NPDES permit was submitted to ADEQ and EPA in November 1991. In the event that a groundwater pump and treat system was ever installed and operated, a NPDES permit would be necessary for discharge of the treated groundwater to the Salt River. The draft NPDES permit, No. AZ-0023663, was approved on July 25, 1994, by ADEQ, however, the final permit has not been issued by the EPA.

The extraction of poor quality groundwater in an Active Management Area requires a Poor Quality Groundwater Withdrawal Permit from ADWR. A work plan outlining the PQGWWP for the Estes Landfill was submitted to the ADWR Director on April 28, 1992. Following approval of the work plan, the Administrative and Hydrologic Report, and Application for Permit to Withdrawal Poor Quality Groundwater within an Active Management Area pursuant to A.R.S. 45-516, were prepared and submitted to ADWR in October, 1992. Approval of the PQGWWP No. 59-537885 was granted on October 8, 1993 by ADWR.

4.3.4 Well Installation (1993)

A Revised Monitor Well Installation work plan (HLA, 1993a) was submitted to ADEQ on March 25, 1993. After approval from the State, bid specifications were prepared and a driller was selected to perform the new well installation. In the fall of 1993, six unit-specific piezometers, four groundwater monitor wells and one exploratory boring were drilled. Unit-specific piezometers EW-PZ1 (unit F2), EW-PZ2 (unit F1), and EW-PZ3 (unit F3) were completed near the source area wells EW-E and EW-6. Unit-specific piezometers EW-PZ5 (unit F3) and EW-PZ6 (unit F2) were completed near the western well cluster EW-W, EW-5 and EW-8. A third unit-specific well cluster was created in the vicinity of monitor well EW-2, where piezometer EW-PZ4 (unit F1) and monitor well EW-16 (unit F2) were installed. The piezometers and well EW-16 were installed to evaluate unit specific chemical concentrations, and whether unit specific flow directions existed that would effect contaminant transport.

At the four monitor well locations, including EW-16, boreholes were drilled until the underlying bedrock was encountered, at which point the holes were continuously cored for geologic interpretation. Monitor well EW-15 was located near the eastern cluster and was completed as a bedrock (unit F4) well. Monitor wells EW-17 and EW-18 were completed primarily to replace the Bradley monitor wells BW-WD and BW-SD, which were not compatible with the other Estes monitoring wells. In addition, an exploratory boring was drilled on the north side of the Tanner property to determine the depth to bedrock in this area.

The results of this drilling program provided significant bedrock information including depth, type and hydraulic properties. Additional geologic data on the heterogeneities of the alluvium were also obtained in part, through the evaluation of sieve analysis (see Table 4.1). Subsequent water level monitoring confirmed the presence of a downward vertical gradient between all the units. Water level data also suggested that groundwater flow directions within the individual units can vary and that the flow direction in unit F1 was more sensitive to small recharge events along the river. Geologic data for the alluvium and bedrock as well as water level data were later incorporated into the groundwater flow model described below.

Unit-specific groundwater quality data indicated that; 1) Unit F2 near the source area contained the highest concentrations of dissolved groundwater contamination from cis-1,2-DCE and VC; 2) The bedrock near the source contained dissolved concentrations of VOCs but that this VOC contamination appeared to be localized near the source; and, 3) units F1 and F2 at the northern well cluster did not contain cis-1,2-DCE or VC. Also, water quality from monitor well EW-18 indicated that the Bradley monitor wells were not accurately representing groundwater concentrations, especially under high water table conditions.

4.3.5 Groundwater Modeling

The development of the groundwater flow model at the Site was driven by multiple goals. The primary goal was to better understand localized groundwater flow at the Site. The secondary goal was to evaluate larger scale groundwater flow to aid in assessing offsite migration as well as migration of VOCs onto the Site and potential commingling of contaminant plumes. A key element in the development of the groundwater model was gaining an understanding of the local and regional hydrogeology. Development of the SCM was the first step in achieving this goal and understanding the subsurface environment at the Site. Discussions of the SCM and its development were presented in the modeling report (HLA, 1996c) and were previously discussed in Section 2.0 of the RI.

Once the SCM was developed, the hydrogeology from the SCM was translated into discrete zones, represented as squares and/or rectangles in two dimensions and cubes in three dimensions, to simulate the natural heterogeneity of the system. The model domain covered an area of approximately 12.5 square miles around and including the Estes

Landfill. The boundaries included Washington Street to the north, 56th Street to the east, Broadway Road to the south and 16th Street to the west. Boundary conditions and model cell types were set to establish areas of no flow, constant head, and head dependent flux. Specific cell parameters were then assigned and input including: starting water-level elevations, model layer bottom elevations, horizontal and vertical hydraulic conductivities, aquifer storativity, and, if applicable, recharge or pumping rates.

Upon completion of the initial model construction, the model calibration was initiated. Model calibration is the process of modifying the values of the unknown model input parameters to achieve a more accurate match between the model results and the known model input parameters for a defined simulation period. Calibration is conducted in two stages. First, a steady state simulation was run and the unknown input parameters were adjusted to more accurately match observed conditions to the model. Second, a transient simulation was run to more accurately represent the dynamics of the hydrogeologic system and further adjust input parameters.

A transient calibration of the 3-D groundwater flow model covering the model domain was completed. The model was shown to reasonably simulate the hydrogeologic system both areally, at a specific time, and temporally at specific locations. Incorporation of the SCM characteristics into the model, combined with the overall strong correlation between the model predicted and actual observed hydraulic head data, provide strong support for elements of the SCM such as: layering of the alluvium, the limited extent of unit F2, semi-confined nature of unit F3, the existence of a bedrock high in the vicinity of the source area, an increase in the transmissivity to the west of the Site, and the ability of the sedimentary bedrock to act as a barrier to vertical migration of contaminants.

4.4 Remedial Data Acquisition (1993 to 1994)

After the collection and evaluation of additional data from monitor well drilling and sampling, aquifer testing and initial groundwater modeling, the City and Bank One began to re-evaluate the effectiveness, appropriateness and necessity of installing a groundwater containment system for the source area. In addition to advances in more effective technologies, the results from the additional tasks indicated that the lateral extent of the groundwater plume was relatively stable even after the Tanner production well had been off line for over two years. The proposal was further complicated by the offsite groundwater TCE plume to the south and west which would have impacted containment efforts. Finally, the high river flows during 1993 provided the opportunity to evaluate its impacts on a contaminant system. Preliminary modeling indicated that hydraulic containment may not have been fully effective during periods of high river flow. While not ruling out hydraulic containment, a shift in emphasis to long-term remedies for the Site began. The shift in emphasis resulted in a review of data needs to begin the evaluation of long term remedies.

The City and Bank One completed and submitted the Revised Estes Landfill Work Plan - Remedial Data Acquisition (RDA), dated January 20, 1994 and amended May 3, 1994. The work was performed after the Work Plan was approved by ADEQ. The purpose of the RDA work was to obtain data to begin evaluating long-term remedies. This included gathering additional Site information related to potential areas of contamination, further defining the SCM, evaluating Landfill gas emissions and performing additional historical file reviews on both Estes and Bradley. Specific tasks included:

Unit-specific aquifer testing;

A surface geophysical survey;

A Phase II soil gas survey;

Installation and sampling of permanent Landfill gas monitor probes; and

A review of historical data, files, reports and aerial photographs pertaining to both the Estes and Bradley Landfills.

The field data were collected during the period from June through September 1994 and were summarized in the RDA report dated April 5, 1995 (HLA, 1995b).

4.4.1 Neuman-Witherspoon Aquifer Test

A Neuman-Witherspoon (Ratio Method) aquifer test was conducted in the vicinity of the source area specifically to calculate the vertical hydraulic conductivity within the suspected alluvial aquitard (unit F2) beneath the Site and source area. This test is specifically designed to evaluate the potential leakage from an aquitard into an aquifer. The test is conducted by pumping from the aquifer and measuring the response in either an overlying or underlying aquitard. At Estes, the test was performed in the vicinity of the suspected source area using existing wells and piezometers. Monitor well EW-6, which is completed in F3, was pumped at a rate of up to 10.9 gpm. During testing, water levels were monitored in the nearby piezometers and monitor wells.

After 24 hours of pumping, no discernible drawdown was observed in the unit F2 piezometer. Based on the results, a value of 0.07 feet per day (ft/dy) or 2.5×10^{-5} cm/sec was calculated for the average vertical hydraulic conductivity for unit F2 in the vicinity of the source area, indicating that a complex aquifer/aquitard hydrologic system was present.

Other findings from the aquifer test were related to the F4 unit. During testing, a relatively rapid and large water level response was noted in monitor well EW-15, which is completed in unit F4. However, corresponding well production data indicated a low hydraulic conductivity in unit F4 at this location. Because a large response was observed in a well that is completed in a formation with low hydraulic conductivity, fracture flow was suspected. This analysis was supported by the core sample data from this location, which indicated the presence of a weathered breccia.

4.4.2 Surface Geophysics

Surface geophysical surveys were proposed to evaluate the vertical and lateral extent of landfilling at the Site and to possibly correlate the depths of units F2 and F4 with known points and then map the units. Two geophysical techniques were used: electromagnetic profiling and soundings (EM) and vertical electrical resistivity soundings (VES). Both methods measure electrical properties of the earth. Test surveys were conducted to evaluate the effectiveness of the techniques and for calibration. Due to a greater than expected degree of interference, only minimal production surveys were performed.

The surveys were somewhat unsuccessful at interpreting the subsurface geology due to electromagnetic interferences. Disposal area delineation was successful including mapping the source area boundaries. No drum disposal areas were observed on the Landfill and there was no indication of refuse in the river bottom. Additional results are discussed in Section 6.

4.4.3 Soil and Landfill Gas Surveys

A Phase II soil gas survey was conducted as part of the RDA work plan. The purpose of the Phase II survey was to evaluate areas of the Landfill that were not covered during the Phase I survey and to confirm some readings outside of the original Landfill. As part of the survey, several areas sampled during Phase I were resampled during Phase II for comparison.

The two main areas covered during the Phase II survey included the area beneath the relocated refuse and the northern access road along the river. Resampled areas included select locations on the western portion of the Site and the source area.

The results from the Phase II survey confirmed those results from Phase I that indicated elevated concentrations of VOCs in soil gas across the Site. Concentrations of halogenated VOCs over the entire area surveyed were generally less than 1 μg/l. The detection of VOCs in soil gas readings across the site would indicate that other potential VOC sources (in addition to the liquid disposal pit) may exist within the Landfill boundary. Readings noted above background in an area east of the source area outside of the original landfilled area were confirmed during Phase II and the concentrations appeared to increase with proximity to the Bradley Landfill. Based on these findings further source characterization of the Landfill was completed (See Section 6.2.5).

In addition to the soil gas survey, landfill gas monitoring probes were installed to evaluate the production and concentrations of methane. Twenty six permanent landfill gas monitoring probes were installed at 13 different locations around the Landfill. At each location, two probes were installed at approximately 5 feet and 20 feet below grade. Sampling of the probes was conducted following installation.

The results indicated that methane is present under the entire Site except the western end near 40th Street. The concentrations of methane in the subsurface probes ranged from below detection to greater than 60% by volume. The highest concentrations of methane were from the probes located in the relocated refuse and between the Estes and Bradley Landfills. (no additional information was submitted on the pressure reading of the probes during this phase of methane monitoring). Although the level of methane may not produce explosive conditions, based on current site layout, future site redevelopment, in which enclosed structures are constructed, could cause methane to accumulate in these areas creating a potential explosion hazard. Methane results obtained from more recent gas probe monitoring are discussed in Section 4.8.5.

4.4.4 Data Review

Additional activities conducted as part of the RDA work included a review of previous investigations relating to soil and soil gas investigations on Estes and Bradley Landfills. The information evaluated included review of the Bradley Landfill Aquifer Protection Permit (APP) file, Bradley historical aerial photographs, and geotechnical and soil gas work at Estes and Bradley by SH&B for State Route 153.

The review of the Bradley APP file and historical aerial photographs indicated that discrepancies existed between stated information and historical documentation with respect to the acceptance of liquid wastes at the Bradley Landfill. In addition to the acceptance of calcium hydroxide sludge, records suggest that other liquid wastes were accepted at the Bradley Landfill, including septic waste. Historical aerial photographs indicated that landfilling in the northeastern corner of the Bradley site was occurring at the time that Estes closed. This is near the area where soil gas readings were detected during the Phase II survey. Other information from the SH&B report helped to correlate areas of refuse with the geophysical data and indicated similar soil gas readings on the eastern side of Bradley.

An additional task included a review of an updated ADWR well inventory to locate nearby domestic wells. The closest reported domestic wells were approximately 1.5 miles north-northwest and 2 miles south-southwest of the Site. Neither of these wells was considered close enough to be impacted by the Site.

4.5 RI/FS/RAP Conceptual Work Plan

In October 1994, the City and Bank One completed a conceptual work plan to complete the RI/FS and prepare a remedial action plan (RAP) (HLA, 1994b). The RI/FS/RAP conceptual work plan presented an overview of the work completed to date and proposed a series of actions designed to review and evaluate existing data, evaluate the applicability of EPA guidance on presumptive remedies and early actions at the Site, identify additional data needs, complete a Baseline Risk Assessment, prepare an RI report, conduct additional treatability studies and pilot testing, prepare an FS report, prepare a RAP, and conduct continuing community involvement activities. This work plan was submitted to ADEQ on October 27, 1994.

Major activities conducted under the RI/FS/RAP workplan included the following:

Support for ADHS in its preparation of a draft RA including performance of a surface soil sampling program and completion of a study of background arsenic concentrations in groundwater;

Completion of a RI/FS Field Sampling Plan and analysis;

Continuation of quarterly groundwater sampling activities;

Analysis of natural attenuation and biodegradation at the Site;

Completion of an independent Human Health Risk Assessment; and

Completion of a Draft RI Report (9/5/97).

4.5.1 Risk Assessment

In support of the ADHS risk assessment at the Site, an evaluation of the existing data was performed to assess additional data requirements. As part of this process, a surface soil sampling program was conducted in accordance with an ADEQ approved Sampling and Analysis Plan (SAP). The results of this investigation were presented in the Surface Soil Sampling report dated March 17, 1995 (HLA, 1995a) and are discussed in Section 6 of the RI. In addition, a background study of arsenic concentrations in groundwater for the study area was performed. The results of this investigation were presented in Characterization of Background Arsenic Groundwater Concentrations for Use in the Estes Landfill Human Health Risk Assessment (HLA, 1995c).

Using the above referenced data, ADHS prepared a draft Baseline Risk Assessment for the Estes Landfill dated August, 1995 (ADHS, 1995). The RA concluded that negligible health risks from potential inhalation of vapors were associated with use of the Bradley Production well for dust control. Health risks were also negligible from fugitive dust at the Site. In addition, the RA concluded that there was no current risk from exposure to contaminants in the groundwater because of the lack of private domestic wells in the area. It was, however, concluded that a potential public health risk, from VC in the groundwater, could arise in the future, if contaminated groundwater beneath the Site itself were used for drinking.

4.5.2 RI/FS Field Sampling Plan and Analysis

The Field Sampling Plan (FSP) (HLA, 1996a) was developed to answer specific questions related to the SCM, to test working hypotheses related to the Site, and to gather data to be used in the analysis of potential remedial technologies. Activities summarized in the FSP included pressure head monitoring, vertical profiling, drilling, physical, chemical, and biological sampling, well installation at three new soil boring locations, and continued groundwater monitoring.

In accordance with the FSP, a hydrostratigraphic evaluation was conducted to provide additional information to evaluate the degree to which unit F2 acts as an aquitard. The task consisted of a graphical analysis to compare fluctuations in total hydraulic head between the different hydrostratigraphic units due to changes in barometric pressure. The analysis was conducted at three existing well clusters (east cluster, west cluster and the northern cluster). To complete this evaluation, total hydraulic head measurements were recorded from each of the three alluvial hydrostratigraphic units (F1, F2 and F3) at each well cluster using electronic data loggers (Trolls™). The Trolls were placed in each of the unit specific wells at a particular well cluster for a period of at least two weeks. Changes in water levels were recorded electronically.

Results from each of the well clusters showed that a downward vertical gradient is present at each well cluster, and that the magnitude of the water level response was greater in unit F2 and F3 wells than in unit F1 wells, which implies confined or semi-confined conditions are present in each of these units. Data collected from this analysis are consistent with previous data that suggest unit F3 behaves as a confined or semi-confined aquifer, thus supporting the assumption that F2 is a confining layer. Further details are presented in Sections 5.0 and 6.0 of this report.

Groundwater sampling and monthly water-level measurements were continued on a quarterly basis from the beginning of 1995 through December 1996. A complete list of the analytical results from sampling events dating as far back as the fall of 1988 and up through December of 1996 are summarized in the Estes Groundwater Database (Appendix A). In addition, the water-level data for the same period are summarized in the Water Level Database (Appendix B). The new wells/piezometers (EW-PZ7, EW-PZ8, EW-PZ9, EW-PZ10, and EW-19) were sampled in June, September, and December, 1996. More recent groundwater monitoring has included a number of additional constituents that reveal the nature and extent of biological processes at the Site. These parameters included redox potential, DO concentrations, COD, BOD, ferrous and ferric iron, orthophosphate, TOC and TKN. Additionally, chemical analysis of VC degradation products (C1-C4 hydrocarbons) was conducted during the June, 1995 and June, 1996 groundwater sampling events. These data have indicated that active degradation of chlorinated VOCs may be occurring at the Site, in which case degradation would likely be responsible in a large extent to the overall downward concentration trends observed at the Site. A detailed analysis of the degradation processes and their effects on the fate and transport of contaminants is included in Section 7.0.

Spinner logging and depth specific sampling were conducted to provide vertical profiling data of contaminants both within specific hydrostratigraphic units and across hydrostratigraphic units (HLA, 1996a). The vertical profiling was conducted in June, 1996, and included spinner logging (downhole flowmeter which uses low inertia impeller to measure vertical groundwater flow) and depth specific groundwater sampling (using a vacuum sampler) in monitor wells EW-4, EW-5, EW-9, and EW-18 at the Site. Spinner logging indicated that a slight downward vertical gradient was present in each of the wells, which is consistent with unit specific water-level information. Concentrations of VOCs in depth specific groundwater samples generally did not vary substantially with depth. Comparing the depth specific results for VC, monitor well EW-4 showed 14 μg/l at 70 feet and 17 μg/l at 95 feet, monitor well EW-5 showed identical concentrations of 1.5 μg/l from 125 feet and 142 feet, monitor well EW-9 showed 130 μg/l at 65 feet and 150μg/l at 85 feet, and monitor well EW-18 showed the largest variation with 32 μg/l at a depth of 70 feet and 69 μg/l at a depth of 90 feet (HLA, 1996b). Overall, the vertical profiling data support the concept of a downward vertical gradient. In addition, the lack of definite contaminant layering in the wells suggests that previous water quality data are representative of the portion of the aquifer that the wells are screened in.

Additional information on physical characteristics of the alluvium were obtained at the Site during May and June, 1996, when soil borings B-1, B-2 and EW-19 were completed using the Rotosonic™ drilling method. This drilling method produces a minimally disturbed soil core, which allows for detailed borehole logging, contributing to a better understanding of the alluvial layering at the Site. Unit specific piezometers EW-PZ7 (F1) and EW-PZ8 (F2) were installed in boring B-2, and unit specific piezometers EW-PZ9 (F2) and EW-PZ10 (F3) were installed in boring B-1. Monitor well EW-19 (F3) was completed in the soil boring of the same name. Each boring was advanced to the bedrock interface, thus collecting a complete record of the alluvial material at each location. Review of the soil core from borings B-1 and B-2 indicated that the materials within each of the layers were heterogeneous and that the contacts between units F1, F2, and F3 were somewhat gradational. In addition, vertical permeability tests confirmed that samples collected from unit F2 had substantially lower permeability than those collected from unit F3, on the order of three to five orders of magnitude and in agreement with previous aquifer testing and the SCM (Table 4.2).

Samples of the aquifer material were collected for the purpose of evaluating the potential extent of VOC contamination present in both the units F2 and F3. Direct drive samples and subsamples from the soil cores from borings B-1 and B-2 were preserved in the field using laboratory specific methanol preservation techniques as recommended by ADEQ and submitted for analysis of the presence of VOCs. These samples showed no detectable concentrations of VC or cis-1,2-DCE suggesting that soils from both units F2 and F3, approximately 150 feet away from the source area, are not a continuing source to groundwater contamination. Further detail of B-1 and B-2 results are presented in Section 6.0 and Table 6.6.

Soil samples from the new wells were also analyzed for total microbial population counts and types of microbes (Table 4.2). However, a planned biodegradation study was not completed on soil samples collected from borings B-1 and B-2, because little to no detectable concentrations of VOCs were identified in the associated samples submitted for chemical analysis. Instead, groundwater was collected on August 12, 1996 from piezometer EW-PZ1 for the purpose of conducting a biodegradation/natural attenuation study. Results of this study and other Site-specific data indicate that biological degradation of VOCs is occurring both onsite and offsite, due to a combination of reductive anaerobic onsite and oxidative aerobic offsite conditions. These results are supported by the laboratory bench scale study. These results are also supported by site specific field data which demonstrate that: (1) groundwater concentrations repeatedly and rapidly attenuate following a recharge induced rise in contaminant concentrations and, (2) groundwater concentrations rapidly attenuate with increasing distance from the source area.

4.6 Estes Landfill RI/FS Remedial Investigation Draft Report

On September 5, 1997, a RI Draft Report prepared by HLA for the City of Phoenix (City) and Bank One Arizona, N.A. (Bank One) was submitted to ADEQ for review and approval. The draft report summarized findings from investigations previously reported, and presented data from remedial investigations and quarterly groundwater sampling events.

4.7 ADEQ's Review and Comment of September 5, 1997 Draft RI Report

On February 25, 1999, ADEQ provided written comments to the Draft RI report to the City based on a technical review of the draft document performed by ADEQ and ESE. The major comments requested additional investigation to identify other potential sources of VOCs within the former and current Landfill, and to determine the lateral and vertical extent of impacted groundwater. In addition, further assessment of the production of methane gas was also requested, along with further evaluation of soil and groundwater components that would support the natural attenuation claim made in the Draft RI report. The February 25, 1999, comment letter is provided in Appendix C.

4.8 Additional Landfill Source Investigation and Groundwater Characterization (1999)

In accordance with the major comments provided in ADEQ's February 25, 1999 letter, during the period from May through June 1999 ESE supervised investigative field activities at Estes. All field activities and laboratory analyses were performed following appropriate procedures in the April 30, 1999 Field Sampling Plan (FSP) and the June 7, 1999 Quality Assurance Project Plan (QAPP) for the Estes Landfill, prepared by ESE and approved by ADEQ. The general investigation activities included:

- The collection of subsurface soil, and grab groundwater samples within the western and central portions of the existing Landfill to identify other potential sources of VOC (other than the liquid disposal pit) and to determine natural biodegradation potential in the Landfill soils.
- Installation of two groundwater monitoring wells (EW-24 and EW-25) within the Salt River Bed of the former Landfill location and collection of soil samples during drilling of the wells to determine if the former Landfill is a source of VOC impacted groundwater.
- Installations of one groundwater well (EW-23) further west of EW-22 to determine the northwestern extent of the migrating plume.
- Installation of one groundwater well (EW-26) within the vicinity of Well EW-15 to determine the vertical extent of VOC contamination in Unit F4.
- Monitoring of 13 existing and 4 new groundwater wells to determine bioactivity (natural attenuation) parameters and current groundwater conditions.
- Monitoring of 34 permanent methane probes to determine current methane production within the current Landfill.
- Performance of an ecological screening within and around the vicinity of the Landfill to determine if a full ecological assessment is required.
- Evaluation of the integrity of the existing Landfill soil cover.

Copies of the Daily Trip Logs, Field Sampling Forms, and Field Equipment Daily Calibration Forms that were maintained during this phase of the investigation are provided in Appendix D.

4.8.1 Source Investigation of Current Landfill (Western and Central Portions)

The following sections provide the rationale for the field investigation conducted on the western and central portions of the current Landfill, and identifies each soil boring location and the methodology and frequency of sample collection. This part of the investigation consisted of drilling 21 soil borings (QST-B1 through QST-B21) to depths ranging from 50 to 90 feet below the ground surface (bgs). The drilling was performed by Layne-Christensen Company using an AP1000 air percussion-drilling rig.

ESE's review of the draft RI data indicated that source characterization within the western and central portions of the current Landfill had not been conducted, and soil gas survey results indicated the potential presence of other VOC sources within the Landfill. Therefore, further source characterization of the Landfill was conducted. The proposed sampling plan for the investigation consisted of a systematic grid sampling program designed to cover the entire area of concern. The grid sampling system was established to ensure statistical representation of the soil conditions. The sample location spacing was selected to reduce the uncertainty and increase confidence that the amount of samples collected would be representative of site conditions. During the actual drilling, boring locations within the grid deviated slightly from the proposed sampling plan based on results from the surface geophysical survey. The rationale for the proposed soil boring locations was as follows:

Based on previous Landfill investigation experience and EPA Superfund site investigation summary documents, a 250' x 250' sampling grid was laid out on the central and western portion of the Landfill, beginning at the southeast corner of the Landfill boundary. All grid areas that contained < 50% of the Landfill area were eliminated from further investigation.

All grid areas contained on the previously investigated eastern part of the Landfill were eliminated from further investigation, as were one grid area that contained the disposal pit, and a grid area that contained the location of previous HLA soil borings B-1 and B-2.

One soil boring was drilled per grid area. In general, the soil boring was drilled within the approximate center of each grid area, unless previous Phase I and II soil gas survey results (Table 6.8 - HLA, September 1997) indicated the presence of VOCs > 1.0 μg/l. At those locations, the soil boring was drilled at the approximate location of soil gas probe. If more than one soil gas survey point was contained within a grid area, the location that exhibited the higher VOC concentration was selected for investigation.

Based on the sampling rationale, a total of 21 soil borings (QST-B1 to QST-B21) were drilled within the central and western portions of the Landfill, eight of which (QST-B14 to QST-B21) were placed on the portion of the current Landfill that contains the relocated waste from the former Landfill. The locations of the soil borings are shown in Figure 4.1.

Prior to implementation of field activities, all soil boring were physically located, marked, and surveyed by an independent certified surveying subcontractor. After the soil boring locations had been marked, a Geophysical Survey subcontractor screened the proposed eight soil boring locations (i.e., QST-B14 to B21) on the relocated portion of the Landfill to determine waste depths and the presence of metal objects (e.g., containers) utilizing electromagnetic and magnetic surface geophysical methods. Based on the results of the geophysical survey, original soil boring locations in the FSP had to be moved. The results of the geophysical survey are presented in Appendix E.

In addition to the surface geophysics, a private underground Line Locating subcontractor screened the remaining thirteen soil boring locations, that have an average waste depth of 7 feet (Table 6.2 - HLA, September 1997), utilizing a magnetometer to detect metal objects beneath the soil boring locations.

Based on site-specific data concerning the Landfill waste and groundwater depths, the eight soil borings placed on the relocated waste were drilled to depths ranging from approximately 79 feet bgs in boring QST-B14, to approximately 90 feet bgs in borings QST-B17, QST-B20, and QST-B21. Groundwater was encountered in each of these borings except QST-B16, at depths ranging from 78 feet bgs in boring QST-B20 to 85 feet in boring QST-B18Drilling began on May 3, 1999. The remaining 13 soil borings were drilled to depths ranging from 53 feet bgs in boring QST-B10 to 89 feet in boring QST-B1. Groundwater was encountered at depths ranging from 50 feet bgs in boring QST-B12 to approximately 75 feet bgs in boring QST-B4.

4.8.1.1 Soil Boring Sampling and Analysis

The 8-inch diameter soil borings were advanced utilizing the dual wall percussion drilling system (Becker Rig) following appropriate procedures in the FSP. The dual wall percussion drilling rig (Becker Rig) uses a drive hammer mounted on top of the drill rig. The dual wall system allows advancement of an outer drive casing which will seal off surrounding soils and lithology as the inner casing is advanced, preventing cross-contamination of different water bearing zones. The dual wall drive casing consists of an inner and outer casing that either 5 or 10-foot length, having an outside and inner diameter of approximately 10 inches and 8 inches, respectively. Drill cuttings are removed by pumping compressed air through the center of the casing. The air then carries the cuttings upwards and out of the casing into a cyclone, where it is discharged onto the ground or into awaiting containers. Note: During the management of the cuttings, waste/soil cuttings from the Landfill cell and the native soil cuttings were kept separate.

When the desired depth was reached, the soil cuttings were removed from the casing, thus allowing the sampler to be lowered through the casing to the bottom of the boring. Prior to and between drilling of each well all drive casings were decontaminated following appropriate procedures in the FSP.

A split-spoon sampler was used to collect soil samples at the surface, at 5 feet bgs, and at subsequent 10 foot intervals until groundwater was encountered following appropriate procedures in the FSP. In addition, ESE s geologist logged each soil boring and visually inspected the cuttings to determine the depth of landfilled waste and when native soil was encountered. All logging was performed in accordance with ASTM D-2488 standard. In addition, 10 % of the total amount of samples collected was submitted to a laboratory for confirmatory analysis using ASTM D-2487. All collected soil samples (except for the surface soil samples) was field screened with a PID and recorded in the field log book. At each boring, the sample that registered the highest reading on the PID and the sample collected from the bottom of the borehole were submitted to DelMar Analytical laboratory for analysis.

A total of 42 soil samples was collected for analysis. However, due to the presence of cobbles and gravel, the sample collected from Boring QST-B18 at 74 feet bgs had sufficient volume for VOC analysis only. In addition, in conforming to the data collection QA and data validation requirements, ESE collected duplicate soil samples and field rinsate blanks at a 10 % frequency. Trip blanks were also carried in all coolers used to temporarily store and transport the environmental samples. All of the collected soil samples were analyzed for the following parameters:

- VOCs - Test Method 8260
- Semi-VOCs (SVOCs) - Test Method 8270
- (Total) As, Ba, Cr, Cd, Pb, Ni, Cu, Sb, Mn, & Tl - Test Method 6010
- (Total) Hg - Test Method 7471 (7470 for rinsate only)
- Organochlorine Pesticides - Test Method 8081
- Polychlorinated Biphenyls (PCBs) - Test Method 8082
- Organophosphorus Pesticides - Test Method 8141
- Chlorinated Herbicides - Test Method 8151

In addition, to evaluate biodegradation properties in the subsurface soils, soil samples collected from QST-B4 @ 25 and 49 feet bgs; QST-B7 @ 55 feet bgs; QST-B12 @ 34 and 50 feet bgs; and QST-B20 @ 76 feet bgs were retained for analysis of total organic carbon (TOC) using the Walkley-Black Test Method.

4.8.1.2 Borehole Groundwater Grab Sampling and Analysis

After completion of each boring, sampling equipment was utilized to collect one grab groundwater sample (one per soil boring), which was submitted to an ADHS approved State-Certified laboratory for analysis. The sampling equipment consisted of a 4-inch diameter PVC slotted piping that was lowered into the center of the outer casing until it rested on the bottom of the borehole. A bailer was then lowered into the casing and a casing volume of water was removed. A disposable bailer was then lowered inside the PVC piping and a groundwater sample was then collected and transferred into appropriate sample containers.

Based on number of borings that were drilled within the Landfill, a total of 21 grab groundwater samples were collected for submittal to the analytical laboratory. In addition, in conforming to the data collection QA and data validation requirements, ESE collected 2 duplicate groundwater samples, and 2 field rinsate blanks (10 % frequency) for a total of 25 environmental samples for analysis. These collected samples were analyzed for the following parameters:

- VOCs - Test Method 8260
- Semi-VOCs (SVOCs) - Test Method 8270
- (Total) As, Ba, Cr, Cd, Pb, Ni, Cu, Sb, Mn, & Tl - Test Method 6010
- (Total) Hg - Test Method 7470
- Organochlorine Pesticides - Test Method 8081
- PCBs - Test Method 8082
- Organophosphorus Pesticides - Test Method 8141
- Chlorinated Herbicides - Test Method 8151

4.8.1.3 Soil and Groundwater Sampling Results

Review of boring logs generated as a results of the soil borings (Appendix F) within the Landfill indicates that soils encountered in borings QST-B1 through QST-B13 were predominantly gravelly sand and sandy gravel, with varying amounts of silt and clay. Bedrock was not encountered in any of these soil borings. Landfill debris was encountered in several borings, at depths generally ranging from 10 to 25 feet bgs. The soil lithology correlates with HLA's hydrostratigraphic unit F1. The alluvial unit denoted as F2 by HLA may have been encountered in borings QST-B2, QST-B5, and QST-B8 at depths of approximately 65 feet 60 feet, and 57 feet, respectively. Soil samples collected at these depths exhibited moderately greater amounts of silt and clay. Similar soils were encountered in borings QST-B14 through QST-B21, which were drilled on the relocated part of the Landfill. Landfill debris was more commonly encountered in these borings, at depths ranging from 5 feet (boring QST-B15) to as great as 75 feet bgs (QST-B21). Hydrostatigraphic unit F2 may have been encountered in borings QST-B15 and QST-B19 at depths of 60 feet and 70 feet bgs, respectively. A two dimensional cross-sectional diagram depicting the wastes and soils encountered within the Landfill is provided in Figure 4.2.

In general, the analytical results for organic compounds of the collected soil samples did not indicate the presence of any significant sources of VOCs in the areas investigated. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit is the primary source of VOC within the Landfill. Other organic compounds detected in the collected soil samples were below their respective ADEQ Soil Remediation Levels (SRLs). Total Metals were detected in all of the collected samples. In particular, Arsenic and Thallium were detected, in some of the samples, at concentrations that may be of concern as potential leachate and to future development of the Landfill. Detailed assessment and evaluation of the detected organic and metal compounds are presented in Section 6.4.8. The assessment of the TOC results for the evaluation of biodegration of VOCs in the soil is discussed in Section 7.0.

Figure 4.3 presents concentrations of VC and cis-1,2-DCE detected in the groundwater samples collected at Borings B1 through B21. In general, the analytical results for organic compounds of the collected grab groundwater samples confirmed the finding of the soil samples, that significant sources of VOCs in the areas investigated were not present. Other organic compounds detected in the grab groundwater samples were below their respective Aquifer Water Quality Standards (AWQSs). In terms of the results for Total Metals, the groundwater grab samples indicated the presence of majority of the analyzed metals at concentrations exceeding AWQSs. However, because the collection of the grab groundwater samples was for screening purposes only and was not collected from properly installed wells, the detection of these metals that exceeds AWQSs cannot be used as valid data in the RI assessment.

4.8.2 Source Investigation of Former Landfill (Salt River Bed)

Because previous groundwater data indicates the presence of VOCs within wells downgradient to the former Landfill (i.e., EW-11 and EW-22) which exceed ADEQ s AWQSs, further investigation of the potential VOC sources within the former Landfill was necessary. Usually, determining potential subsurface sources is completed by placement of soil borings within the former Landfill. However, ESE was aware that the presence of cobbles within the Salt River Bed would make collection of soil samples extremely difficult (if not impossible). Consequently, ESE elected to install two groundwater monitoring wells (EW-24 and EW-25) within the former Landfill in lieu of soil borings. The locations of the two wells (Figure 4.1), north and northwest of the current

Landfill configuration, would provide critical data on whether or not the former Landfill area was contributing to the impact of VOCs in groundwater. In addition, these wells would provide additional data points for determination of upgradient and crossgradient VOC degradation conditions.

4.8.2.1 Well Drilling and Construction

Because groundwater has been documented to fluctuate between approximately 15 and 50 feet below ground surface (bgs) at these areas, ESE advanced the well boring to an approximate maximum depth of 69 feet bgs. The 10-inch diameter borehole was advanced utilizing the Becker Rig dual wall percussion drilling system. The dual wall system allowed the advancement of an outer drive casing which sealed off surrounding soils and lithology as the inner casing was advanced. Because the purpose of these wells were to monitor potential residual contamination from the former Landfill, the wells were screened across the upper alluvial unit F1, and possibly into F2/F3.

Both monitoring wells were constructed of 5-inch inter-diameter casing with screen intervals 30 feet in length, to account for anticipated fluctuations in groundwater levels. The well screens used in the construction of these well were 0.020 slot size with ¼ inch spacing. The wells were developed and incorporated into the groundwater monitoring event (See Section 4.8.5). Dedicated 4-inch diameter pumps were installed at each monitoring well. Upon well completion, the elevation of the top of each well casing was surveyed by a licensed surveyor. The well construction diagrams for Well EW-24 and EW-25 are provided in Appendix G.

4.8.2.2 Soil Sample Collection and Analysis

During drilling of the two wells ESE collected soil samples at each well location by driving a split-spoon sampler at approximate 10-foot intervals beginning at 5 feet bgs. Two samples from each well; one that registered the highest reading on the PID, and one immediate above the water table were retained and submitted DelMar Analytical for analysis. In addition, ESE s geologist logged each soil boring per ASTM D-2488 and retain 10 % of all collected samples for confirmatory analysis using ASTM D-2487.

Based on field investigation activities a total of four soil samples were collected for analysis. Due to insufficient volume of soil sample a duplicate soil sample could not be collected. However, 1 field rinsate blank was collected and trip blanks were carried in the sample coolers. These collected samples were analyzed for the following parameters.

- The 4 soils and 1 rinsate sample were analyzed for:
    - VOCs - Test Method 8260
    - Semi-VOCs (SVOCs) - Test Method 8270
    - (Total) As, Ba, Cr, Cd, Pb, Ni, Cu, Sb, Mn, & Tl - Test Method 6010
    - (Total) Hg - Test Method 7471 (7470 rinsate only)
    - Organochlorine Pesticides - Test Method 8081
    - Polychlorinated Biphenyls (PCBs) - Test Method 8082
    - Organophosphorus Pesticides - Test Method 8141
    - Chlorinated Herbicides - Test Method 8151
- The trip blanks were analyzed for: VOCs using Test Method 8260

4.8.2.3 Soil Sampling Results

Review of boring logs generated as a result of the installation of the groundwater wells (Appendix G) installed indicates that soils encountered were silty to clayey sand from the ground surface to the deepest depth drilled of 62 feet bgs. Groundwater was encountered at approximately 35-40 feet bgs.

In general, the analytical results for organic compounds of the collected soil samples were all below their respective method reporting limits. Although, this is an indication that no organic residues remain in the subsurface soil beneath the Salt River Channel, this does not imply that VOC sources do not exist. Total Metals were detected in all of the collected samples of which Arsenic and Thallium were detect in concentrations is some of the samples to be of concern.

4.8.3 Well Installation for Delineation of the Horizontal Extent of Groundwater Plume

The draft RI report prepared by HLA stated that an additional source to the north or west is causing or contributing to VOC concentrations observed at wells north and northwest of the Landfill, specifically at wells EW-11 and EW-22. VC concentrations at these wells have consistently exceeded the ADEQ AWQSs. However, evaluation of recent data at these wells (June 1995 through June 1998) indicated an inferred west to northwest groundwater flow component, along the general path of Wells EW-19, EW-9, EW-11 and EW-22. Based on these site conditions, Wells EW-23, EW-24, and EW-25 were installed west-northwest, northwest and north of the Estes Landfill (Figure 4.1).

Well EW-23 was installed approximately 650 feet west of existing well EW-22. Wells EW-24 and EW-25 were located in the current dry channel of the Salt River (see Section 4.8.2), within the former Landfill boundary.
The installation of EW-24 and EW-25 is detailed in previous Section 4.8.2.

4.8.3.1 Well Drilling and Construction

Well EW-23 was drilled to a total depth of 165 feet bgs on May 27, 1999. During drilling, soil samples were collected at 10-foot intervals beginning at 10 feet bgs, to a depth of 80 feet, or the approximate depth at which groundwater was encountered. Soil samples were collected using a split-spoon sampler, with the samples being collected in pre-cleaned brass sleeves.

Well construction consisted of 5-inch diameter Schedule 80 PVC well casing and screen. The bottom of the well was set at approximately 148 feet bgs, with the well screen extending from 118 to 148 feet bgs. The well was completed in an airport traffic-rated steel vault flush to the ground surface. Well development consisted of surging and bailing until fine sediment was removed to the satisfaction of the ESE supervisor. Following development, a dedicated 4-inch diameter pump was installed in the well. Upon well completion, the elevation of the top of each well casing was surveyed by a licensed surveyor. Complete well construction details are provided in Appendix G.

4.8.3.2 Soil Sample Collection and Analysis

During drilling of EW-23 ESE attempted to collect soil samples by driving a split-spoon sampler at approximate 10-foot intervals beginning at 5 feet bgs. Only one soil sample was retained for analysis of total organic carbon (TOC). ESE's geologist logged each soil boring per ASTM D-2488.

4.8.3.3 Soil Sampling Results

Review of boring logs generated as a result of the installation of the groundwater wells (Appendix G) installed indicates that soils encountered consisted of silty sand to a depth of 20 feet bgs, clayey sand from 20 feet to 70 feet bgs, silty sand from approximately 70 feet to 80 feet bgs, and clayey sand and gravel at 80 feet bgs. Groundwater was encountered at approximately 83 feet bgs. Soil lithology was not logged below this depth. At approximately 163 feet bgs, weathered granite bedrock was encountered. Competent bedrock was encountered at approximately 165 feet bgs, and drilling was halted.

4.8.4 Well Installation for Delineation of the Vertical Extent of Groundwater Plume

Concentrations of VC reported at previously installed well EW-15 (screened in hydrostratigraphic Unit F4) indicate that the vertical extent of VC in groundwater had *not* been fully determined. VOC concentrations in groundwater samples collected at Well EW-15 have consistently exceeded respective AWQSs for VC and cis-1,2-DCE since sampling was initiated at this well in December 1993. Based on these site conditions, well EW-26 was installed approximately 45 feet east of well EW-15, and was screened within a deeper part of the aquifer.

4.8.4.1 Well Drilling and Construction

Because well EW-26 was drilled into bedrock, a combination of air rotary drilling methods was used. From the ground surface to approximately 135 feet bgs (20 feet beyond the alluvium/bedrock interface), the air rotary rig was equipped with a downhole casing hammer (ODEX system) to allow the continuous advancement of drill casing, effectively sealing off the alluvial units from the underlying bedrock unit. The drill rig was then switch to an "open hole" air rotary drilling method for advancement through the bedrock.

Drilling of well EW-26 began on May 21, 1999. Groundwater was encouintered at a depth of approximately 52 feet bgs. The top of the bedrock surface was encountered at a depth of approimately 115 feet bgs. At 135 feet bgs, the drilling system was changed to an open hole method, and drilling continued to a depth of 180 feet bgs. At this depth, drilling was halted and the first of several discrete groundwater samples was collected (groundwater sampling methodology is described in the following section). The target depth of 260 feet bgs was attained on May 28. The boring was extended to a depth of 275 feet bgs to clean out the borehole prior to well construction.

Based on the results of the discrete groundwater sampling, described in Section xx, well EW-26 was constructed to a depth of 260 feet bgs, with 20 feet of 5-inch diameter Schedule 80 PVC well screen (0.020 slot) extending from 240 feet to 260 feet bgs, blank PVC well casing extending from 20 feet to 220 feet bgs, and steel well casing extending approximately 3 feet above the ground surface.

4.8.4.2 Soil Sample Collection and Analysis

During drilling, soil samples were collected using a split-spoon sampler whenever the lithology would allow. Otherwise, soil lithology was described based on cuttings from the cyclone. Undisturbed soil samples were collected at depths of approximately 10, 20, 40, 50, 93, and 123 feet bgs. Two soil samples were retained for analysis of total organic carbon (TOC). ESE's geologist logged each soil boring per ASTM D-2488.

4.8.4.3 Downhole Geophyscial Survey

Upon completion of the boring for EW-26, ESE directed Southwest Geophysical Services, Inc., of Tempe, to conduct an open hole survey. The methods used were Sonic, Spontaneous Potential (SP) and Electircal Resistivity (short and long normal). Logs from the survey are presented as Appendix H.

4.8.4.4 Soil Sample Lithologic Description

Soils encountered included silty to gravelly sand, mixed with Landfill debris from the ground surface to 20 feet bgs;

gravelly sand and sandy gravel from 20 to 62 feet bgs; cand layey to silty sand and gravel from 62 feet to 93 feet bgs. At 93 feet, a well sorted sand was encountered, which appeared to be sand pack material from a previously abandoned well. This continued to approximately 102 feet bgs. At approximately 102 feet bgs, the sand became mixed with gray and red breccia fragments. The percentage of breccia fragments increased to a depth of approximately 125 feet, at which depth more competent bedrock was encountered. Bedrock at this depth consisted of gray, angular to subangular granitic clasts. The granitic clasts continued to a depth of approximately 265 feet bgs. At 265 feet, drill cuttings from the cyclone appeared to be red sandstone.

According to HLA (draft RI, 1997), similar bedrock consisting of a dark red-brown breccia containing foliated granitic clasts was also encountered in well EW-15, located 45 feet west of well EW-26. Depth to the top of bedrock in that well was approximately 115 to 120 feet bgs, which also correlates closely with the depth at which bedrock was encountered in well EW-26. The lithology in well EW-26 supports HLA's conclusion that this area represents a localized bedrock high. The bedrock high appears to be a buried erosional remnant composed of brecciated sediments of the Tertiary Age Camel's Head Formation.

As previously noted, drill cuttings recovered from the cyclone below a depth of 265 feet appeared to consist of red sandstone. It is likely that the rig drilled through a zone in the bedrock which contained few, if any, clasts. Above this zone, the air rotary drilling methodology resulted in the red, silty to sandy breccia matrix being pulverized, which thus explains the occurrence of only the fragmented clasts in the rig's cyclone.

4.8.4.5 Borehole Groundwater Sample Collection

Groundwater samples were collected during the drilling of well EW-26 at discrete intervals within Unit F4. Sampling was conducted using an inflatable packer in the open borehole, allowing isolation and purging of specific depth intervals as described in the following paragraphs.

At a depth of 180 feet bgs, drilling was ceased and the drill bit was removed from the casing and a packer was installed to a depth of 169.5 feet and inflated to seal off the well casing. After purging approximately 15 gallons, the depth of water was measured in the borehole and deemed “dry”. ESE personnel waited 30 minutes for groundwater to recover inside the casing before collecting groundwater sample EW-26-(GW/180).

The packer was then removed and drilling continued to a depth of 200 feet. On May 27, the drill bit was removed and the packer was returned to the casing with the botom of the packer set at 190.5 feet. After bailing approximately 35 gallons and waiting for recovery, sample EW-26-(GW/200) was collected. Additional samples were collected using the same methodology at depths of 220 feet (sample EW-26-(GW/220), 240 feet (sample EW-26-(GW/240), and 260 feet (sample EW-26-(GW/260). Upon collection, each groundwater sample was immediately hand delivered to a certified analytical laboratory for same day, or next morning, analysis and reporting of VOCs. Samples at 180 and 200 feet were analyzed via EPA Method 8021B, and samples at 220, 240 and 260 feet were analyzed via EPA Method 2860.

4.8.4.6 Borehole Groundwater Sample Results

Concentrations of cis-1,2-DCE were reported in all five samples between 180 and 260 feet. In general, the concentrations declined from 28 µg/l to 8.4 µg/l. VC was only detected in the samples at 180 and 200 feet at concentrations of 10 and 6.9 µg/l, respectively. TCE was detected in samples collected at 220 and 260 feet at concencentrations of 1.4 and 0.82 µg/l, respectively. No other VOCs were detected in the sample collected at 260 feet.

4.8.5 Groundwater Monitoring and Sampling

Upon completion of Wells EW-23, EW-24, EW-25 and EW-26, groundwater monitoring and sampling was performed in selected monitoring wells to evaluate VOC and inorganic/wet chemistry concentrations within the plume and assess potential bioactivity. The rationale in selecting the existing wells for monitoring, was based on the wells that best represented on-site groundwater characteristics and conditions. Consequently, wells that best represented upgradient, downgradient, and source groundwater conditions, and wells that were screened in the different hydrogeologic units (F1 to F4) were selected for monitoring. Based on this rationale, 17 wells are selected for monitoring, as follows: EW-NE, EW-E, EW-PZ1, EW-1, EW-4, EW-W*, EW-8, EW-9, EW-11, EW-15, EW-

19, EW-22, EW-18, and the four new wells EW-23 to EW-26. The locations of these wells are shown on Figures 1.3 and 4.1.

*Note: Well EW-W was mistakenly sampled in place of (scheduled) Well EW-5. This was an oversite, based on the two wells proximity to each other, and the fact that neither well had any identification present at the wellhead. This deviation from the FSP does not significantly impact the evaluation or conclusions addressed in Section 6.0.

4.8.5.1 Monitoring and Sampling Procedures and Analysis

One round of groundwater monitoring was completed for the existing and newly installed wells at the site. Prior to sample collection, the depth to water within each groundwater monitoring well was measured and recorded in the field log book. After water level measurements were recorded for all of the wells, the monitoring wells were purged, and appropriate field data measurements will be collected and recorded in the field log book. Groundwater samples were then collected using dedicated pumps, with the exception of EW-PZ1. This well was sampled with a portable submersible pump.

Based on the FSP, a subtotal of 17 groundwater well samples were collected. In addition, with the inclusion of 2 duplicate samples, and 2 rinsate samples (field QC sampling), a grand total of 21 water samples were submitted to Del Mar Analytical to be analyzed for the following parameters:

- The 17 groundwater, 2 duplicate, and 2 rinsate samples will be analyzed for:
    - VOCs - Test Method 8260
    - Semi-VOCs (SVOCs) - Test Method 8270
    - (Total & Dissolved) As, Ba, Cr, Cd, Fe, Pb, Ni, Cu, & Mn - Test Method 6010B
    - (Total & Dissolved) Antimony - Test Method 7041
    - (Total & Dissolved) Mercury - Test Method 7470
    - (Total & Dissolved) Thallium - Test Method 7841
    - Organochlorine Pesticides - Test Method 8081

  - PCBs - Test Method 8082
  - Organophosphorus Pesticides - Test Method 8141
  - Chlorinated Herbicides - Test Method 8151
  - Chloride, Nitrate, Nitrite, Nitrate/Nitrite as N, & Sulfate - Test Method 300.0
  - Total and bicarbonate Alkalinity - Test Method SM2320B
  - (Dissolved) Methane, Ethane, and Ethene - Test Method RSK SOP 175
  - (Total & Dissolved) TOC - Test Method 415.1
  - Sulfide - Test Method SM4500-S-C,D
  - Carbon Dioxide - Test Method SM4500-CO2
  - Iron II - Test Method 200.7

- The following parameters were directly measured in the field from a YSI logger during purging after the water has stabilized: pH; Specific Conductance; Temperature; Dissolved Oxygen; Turbidity; and ORP.

4.8.5.2 Groundwater Monitoring Results

June 1999 Groundwater level measurements indicated depths to groundwater ranging from 30.77 feet (below top of casing - btoc) at EW-25, to 70.50 feet btoc at EW-23 (Appendix B). Inferred groundwater flow, using measurements from predominantly shallow screened wells, indicated a general westerly flow, with a southern trend at the east side of the Site, and a northern trend at the west side of the site (Figure 5.18). The estimated groundwater gradient ranges from approximately 0.009 to 0.007, moving from east to west at the Site.

4.8.5.3 Groundwater Sampling Results

In general, only VOCs and metals were detected in the groundwater samples collected at the 21 wells sampled. The VOCs detected at the highest concentrations were cis-1,2-DCE and VC. Cis-1,2-DCE was detected at concentrations exceeding the ADEQ AWQSs at four of the 21 wells sampled. These four wells were EW-W, EW-E, EW-PZ1 and EW-15, representing alluvial Unit F1 at the western cluster, and Units F1, F2 and F4 at the eastern well cluster, respectively. VC was detected at concentrations exceeding the ADEQ AWQSs at 10 of the 21 wells

sampled. These 10 wells were EW-E, EW-PZ1, EW-15, EW-W, EW-18, EW-9, EW-11, EW-4, EW-22 and EW-23. TCE was only detected in 2 (EW-9 and EW-19) of the 21 wells sampled, and only one of these samples (EW-19) was at a concentration that exceeded the ADEQ AWQS.

Of the metals detected, only manganese and chromium were at concentrations exceeding the ADEQ AWQSs. Dissolved chromium was detected at only one well (EW-26) at a concentration exceeding the ADEQ AWQS. Dissolved manganese was detected at Wells EW-9, EW-24 and EW-25, at concentrations exceeding the ADEQ AWQSs.

A detailed discussion of the detected analytes, and how they relate to the previous data, is presented in Section 6.0

4.8.6 Methane Monitoring

Review of the methane data summary in the draft RI report indicated that the percent volume of methane found in the monitoring probes are at concentrations that may be considered flammable (or explosive) at atmospheric pressure and temperatures. This potential high level of methane may necessitate the need of a passive or active perimeter methane control system, which will need to be evaluated during the remedy screening/selection process of the Feasibility Study. Proper evaluation of the methane production rate within the Landfill required that current methane data be obtained, which is compared to previous data to determine the trend of methane production rates within the Landfill. Based on these findings, vapor samples were collected from the existing 17 methane gas probe locations at the site (i.e., PP-1 to PP-17). The locations of the monitoring probes are shown on Figure 4.4.

4.8.6.1 Methane Sample Collection and Analysis

One round of methane readings/samples was collected from the existing 17 methane monitoring locations at the site. Two methane probes were present at each monitoring location; the shallow probes are screened at 5 feet bgs, and the deeper probes are screened from 17 to 20 feet bgs. Prior to taking the field readings and collecting the vapor samples, temperature, barometric pressure, and wind direction were measured and recorded. A hand held Combustible Gas Indicator (CGI), which was calibrated for methane on a daily basis, was used to take methane readings in each probe, which was recorded in the field log book. For field reading verification purposes, a vapor sample was collected from the one of the two probes that registered the highest methane reading on the CGI, and sent to the analytical laboratory for methane analysis using Test Method ASTM D1945 (Natural Gas Analysis).

4.8.6.2 Methane Sample Results

The results of the methane field readings as confirmed by laboratory analysis, indicates the level of methane ranged from non detect to 68 % by volume, which is slightly higher than previous methane readings/results. The results (like previous results) indicated that methane is present under the Landfill except the western end near 40th Street, with the highest concentrations of methane from the probes located in the relocated refuse and between the Estes and Bradley Landfills. Although methane concentrations were slightly higher during this sampling event no clear production trend could be established.

4.8.6 Ecological Risk Screening

In May 1999, ESE performed an ecological risk screening evaluation at the Estes Landfill Site. The objectives of the screening-level ecological risk assessment were to utilize currently available information and data regarding ecological constituents of potential concern (ecoCOPCs), ecotox, and ecology to estimate the potential for undesirable ecological effects and to provide a means of determining if a more detailed ecological risk assessment was required. This screening-level ecological risk assessment was performed to evaluate the potential for adverse effects to the ecological resources at the Estes Landfill due to the constituents present in soil and groundwater. Results of the screening-level ecological risk assessment were used to:

- Determine if specific ecoCOPCs associated with the Estes Landfill pose potential adverse effects to ecological receptors. The ecoCOPCs are listed on Table 7 of the Ecological Risk Screening report, attached as Appendix J;
- Determine if the potential risks from specific constituents are greater than the acceptable range; and
- Assist in the determination of whether a more thorough assessment is warranted.

Based on the results of the screening, ecoCOPCs in soil and groundwater at the Estes Landfill do not pose a threat to ecological receptors. Area soils do not pose a threat to invertebrates living in the soil, plants growing in the soil, or terrestrial receptors (i.e. birds, mammals, and reptiles) ingesting soil. Risk analysis of food chain bioaccumulation of ecoCOPCs at the Estes Landfill indicate no adverse effects to terrestrial ecological receptors of concern. Groundwater does not pose a threat to amphibians, fish and other aquatic life that may inhabit the surface water of Southbank Lake. Based on this analysis, a more detailed ecological risk assessment is not warranted.

The assessment was conducted using conservative assumptions with respect to the benchmark values and the exposure factors. The derivation of ecological EQs for different constituents and different ecological species was conducted using laboratory toxicity data that were available in the literature. A considerable amount of uncertainty associated with inter- and intra species extrapolation exists when determining benchmark data. The concentrations of ecoCOPCs in terrestrial plants and small mammals used in the exposure models were estimated from site-specific data. Maximum or UCL 95 concentrations based on measured groundwater data down gradient of the site were used as estimates of surface water concentrations in Southbank Lake. To balance such uncertainties, assumptions tend to be conservative, which will overestimate rather than underestimate risks. Considering the conservative nature of the assessment, it is concluded that there is little or no potential that any significant adverse effects will occur at the Estes Landfill with respect to ecological receptors. Based on this analysis, a more thorough assessment is not required. A copy of the Ecological Risk Screening report is included in Appendix J.

4.8.7 Integrity Investigation of Current Landfill

The assessment of the existing Landfill cap (protective surface material) will be a critical component of the remedial alternatives screening stage. Consequently, the field investigation to determine the integrity of the CAP was completed during the same time the soil boring investigation of the current Landfill (Section 4.8.1) was being performed.

4.8.7.1 Soil Sample Collection and Analysis

During soil boring activities, the field geologist provided by a subcontracted Geotechnical Engineering Firm evaluated the material type, density, and thickness of the CAP during drilling of the 21 soil borings. The field geologist logged the boring in the cover material, recorded visual classification of the soils and apparent thickness, and obtained both bulk and undisturbed samples for testing in a certified laboratory to determine the CAP s geotechnical properties. A split-spoon sampler attached to the drill rig was used to collect the soil samples that were submitted for geotechnical analysis. The sampler was placed directly on the surface of the Landfill CAP at each soil boring location, and driven through the entire thickness of the CAP, which had an average thickness of 2 feet. The types of soil samples that were collected for analysis included both undisturbed (brass ring) and bulk samples.

Based on proposed field investigation activities, a total of 40 soil samples were collected and submitted to the geotechnical analytical laboratory for the following parameters.

- All 40 soil samples were analyzed for the following parameters:
    - Moisture Content and Dry Density - Test Method ASTM D2216
    - Sieve Analysis - Test Methods ASTM C136 & D1140
    - Plasticity Index - Test Method ASTM D4318
- 4 of the 40 soil samples were analyzed for the following parameters:
    - Compression - Test Method ASTM D2434
    - Standard Proctor - Test Method ASTM D698
    - Flexible Wall Permeability Test - Test Method ASTM D5080

4.8.7.2 Soil Sample Results

At the time of this report, the geotechnical properties of the soil samples were not available, but will be included in the FS report.

5.0 HYDROGEOLOGY

Contaminant migration at the Site occurs largely via groundwater transport in the subsurface, making the hydrologic properties a key element of the SCM. These hydrologic elements include the spatial distribution and magnitude of hydraulic conductivity, the saturated thickness of the aquifer, groundwater gradients, and the interaction between groundwater and surface water.

Prior to the Site investigations, very little information was published regarding the hydrogeology in the immediate vicinity of the Site. Although four monitor wells had been installed at the Site by the City in 1982, and two-well clusters (a shallow and deep well) were installed at four locations within the adjacent Bradley Landfill, available boring logs only indicated a well to poorly sorted mix of sand, gravel and cobbles from the ground surface to depth. Additionally, while two basin-wide hydrogeologic reports had been completed prior to 1989, limited site-specific data were available. Much of the data for these reports are typically obtained from the water supply wells associated with agricultural areas that are not present in this portion of the basin. Through the collection and evaluation of data in a phased approach, a detailed understanding of the hydrogeology in the study area and beneath the Site has been developed.

5.1 Regional Geology

The SRV is an alluvial basin within the Basin and Range physiographic province of the United States. The mountains that define the basin are composed primarily of igneous and metamorphic granites, gneisses, schists, quartzites and metavolcanics. Lesser amounts of consolidated sedimentary rock occurs near the basin margins. The basin alluvial fill is comprised of unconsolidated to semiconsolidated sedimentary deposits with grain sizes ranging in size from clays to boulders. Deposition of these alluvial sediments is the result of continued uplift of the highlands, subsidence of the basin, and erosion after faulting had ceased (Brown and Pool, 1989). In general, rocks of the SRV are divided into six groups including; (1) igneous and metamorphic crystalline rocks, (2) extrusive volcanic rocks, (3) consolidated sedimentary rocks including a red arkosic conglomerate (also known as the Camels Head Formation), (4) a lower alluvial unit (LAU), (5) a middle alluvial unit (MAU), and (6) an upper alluvial unit (UAU). Where basin fill has been deposited, portions of some or all of the alluvial units may be present. The thickness of these alluvial units may range from zero to several thousand feet, depending on the specific location within the valley. The alluvium contains large quantities of water at depths ranging from 18 feet bgs to nearly 500 feet bgs.

The SRV is divided into the eastern and western SRV sub-basins. The Site is located on the eastern margin of the WSRV sub-basin. The WSRV extends from the Phoenix Mountains and Papago Buttes area on the east, to the White Tank Mountains on the west, which encompasses approximately 1,500 square miles (Brown and Pool, 1989). The WSRV is composed of a thick sequence of alluvial sediments, which may be up to 12,000 feet deep near the center of the basin. Bounding and underlying the basin are bedrock units which locally include sedimentary, metamorphic or igneous rocks. A generalized depiction of the regional geology near the Site is provided in Figure 5.1.

5.1.1 Regional Bedrock Geology

A listing of the type and depth of bedrock encountered near the Site is provided in Table 5.1. Cross-sections through the Site are shown in Figures 5.2 through 5.5. These cross-sections depict the depth to bedrock as generally shallowest between monitor wells EW-6 and EW-19, deepening to the west, south and north. While the topography of the bedrock varies beneath the Site, it does not appear to substantially impact local groundwater flow directions. The crystalline and extrusive rocks generally comprise the surrounding mountains and form the hydrologic boundary, both laterally and beneath the valley (Brown and Pool, 1989).

The Precambrian metarhyolite, exposed in the Papago Park area, are the oldest rocks in the vicinity of the Site, and are thought to be at least 1,800 million years old. The metarhyolite is a blocky, heavily fractured, metamorphosed rhyolite, gray to pink in color. The metarhyolite is locally intruded by the Tovrea Granite and the Camelback Granite. The Tovrea Granite is a gray granite thought to be approximately 1,700 million years old. The Camelback Granite is a prominent pink granite, which is thought to be approximately 1,400 million years old (Péwé, et. al., 1986). Tovrea Granite clasts are evident in core samples of a poorly lithified breccia collected from core samples from monitor well EW-15.

The granites are overlain by the Tertiary Camels Head Formation, which generally consists of breccia and fanglomerate units. The Camels Head Formation is poorly bedded, and exhibits gradational contacts between layers in the unit. The breccias are composed of angular and subangular granite and metarhyolite clasts, ranging up to 15 feet in diameter (Péwé, et. al., 1986). These large clasts are evident where exposed, such as those in the road cut along McDowell Road near 56th Street. The angular nature and composition of the clasts indicates that the formation was probably locally derived.

Overlying the Camels Head Formation are the Tertiary Tempe Beds, which consist of gray-pink to reddish purple arkosic conglomerates, coarse to fine-grained sandstones and siltstones. Boundaries between the Tempe Beds are typically sharp, but can be locally gradational. Geologic core samples from monitor well EW-8 showed a typical Tempe Beds type sequence. The Tempe Beds are interbedded with and locally overlain by Tertiary volcanic rocks, which are predominantly basaltic in character (Péwé, et. al., 1986). In an area called the Tempe Narrows, approximately three miles east of the Site, the width of the Salt River is constricted and channeled through outcrops of Tertiary sedimentary beds and volcanics (Figure 5.1). These same Tertiary volcanics can be seen in an outcrop further to the southwest in an area approximately two miles southeast of the landfill. Basalt was also noted at a depth of approximately 60 feet bgs in core samples collected by Thomas Hartig and Associates for the State Route 153 bridge construction, just east of the Site.

5.1.2 Regional Alluvial Geology

The LAU overlies the consolidated sedimentary units and/or the older crystalline rocks and underlies the younger MAU and/or UAU. Brown and Pool (1989) describe the LAU as consisting of playa, alluvial fan, fluvial and evaporite deposits. The LAU is divided into upper and lower facies and consists of fine-grained (upper) and coarse-grained (lower) facies. Reportedly, the fine-grained deposits may be massive or bedded and range in color from reddish brown to grayish brown. The coarser deposits are generally brown to gray. The LAU does not appear to be present beneath the Site.

The MAU of the basin fill also consists of playa, fluvial and alluvial fan deposits somewhat similar to those of the LAU. Reportedly, however, distribution of the fine-grained sediments of the MAU are much less extensive and more irregular than in the LAU (Brown and Pool, 1989). The MAU ranges from less than 100 feet thick to more than 1000 feet thick in the east SRV and is composed of deposits of silt, siltstone, and silty sand and gravel. Thinning of the unit occurs west of Mesa and Tempe and the MAU unit is generally absent near the margins of the basin. Current information suggests that the MAU is not present in the area of the Estes Landfill.

The UAU of the basin fill consists mainly of channel and flood plain deposits comprised of silts, sands, gravels and cobbles. Along the Salt River, the unit may contain more than 80 % unconsolidated sand and gravel (Brown and Pool, 1989), Within the unit, sediments generally consist of moderately to well rounded clasts of granite, gneiss, quartz and quartzite that range in size from sand to boulders. Within the WSRV, the UAU is thickest to the west of the Site, ranging in thickness from less than 100 feet near the mountain fronts to nearly 400 feet near the confluence of the Salt and Gila Rivers (Brown and Pool, 1989). Finer grained facies within the unit also occur and are probably the result of low energy depositional environments associated with overbank flooding (Laney and Hahn, 1986). These finer grained facies within the alluvium have been documented at Estes (i.e., unit F2) and are described in Section 5.3.

5.2 Local Geology

As was previously noted, the Site is characterized by a range of 115 to 175 feet of UAU sediments over sedimentary bedrock (Tempe Beds or equivalent). The MAU and LAU do not appear to be present in the vicinity of the Site. The following sections discuss the characteristics of the local bedrock and alluvial geology. The hydrologic properties of the bedrock and alluvium are discussed in Sections 5.3, 5.4, and 5.5.

5.2.1 Local Bedrock Geology

Bedrock forms a hydrologic boundary beneath and in the vicinity of the Site. Bedrock has been encountered in several bore holes drilled on and near the Site. The Tempe Beds have been noted in core samples from EW-16, EW-8, EW-17 and EW-7 at depths ranging from 115 to 175 feet bgs (Figure 1.3). A log for a CAP test well drilled by the U.S. Bureau of Reclamation (USBR) on the Phoenix Sky Harbor International Airport property (located approximately 1,300 feet west of EW-22) appears to indicate a thick sequence of rocks, nearly 600 feet, consistent with Tempe Beds. The interpretation of the well log for monitor well EW-3 also is consistent with Tempe Beds. More recently, samples collected from borings B-1, B-2 and EW-19 also appear to be Tempe Beds or equivalent (HLA, 1996b). Core samples collected from well EW-12 and exploratory boring EXB1A show moderately indurated sedimentary rocks that could be interpreted as weathered Tempe Beds or Camels Head Formation.

The area around monitor well EW-15 appears to correlate with localized bedrock high. The core sample from monitor well EW-15 consisted of breccia characterized by angular to subangular granitic clasts, within a fine grained matrix, which crumbled into small fragments after recovery (HLA, 1995b). The geologic core samples collected from borings to the west, north and south of this bedrock high point are generally composed of well lithified, minimally fractured Tempe Beds (HLA, 1990, HLA, 1992e, and HLA, 1995b). However, because this area appears to have been a remnant bedrock high, the area must have been more resistant to weathering than the other low lying areas otherwise it would have been eroded. Therefore, core samples from EW-15 are likely representative of a localized weathered surface capping the ancestral bedrock high.

The core samples of sedimentary bedrock at the Site have generally consisted of well lithified fine-to medium-grained siltstones and sandstones with the exception of the core samples from monitor wells EW-15, EW-12, and exploratory boring EXB1A that showed either moderately indurated sedimentary rocks or a breccia (HLA, 1995b). Overall the core samples were normally of excellent quality, with individual pieces being 3 to 36 inches in length. While the composition and induration of the bedrock varies across the Site, the sedimentary Tempe Beds appear to be the predominant bedrock type. This indicates that the Tempe Beds have remained relatively intact with isolated areas of fracturing or weathering. The lack of fractures in much of the Tempe Beds samples suggest that migration through the Tempe Beds is controlled by the bulk hydrologic properties of the rock, which are not conducive to groundwater flow and thus limit contaminant transport.

5.2.2 Local Alluvial Geology

The alluvial sediments found at the Site including units F1, F2, and F3 appear to be representative of the UAU; the

MAU and LAU appear to be absent. Further subdivision of the UAU alluvium is necessary due to significant variations in hydraulic characteristics. These local variations are discussed in detail in Section 5.4.

The unconsolidated alluvium in the subsurface at the Site was deposited in a fluvial system by a river with substantial sediment carrying capacity. This is evident by the well rounded gravel and cobbles which are observed at the surface and in drill cuttings from Site borings completed as part of the RI (HLA, 1990, HLA, 1992e, and HLA, 1995b), and reported in other drill logs in the area. Fluvial depositional environments are characterized by deposits that generally exhibit decreasing grain sizes in the downstream direction. This is due to the fact that the stream grade decreases as the stream gets further from the mountainous upland source areas and, therefore, has a lower flow velocity. This gradually decreasing flow velocity results in the settling out of sediment from the largest to smallest grain size moving downstream.

Based on the large percentage of cobble-sized material in the subsurface at the Site, much of the deposition occurred under a fairly high energy environment. In addition, the presence of coarse-grained clasts suspended in a finer-grained matrix (matrix supported) indicates that deposition occurred during flooding conditions. Flood events typically rise and recede very quickly. This tends to result in a sediment load that is very poorly sorted. As the flood rapidly decreases, sediment of a wide range in grain sizes will settle in the same area. Another characteristic of fluvially deposited sediments is that they often have a long sinuous shape, generally trending in the same direction as the stream which deposited them. These sediments can be laterally discontinuous over very short distances. This can result in widely variable, relatively closely spaced individual deposits with a wide range of grain sizes and degree of sorting. Variation in the grain-size and degree of sorting can result in sediments with vastly different hydraulic properties.

The alluvial sediments at the Site clearly exhibit deposition under varying flow regimes, including flood conditions, because the materials range from cobbles to coarse sand and gravels to fine grained silts and clays. The sediments are poorly sorted with a wide range of grain size distribution, and create a heterogeneous alluvial sequence varying both laterally and vertically. The results of sieve analyses for samples collected from selected monitor wells near the Site are shown in Table 4.1. Soil samples submitted for sieve analysis were collected at various depths from five soil borings.

The general makeup of the alluvium is classified as a poorly sorted, sandy gravel, as the fraction of fine grained material (very fine sand, silt and clay smaller than No. 200 sieve size) is generally less than 15 %. While, the actual percentages of material passing the No. 200 sieve size ranged from a minimum of 1.1 % in EW-RW2 at 125 feet to a maximum of 34.4 % in EW-16 at 130-135 feet (Table 4.1), thus illustrating a wide range of grain size distribution and supporting the concept of heterogeneity and a poorly sorted composition, the typical range was more on the order of 5 to 10 %.

The distribution of particle sizes versus depth is graphically illustrated in Figure 5.6 for soil samples collected while drilling monitor well EW-15. These data illustrate that the percentage of fines shows only minor variation with depth, ranging from 3.9% to 9.9% of the sample volume. In the vicinity of monitor well EW-15, unit F2 is believed to extend from 60 feet bgs to 90 feet bgs. On the basis of the depth of unit F2 and the distribution of fines (Table 4.1 and Figure 5.6) at EW-15, fines comprise 5% of unit F1, 9% of unit F2 and 7% of unit F3.

In addition to the percentage of fines, the degree of angularity and sorting can also affect the permeability of clastic material. The angularity of the material is similar for all three units, ranging from subrounded to rounded. Because the differences observed in hydraulic conductivities of the three alluvial units at the Site (illustrated in Figure 5.7 and discussed in detail below) are too large to be attributed to the percentage of fines alone, it was concluded that the degree of sorting must be a significant factor affecting hydraulic conductivities of the three units at the Site. Therefore, the resulting differences in the hydraulic conductivities within the alluvium formed the basis for the establishment of individual hydrostratigraphic units. The term "hydrostratigraphic" has been used because the geologic and lithologic characteristics are not significantly different, however the hydrologic properties are. These units are discussed below.

5.3 Hydrostratigraphy

On the basis of data collected during the RI, the majority of the Site is underlain by four relatively distinct hydrostratigraphic units. Three of these units occur within the alluvium (F1, F2, and F3). The fourth corresponds to the hydrologic bedrock (Tempe Beds) (F4). A hydrostratigraphic unit is described as a body or rock or sediment with similar hydraulic properties that allows grouping into aquifer or confining layers (Fetter, 1988). A cross-section showing estimated hydraulic conductivities for the different units across the Estes Landfill is presented as Figure 5.7.

5.3.1 Hydrostratigraphic Unit F1

Evaluation of the drilling logs from monitor wells drilled on Site indicate that unit F1 is a coarse grained mixture of cobbles, gravel and sand with varying, but minor amounts of silt and clay. In general, unit F1 is believed to be approximately 50 to 70 feet thick beneath the Site. When unit F1 is saturated, wells screened in the unit are capable of producing large quantities of groundwater with only minimal drawdown. For example, during pumping in May 1991 (HLA, 1992e), when an estimated 5 to 10 feet of unit F1 was saturated, well EW-RW1 produced 175 gpm for approximately 150 minutes with only 2.25 feet of drawdown in the pumping well. Test data indicate a specific capacity of approximately 77 gpm per foot of drawdown. During the May 1991 aquifer test, near well EW-RW1, unit F1 consisted of saturated material located above 56 feet bgs.

5.3.2 Hydrostratigraphic Unit F2

In general, unit F2 is relatively similar in composition to both units F1 and F3. The major difference in the units is that unit F2 is more poorly sorted with a slightly higher percentage of clay and silt size material. These characteristics were confirmed during the final phase of drilling when the Rotosonic™ drill method was utilized. This drilling method allows for the collection of a continuous soil core so that even difficult to drill sediments near the Salt River can be logged in detail. The boring logs from this phase of work were presented in the second quarter 1996 quarterly report (HLA, 1996b). Data from sieve analyses and vertical permeabilities from this and previous phases of work, are summarized in Table 4.1.

The soil core obtained during the Rotosonic™ drilling activities displayed the wide distribution of grain size and sorting that was expected (HLA, 1996b). The presence of unit F2 was confirmed through visual inspection, grain size analysis and permeability testing of core samples which indicated low hydraulic conductivity. The results of the permeability testing are further discussed the Section 5.4.1.

The most notable difference between unit F2 and the other units within the alluvium is unit F2's inability to produce water during drilling and the different groundwater extraction rates from wells completed within these units. The low water production capability of unit F2 was confirmed during an aquifer test conducted on EW-RW1 in June 1991 (HLA, 1992e). At that time, the water level in EW-RW1 was at approximately 56 feet bgs, which places the water level near the interface between units F1 and F2. Upon initiating pumping, the water level in the pumping well declined very rapidly to a depth of approximately 95 feet bgs and the maximum pumping rate stabilized at approximately 80 gpm. This depth is considered to be near the approximate base of unit F2. Because unit F2 was not capable of producing appreciable water, the water level declined until unit F3 could sustain the groundwater withdrawal. The results of this test indicate an average specific capacity of approximately 2 gpm per foot of drawdown for units F2 and F3 combined. Because the well is screened across units F1, F2, and F3, the specific capacity of unit F2 alone could not be calculated, but is suspected to be much lower than the average specific capacity of 2 gpm per foot of drawdown for both units F2 and F3.

The F2 unit is believed to range from approximately five feet or less to approximately 25 to 30 feet in thickness beneath the Site. The estimated lateral extent of unit F2 is based both on available drill hole data and the assumption that it was formed under flood conditions. These deposits typically are oriented semi-parallel to the river channel (east to west) and tend to be much longer than they are wide. Due to the subtle geologic differences between unit F2 and the other units within the alluvium, the mechanism(s) that produced unit F2, and the likelihood that the contacts between units F1, F2 and F3 are gradational, the F2 unit's lateral and vertical extent may be somewhat different from that conceptualized. On the basis of the data, the geometry of unit F2 as depicted in the SCM appears to be an east-west trending ellipsoidal unit which extends from somewhere east of monitor well EW-3 on the east end of the Site to approximately monitor well EW-4 located on 40th Street. The northern boundary appears to be approximately the southern part of the Salt River channel, extending south to approximately Magnolia Street. The thickness of unit F2 is assumed to vary across the Site, with the maximum thickness of approximately 25 to 30 feet occurring in the vicinity of the eastern and western well clusters. The overall conceptualized geometry of unit F2 is illustrated by a computer generated thickness map shown on Figure 5.8 and in the SCM block diagram on Figure 2.1. Because the differences between F1 and F3 are even more subtle than those of F2, F1 and F3 are considered to be a single hydrostratigraphic unit where F2 is not present.

5.3.3 Hydrostratigraphic Unit F3

On the basis of drill cuttings from various monitor wells, unit F3 is composed of gravel, sand and silt. It is very difficult to directly demonstrate the variations in the degree of sorting between the various alluvial hydrostratigraphic units. However, as previously stated, all three of the units are very similar in composition with only subtle differences in the percentages of gravel, sand and fines. The subtle differences in the percentage of various particle sizes (Table 4.1) are not large enough to account for the orders of magnitude differences seen in the hydraulic conductivities of the three units, unless significant differences in the degree of sorting accompany these subtle variations. On the basis of results from various sieve analyses (Table 4.1), the vertical permeability values obtained from core samples from specific depths (Table 4.2), and data from the 1991 aquifer test (HLA, 1992b), the degree of sorting and thus the hydraulic conductivity in unit F3 appears to be somewhat less that seen in unit F1, but far better than that of unit F2. The aquifer test conducted during June 1991 and described below showed that unit F3 is capable of producing a maximum of approximately 80 gpm with a drawdown of approximately 10 feet. Assuming little to no contribution from unit F2, this results in a specific capacity of approximately 8 gpm per foot of drawdown for unit F3 near EW-RW1. Alluvial core samples from Rotosonic™ drilling revealed a presence of sandy zones beginning at 93 feet bgs. This is evident in the boring logs from B-1, B-2, and EW-19 (HLA, 1996b) and correlates with the upper portion of unit F3. This depth also agrees with earlier lithologic logs from drilling operations at EW-15 and EW-PZ3 (HLA, 1995b).

5.3.4 Hydrostratigraphic Unit F4 (Bedrock)

Unit F4 is the sedimentary bedrock beneath the Site that has been field identified at numerous locations both on and off the Site. The depth to bedrock (unit F4) ranges from approximately 115 to 175 feet bgs. As previously discussed, the characteristics of unit F4, based on geologic core samples include: a well-bedded siltstone to claystone; a well-cemented, coarse-grained sandstone; and a moderately cemented conglomerate or breccia (Table 5.1). In general, unit F4 is considered to be a part of the Tempe Beds formation which crop out on both the north and south sides of the Salt River approximately three miles east of the Site. The water bearing and water transmitting capabilities of F4 are highly dependent on its degree of cementation and fracturing. Although VOC concentrations above applicable water quality standards have been observed in the F4 monitor well (EW-15) at the eastern well cluster (Appendix A), the transport path for the VOCs into F4 is thought to be related to localized weathering and/or fracturing in this area because F4 is an aquitard to subsurface flow in the existing SCM. ESE's investigation at Well EW-26 verified reduction of VOCs vertically near EW-15, supporting F4 as an aquitard.

5.4 Aquifer Testing

Aquifer testing has been performed during the RI to evaluate and further refine the hydrologic characteristics of the aquifer in the vicinity of the Site. Constant discharge aquifer pumping and recovery tests have been conducted using wells EW-RW1, EW-RW2 and EW-6, and an aquifer response test was also conducted on the Bradley Landfill industrial supply well BW-P. In addition, information on well responses has been supplemented by monitoring drawdown in many of the monitor wells during sampling.

In June 1991, Estes Landfill aquifer test/recovery well EW-RW1 (ADWR #55-529347) was pumped at a constant rate of approximately 80 gpm for 120 hours (5 days). This pumping rate was the maximum rate sustainable by the well. The static depth to water in the pumping well prior to initiation of the test was approximately 56 feet bgs. During the 1991 test, water levels were monitored in the pumping well and six surrounding observation wells ranging in distance from 45 feet to 1,525 feet from the pumping well. Details on the construction of the observation wells and the drawdown versus time in the various observation wells can be found in HLA (1991e).

The data obtained from the pumping well (EW-RW1) and the three closest observation wells were considered most useful for quantitative analyses from the June 1991 aquifer test (HLA, 1991a). The remaining, more distant observation wells had rapid but minor water-level declines in response to the pumping well. However, these qualitative observations at the more distant observation wells support the characterization of unit F3 as a semi-confined system. In general, the transmissivity values calculated for unit F3 by the various analytical methods utilized ranged from approximately 1,300 feet squared per day (ft^2/d) to 4,000 ft^2/d. Assuming a saturated thickness for unit F3 of 20 feet resulted in an estimated horizontal hydraulic conductivity of 65 to 200 ft/d or 2.3 $x10^{-2}$ to 7.1 $x10^{-2}$ cm/sec. The calculated transmissivities do not account for potential delayed yield from F2. With regard to unit F3, the early-time drawdown data using the Theis non-equilibrium method provided the most representative value of hydraulic conductivity. This is because leakage would not be as prevalent at earlier periods of time in the test and therefore these data would be the least affected by potential leakage from unit F2. Using the Theis non-equilibrium analytical method, a hydraulic conductivity of 785 ft/d (2.77 x10^{-1} cm/sec) was calculated for unit F3. Because of the absence of unit-specific monitoring points at the time of this aquifer test, no estimates of conductivity and/or storitivity were made for units F1 or F2.

In October 1991, a six hour aquifer response test was conducted utilizing the Bradley Landfill industrial water supply well (BW-P, ADWR #55-800536). This test is referred to as an aquifer response test rather than an aquifer test because of the short pumping time and uncertainties in the design of the pumping well. Although no reliable records exist, the owner of the landfill, Mr. Ken Bradley, believes the well is 250 feet deep. A depth of at least 200 feet was verified in the field using a steel tape. No information is available on the well construction or location(s) of perforations. As a result, the goal of this test was to collect data on the timing and magnitude of water-level changes in surrounding monitor wells and to evaluate the zone of influence of a proposed groundwater recovery well with a similar pumping rate (HLA, 1992g).

The results of the BW-P aquifer test were consistent with the conclusion from the June 1991 test on EW-RW1 in that the deeper alluvial aquifer (unit F3) behaves like a semi-confined system (HLA, 1992g). The data from this test also indicated that there is a lower permeability zone or layer above a depth of 100 feet bgs, similar to that observed in the area of EW-RW1. This was confirmed when EW-RW2 was drilled. Because of the short time frame of the test, the lack of information on the construction of well BW-P and hydrostratigraphic complexities, a quantitative analysis of the data was not performed. Further details on the results of this test can be found in HLA (1992g).

In January, 1992, Estes Landfill aquifer test/recovery well EW-RW2 (ADWR #55-533343) was pumped at a constant rate of approximately 410 gpm as part of an aquifer test (HLA, 1992d). The test was originally scheduled to last for 72 hours but was discontinued after 49.5 hours because of net water-level rises caused by unexpected flow and recharge in the Salt River channel. The transient nature of the recharge made analysis, using it as a boundary effect, mathematically incompatible with the analytical methods. Therefore, the test was discontinued when evidence of the river recharge was seen in the observation wells. In the 18 hours prior to starting the test, water-level rises in response to flow in the river ranged from 0.6 feet in BW-WD, which is approximately 800 feet south of the river, to 1.15 feet in EW-9, which is along the south bank of the river.

Results from the January 1992 aquifer test were similar to findings from previous aquifer testing at the landfill. The lower sand and gravel (unit F3) responded to pumping as a confined or semi-confined aquifer (HLA, 1992d). Despite an ongoing water-level rise of close to 1 ft/d due to river flows, the water level in EW-RW1, which is approximately 900 feet east of EW-RW2, declined 0.67 feet after 225 minutes of pumping in EW-RW2. As was identified in the tests described above, a low permeability zone was identified, based on pumping well water-level information. Upon initiating pumping, a rapid water-level decline, from approximately 65 to 100 feet bgs, was recorded in the pumping well. This interval corresponds with the clayey gravel zone (unit F2) which produced very little water during the drilling of EW-RW2. A similar response, but in reverse (i.e., a rapid water-level rise), was observed when turning the pump off during the recovery phase of the test. Other evidence of a lower permeability material in that zone included the delayed and muted drawdown recorded in observation well EW-W relative to EW-5. Although EW-W is approximately 45 feet closer to the pumping well than EW-5, the slower rate and decreased magnitude of drawdown observed in EW-W is attributed to its screened interval being primarily in the clayey gravel zone and thus having predominantly vertical flow (or leakage) down into unit F3, where EW-5 is screened.

An additional finding during this test was the ability of a well pumping from unit F3 to induce flow from the underlying bedrock (unit F4). Although the drawdown and recovery response times in monitor well EW-8, which is completed solely in unit F4, lagged compared to wells located in the overlying unconsolidated material, a relatively large total drawdown (3.78 feet) was observed after 49.5 hours of pumping from EW-RW2. These data suggest that although the volume per unit time of water from unit F4 into unit F3 is probably low because of the low vertical permeability of unit F4, the assumed low storage capacity means relatively large head differences can be generated. However, under non-stressed conditions the groundwater flux between units F3 and F4 is apparently negligible based on the negligible difference in hydraulic heads between EW-5, which is screened solely in unit F3, and EW-8, which is screened solely in unit F4. Laboratory permeability tests conducted on core from a depth of 175 feet bgs in EW-8 indicated a vertical hydraulic conductivity of 1.2 x10^{-2} ft/d or 4.2 x10^{-6} cm/sec (HLA, 1992g).

Although the complex hydrogeologic system at the landfill is not amenable to typical 2-dimensional aquifer test analytical methods due to the presence of the different hydrostratigraphic units, quantitative estimates of aquifer properties of unit F3 were developed using various assumptions. In general, estimates for horizontal hydraulic conductivity in unit F3 range from approximately 2.5 x10^{-2} cm/sec (70 ft/d) to almost 1.4 x10^{-1} cm/sec (400 ft/d). Using various methods, values were typically between 8.2 x10^{-2} cm/sec (230 ft/d) and 1.4 x10^{-1} (400 ft/d). No physical explanation for an increase in the hydraulic conductivity of unit F3 between EW-RW1 and EW-RW2 is proposed; however, an increase in transmissivity is supported by the decreasing hydraulic gradient moving to the west across and beyond the landfill. Additional details regarding the aquifer test and the data analysis are available in HLA (1992a).

In May, 1992, a short-term aquifer performance test was conducted using EW-RW1 as the pumping well (HLA, 1992g). The purpose of the test was to evaluate the aquifer response and well/aquifer pumping capacity during this period of elevated groundwater levels due to river recharge and, in particular, to evaluate the response in unit F1 when pumping EW-RW1.

The planned pumping length was from 4 to 6 hours. However, because of a greater than expected pumping rate (approximately 405 gpm), the test was limited to 2½ hours because of limited onsite storage capacity for the pumped water. An assumption of this test was that all of the well production except 80 gpm could be attributed to unit F1 during this test. This assumption was made because during the previous test unit F3 only was capable of producing 80 gpm. At the time of the test, the river was flowing and had sustained a continuous flow since January 8, 1992. Regional water levels were rising at a rate of approximately 2 feet per month at the time of the aquifer test.

During the May 1992 aquifer test of EW-RW1, the quantitative analyses of the observation well data could not be performed because of an inability to positively separate the contribution to the total pumping rate from unit F3 versus unit F1 (or unit F2). It was apparent when reviewing the drawdown hydrographs for monitor well EW-6, that the response in unit F3 was different in the two tests. In the initial test, when no water was present in unit F1, monitor well EW-6 had 5.4 feet of drawdown after pumping EW-RW1 at 80 gpm for 150 minutes. During the second test, when approximately 22 feet of unit F1 was saturated, monitor well EW-6 had 2.3 feet of drawdown after pumping EW-RW1 at 405 gpm for 150 minutes. Because the maximum pumping rate during the second test was not limited by the formation's ability to supply water but by the pump capacity, it is suspected that the decreased drawdown in unit F3 was caused, in part, by less water being extracted from unit F3 (i.e., a lower stress).

During the ratio method aquifer test conducted on June 29 and 30, 1994, the static water level was approximately 47 feet bgs in the proposed pumping well EW-6 (HLA, 1995b). The field tasks included the collection of water levels from the cluster of wells near EW-6 on a daily basis for a period of 6 days prior to the test start-up. The test was conducted using the EW-6, EW-PZ1, EW-PZ2, EW-PZ3, and EW-15 well/piezometer cluster (Figure 2.1). The general design of the test consisted of pumping water from the lower sand and gravel aquifer (unit F3) and monitoring the pressure change in the form of a water-level decline in units F3, F1 (the upper sand and gravel aquifer), F2 (the aquitard), and F4 (the underlying consolidated formation). A Hermit™ data logger system with pressure transducers manufactured by In Situ was used to record the water-level information during the test. The pressure transducers were installed in the pumping well EW-6 and in monitor wells EW-PZ1, EW-PZ2, EW-PZ3, EW-E, and EW-15. Water levels were collected every minute for the first 30 minutes, every five minutes from 30 minutes to six hours, and every 15 minutes from six hours to 24 hours. During the test, measurements were also taken manually approximately every 30 minutes using an electronic sounder or steel tape. Approximately 14,400 gallons of water were pumped as part of this test.

At an initial pumping rate of 9.2 gpm, well EW-6 had a pumping water level of approximately 76 feet bgs. After approximately three hours of pumping, no response had been observed in the F2 well EW-PZ1. Therefore, the pumping rate was increased to approximately 10.0 gpm. This additional 0.8 gpm of discharge resulted in an additional 6 feet of drawdown in the pumping well. Although designed to be a constant discharge test, the pumping rate was increased in an effort to obtain data on the relationship between pumping in unit F3 and a response in unit F2. After a total of 17.5 hours of pumping, a measurable response had still not been observed in the F2 well EW-PZ1 and therefore the pumping rate was further increased to approximately 10.9 gpm. This additional 0.9 gpm increased the drawdown in the pumping well by approximately 7 feet and brought the pumping water-level to 88 feet. This water level was only 12 feet above the pump intake and, therefore, no further increases were performed. Only EW-PZ3, which is screened across or just below the F2/F3 interface, responded to the pumping of EW-6. The data from EW-PZ1 (unit F2) and EW-PZ2 (unit F1) resembled the diurnal changes observed in pre-test water-levels indicating that no noticeable pressure response had reached them.

Using the available response data from EW-PZ3 after 24 hours of pumping (0.8 feet) and assuming a hypothetical measurable response of 0.1 feet in EW-PZ1, the test method calculations were used to derive an upper limit for the vertical hydraulic conductivity of unit F2. Using an aquifer thickness of 20 feet, an aquitard thickness of 40 feet, the horizontal hydraulic conductivity and specific storage for unit F3 were 100 ft/d and 1 $\times 10^{-6}$, respectively. Assuming a specific storage of 1 $\times 10^{-3}$ to 1 $\times 10^{-4}$ for the unit F2 aquitard, a range of 2.5 $\times 10^{-6}$ cm/sec (0.007 ft/d) to 2.5 $\times 10^{-5}$ cm/sec (0.07 ft/d) was calculated for the maximum vertical hydraulic conductivity of unit F2. These results show that the hydraulic conductivity values for unit F2 are four to five times lower than those for unit F3, indicating that unit F2 is a localized aquitard. Figure 5.7 illustrates a profile of estimated hydraulic conductivities.

An additional finding of significance from this test was the response of monitor well EW-15, which is screened in the underlying consolidated formation, unit F4 (Figure 1.3). Upon initiating pumping in EW-6, the water level in EW-15, located about 23 feet away, steadily declined for approximately 150 minutes before leveling off. At that time a total water-level decline of approximately 2.6 feet had occurred. When the pumping rate in EW-6 was increased slightly, the drawdown in EW-15 also increased almost immediately. This response is contrary to what would have been expected based on the behavior of the other unit F4 monitor well EW-8, during a previous aquifer test at EW-RW2, as well as the low pumping rate of EW-6. This response indicates a hydraulic connection between units F3 and F4 at this location, or at least between EW-6 and EW-15.

5.5 Hydraulic Properties

The hydrostratigraphy beneath the Site consists, in descending order, of a water table aquifer (unit F1), an alluvial aquitard (unit F2), a semi-confined aquifer (unit F3), and a bedrock aquitard (unit F4). The defining of unit F2 as an aquitard is based on its inability to produce water as described in Section 5.3. Where unit F2 is present, unit F3 becomes a partially or semi-confined aquifer. These designations are supported by the results of previous aquifer testing and recent unit-specific monitoring of hydraulic head changes in wells compared to changes in barometric pressure. A comparison of water levels in wells to barometric pressure change is shown on Figures 5.9 and 5.10. The decline in water levels in the unit F2 and unit F3 monitor wells, due to an increase in barometric pressure, is approximately three times that observed in the unit F1 well. These changes are consistent with expected changes in a semi-confined aquifer versus an unconfined aquifer (Bear, 1972).

The hydraulic properties of the different hydrostratigraphic units have been estimated based on aquifer testing, laboratory permeability testing on cores, groundwater flow model calibration, and experience with similar types of materials. Based on the different water transmitting capabilities observed at the Site, the aquifer characteristics appear to vary substantially within the alluvium and between the alluvium and bedrock material. A cross-section of onsite hydraulic conductivity values for the four units is shown on Figure 5.7. Hydraulic conductivity values generated for the study area through the groundwater modeling process are presented on Figures 25 through 29 in the groundwater modeling report (HLA, 1996c). A detailed discussion of hydraulic conductivities follows.

5.5.1 Hydraulic Conductivity

Regionally, well sorted zones of the alluvium are characterized as having the highest horizontal hydraulic conductivity (KH) values. These can range from 6 x10^{-2} to 6 x10^{-1} centimeters per second (cm/s)(Brown and Pool, 1989). However, these estimates are based on relatively large-scale aquifer testing conducted on deep pumping wells with long screen intervals in the central portion of the WSRV. These types of wells tend to mask the effects of thin or areally localized zones of low permeability or high permeability material. Based on aquifer tests conducted at wells EW-RW1 and EW-RW2, KH values of 1.4 x10^{-1} cm/s and 2.6 x10^{-2} cm/s were calculated for F1 and F3, respectively (HLA, 1992d and HLA 1992e). These aquifer tests were conducted under non-ideal conditions (eg., the river was flowing or the wells were screened across multiple units) and therefore the KH values are considered estimates. Nonetheless, these values were utilized during the calibration of a groundwater flow model for the Site with a reasonable level of success, indicating that the estimates are likely within an acceptable range.

Laboratory permeability testing on alluvial cores was conducted (Table 4.2). These tests provide values for vertical hydraulic conductivity (KV). Based on the limited number of tests, poorly sorted zones of the alluvium, such as those found in F2, have KV values ranging from 1×10^{-6} to 1×10^{-8} cm/s. Better sorted zones of alluvium, such as F3, have KV values ranging from 1×10^{-3} to 1×10^{-5} cm/s. Because a reasonable estimate of KH values for alluvium is approximately 10 to 100 times greater than KV (HLA, 1996c), well-sorted zones of alluvium at the Site could have KH values which approach the 6×10^{-1} cm/s value mentioned above. These high KH values are supported by observations during Site aquifer tests when over 400 gpm of water was produced from onsite wells with only minimal drawdown.

5.5.2 Aquifer Storage

Aquifer storage properties include specific yield (SY) for unconfined aquifers and specific storage (SS) for confined aquifers. The storage values are defined differently because, when groundwater is pumped from an unconfined aquifer, production causes an actual dewatering of the pores. In contrast, water pumped from a confined aquifer is released through a decrease in hydrostatic pressure which causes the aquifer skeletal material to slightly contract and the water molecules to slightly expand. SY is typically slightly less than the porosity of the sediment, as some water remains in the pore space.

Reasonably accurate estimates for storage are important in estimating the number of pore volumes of groundwater which may move through a volume of aquifer in some unit of time. Estimates for SY are commonly obtained from grain size analysis of drill cuttings. The SY for unit F1 sediments is estimated to range from 0.15 to 0.25. Estimates for SS are much more difficult to obtain. Sometimes, estimates can be made for storage coefficient (SC), which is equal to SS multiplied by the aquifer thickness (making the dimensions for SC unitless). Values for SC can be obtained from aquifer tests conducted on confined aquifers. This was not possible on the aquifer test conducted on well EW-RW1 because of the uncertain impact caused by leakage from F2 into F3 during the test into the fully screened well. For the groundwater flow model, estimates of SS for F2 were set at 1 x10^{-4} per foot and 1 x10^{-6} per foot for F3. These values were obtained from published estimates based on material description (Domenico and Schwartz, 1990).

5.6 Groundwater Flow Conditions

Groundwater flow conditions are an important component of the SCM because they impact the movement and distribution of contaminants. Site groundwater flow conditions have been monitored since the mid-1980s (HLA, 1996c). Discerning Site groundwater flow conditions consists of determining the level of groundwater or water level in at least three points, which in turn, provides the means for ascertaining the horizontal groundwater flow direction and gradient. To evaluate vertical groundwater flow directions and gradients, water levels must be measured in at least two wells in the same general vicinity that are completed to different depths. Vertical flow can also be assessed by spinner logging as discussed in Section 4.4.3. Site specific water levels have been recorded in various monitor wells on a monthly, weekly, daily, and continuous basis, dating back to 1982.

The following summarizes how groundwater flow conditions influence regional and Site water levels, horizontal groundwater flow, and vertical groundwater flow. The interrelationships between groundwater flow conditions and the fate and transport of contaminants are discussed in Chapter 7.

5.6.1 Water Table Elevations

This Section summarizes the factors that influence regional and local variations in the water table elevations or depth to water.

5.6.1.1 Regional Water Table Elevations

Regional water-level data shows considerable variations in the water table elevations and the direction of groundwater flow through the WSRV. The general trend is that flow is directed away from the basin margins towards lower elevations and eventually to the basin outlet at the southwest corner of the basin where the Gila River exits the basin (Brown and Pool, 1989). The water-level elevations are controlled by several factors including: the elevation of the hydrologic bedrock, the thickness of the aquifer, variation in hydraulic properties of the sediments, and the net loss or gain of water to the system. The hydrologic bedrock acts to contain the water and retard the downward migration or percolation of the groundwater. The thickness of the aquifer and the hydraulic properties act to control the speed that water is transmitted through the aquifer and can locally flatten or steepen the gradient. Recharge to the aquifer and discharge from the aquifer cause localized shifts from the overall regional trend of groundwater flow.

The latter of these factors plays a significant role in the WSRV, because of heavy aquifer pumpage to supply water for agricultural needs. The heavy pumping related to agriculture varies seasonally and is strongly dependent on the daytime high temperatures. Heavy pumping of the aquifer tends to alter the overall regional trend by creating areas of localized groundwater sinks or depressions that locally divert groundwater flow into these low areas rather than following the natural path out of the basin. Part of this affect is to induce a region-wide declining water table. The overall rate of decline varies with proximity to the pumping centers, but a basin-wide decline is evident during periods of low precipitation and during times of no river flow in the basin. The declining trends are offset by recharge to the basin from storm events and releases to the Salt and Verde Rivers. The recharge events typically mirror the seasonal weather patterns and are strongly dependent on precipitation at higher elevations that create runoff and result in reservoir releases to the Salt and Verde Rivers. The combination of groundwater withdrawal and recharge events result in alternating periods of declining and rising water tables. This is illustrated in Figure 3.2 where releases from Granite Reef Dam (GDR) are plotted against the hydrograph for the USGS Tovrea well.

5.6.1.2 Local Water Table Elevations

The local water table is ultimately controlled by the same hydrogeologic factors that control the region. However, the Site's proximity to the Salt River results in water levels that are more strongly influenced by flow events in the Salt River. Water table conditions are locally affected by flow in the Salt River because the bottom of the river bed is both highly permeable and above the top of the water table. Thus, water in the Salt River will percolate through the bottom of the river and recharge the underlying aquifer. It should be noted that the normal or predominant water flow condition of the Salt River is no water flow (no-flow) (Figure 3.2). During the no-flow scenario, Site water levels reflect the regional declining trend. For example, well EW-OE showed a decline of 15.1 feet from

January 1 to December 13, 1994, which equates to an average decline of 1.26 feet per month. Local water table fluctuations are clearly illustrated on Figure 5.11, which is a hydrograph of water-level elevations versus time collected from wells in the eastern well cluster. As shown on Figure 5.11, from the period between 1982 to the middle of 1996, the greatest fluctuation in water table elevations occurred in response to river flows, primarily in 1992 and 1993. During the time from early 1991 to early 1993, water levels in monitor well EW-E rose nearly 41 feet from a low of 1059 ft above msl to about 1100 feet above msl. These water table rises correspond to continuous and/or flood flow conditions in the Salt River.

Smaller magnitude flows of short duration and/or low flow may cause water levels to rise in monitor wells located adjacent to the Salt River, but may not affect the water levels further south of the Site. Therefore, it can be said that water level changes in response to river flow observed in the Site monitor wells are inversely proportional to the distance the monitor well is located from the river. In other words, water levels observed in monitor wells located farther from the Salt River are less likely to experience change during small magnitude flows. The differences in response of water levels to large and small magnitude flows is illustrated by comparing the hydrograph of EW-9, located just north of the Site boundary in the river channel, and EW-10, located approximately 2,000 feet south of the river on Winslow Avenue (Figure 5.12). While the overall water level trend in monitor well EW-10 is similar to the trend of monitor well EW-9, the magnitude of water level response in monitor well EW-10 is clearly less than that of monitor well EW-9. In January 1991, the difference in elevation of the water table between EW-9 and EW-10 was less than five feet. However, by April of the same year, the difference in elevation of the water table between EW-9 and EW-10 was greater than 20 feet. In addition, there are clearly numerous small water level fluctuations observed in monitor well EW-9 that are not apparent in monitor well EW-10. This is particularly evident during 1993, where numerous spikes in the depth to water were recorded at monitor well EW-9, but are not recorded in monitor well EW-10. Water level changes in monitor well EW-10 also lag behind those of monitor well EW-9. This is particularly evident at the onset of a rising or declining cycle, such as recorded in the middle of 1991. Water levels measured in both monitor wells were within two feet of each other in August 1991. However, water levels in monitor well EW-9 rose approximately five feet in November 1991 and three feet in December 1991, while during the same time water levels in monitor well EW-10 declined approximately one foot in

November and then rose one foot during December.

5.6.2 Horizontal Groundwater Flow

Both regional and local groundwater flow directions are directly controlled by fluctuations in the water table elevations. Consequently, as water table elevations rise or decline in response to water-level changes, the direction of horizontal groundwater flow also changes. The direction of horizontal groundwater flow is determined by groundwater elevations. Horizontal groundwater flow can be illustrated by drawing a line or contour between two points that represents an equal groundwater elevation. A minimum of three points, or three monitor well groundwater elevations, is required to draw a contour line. The direction of horizontal groundwater flow is perpendicular to the contour line.

5.6.2.1 Regional Horizontal Groundwater Flow

Groundwater flow directions in the region are characteristically to the west in the vicinity of the river, to the northwest south of the river and to the southwest north of the river. An example of the regional flow directions, during an episode of no-flow, is illustrated on a study area groundwater contour map from February 1990 that was presented in the Groundwater Modeling Report (HLA, 1996b, Figure 16). The regional gradient calculated from the February 1990 contour map indicates a slope of approximately 17 feet per mile (ft/mi).

5.6.2.2 Local Horizontal Groundwater Flow

During normal or no-flow conditions and during low flow and/or short term flow conditions, the direction of horizontal groundwater flow across the Site is similar to the regional flow near the river (i.e., to the west). March 1991 and June 1996 represent two periods of no-flow conditions. Maps illustrating groundwater elevations and horizontal groundwater flow for these two periods of no-flow conditions are presented in Figures 5.13 and 5.14 (a & b). The gradient or slope of the water table becomes steeper beneath the Site, because of the presence of the bedrock high and the presence of the low permeability unit F2. For example, in March 1991 the gradient at the eastern end of the study area was 14.9 ft/mi, the gradient across the Site was 16.2 ft/mi and the gradient at the western end of the Site was 7.1 ft/mi.

During flow conditions of the Salt River, the horizontal groundwater flow direction over the Site shifts to the southwest and the horizontal groundwater flow north of the Salt River shifts to the northwest. The differences in horizontal groundwater flow north and south of the Salt River are due to linear river recharge. Because the no-flow water table slope is approximately parallel to the trend of the river and the recharge ridge during times of sustained river flow, the additive affect from the perpendicular flow results in shifting the slope of the water table to the southwest on the south side of the river and to the northwest on the north side of the river. The mounding of the water table was observed during the Salt River flow events of June 1992 and March 1993. As Figures 5.15 and 5.16 illustrate, this mounding of the water table creates a groundwater divide that results in groundwater flowing away from the mound. The size of the water table mound is dependent upon the Salt River flow rate, the initial depth to water, the duration of the river flow, and the amount of time elapse since the last flow. Similar to the no-flow scenario, the horizontal gradient varies across the study area. For example, in June 1992 the gradients were calculated as 8.8 ft/mi at the eastern end of the study area, 30.8 ft/mi beneath the Site, and 11.9 ft/mi at the western end of the Site.

Horizontal groundwater flow directions also vary between the different hydrostratigraphic units. These variations were observed during the evaluation of specific water level data collected from specific hydrostratigraphic unit monitor wells and piezometers. Horizontal groundwater flow in F1 appears to be influenced by small recharge events and perhaps subflow in the river. The direction of horizontal groundwater flow in F1 is generally to the southwest, even during extended normal or no-flow periods. In contrast, the F3 horizontal groundwater flow direction is consistent with Site and regional horizontal groundwater flow which is to the west. Small recharge events did not influence F3 horizontal groundwater flow direction. Data collected and reported in the quarterly reports during 1994, 1995 and 1996 demonstrate the prominent southwest horizontal groundwater flow direction of F1 and the west horizontal groundwater flow direction of F3 (HLA, 1994). An example of these trends are shown on Figure 5.17. This figure also presents the horizontal groundwater flow in Unit F2 as west to slightly southwest. It should be noted that these unit specific flow directions were calculated from three points and illustrate variability in a very small portion of the Site.

More recent groundwater elevation data from 1996 through 1999 indicate a generally west flow through Unit F1 and F3. As indicated on Figures 5.14a, Unit F1 flow for these periods is generally west with a south trend at the eastern portions of the site, and north trend at the western portions of the site (Figure 5.18). Figures 5.14b show a predominantly west flow in F3.

Water in the river bed infiltrates through the underlying strata and recharges the aquifer. Recharge rates of the aquifer is a function of the distance or depth of the water table from the water in the river. Previous investigations have estimated the recharge rate of the aquifer by the Salt River to range from less than one foot per day (ft/d) to over 2 ft/d (Briggs and Werho, 1966). The SCM estimated that the recharge rate ranged from 0.5 ft/d to 1.5 ft/d (HLA, 1996c). The recharge rate of the aquifer by the Salt River is greater during periods of sustained flow. Vertical groundwater flow is discussed below.

5.6.3 Vertical Groundwater Flow

Downward or vertical groundwater flow was noted during the early portions of the investigation (HLA, 1990 and HLA, 1992e). As a result, hydrostratigraphic unit specific piezometers were installed at three locations. Water levels collected from units F1, F2 and F3 during the summer of 1996 using the Trolls demonstrate a downward vertical gradient between each of the hydrostratigraphic units. Figure 5.19 shows the differences in water-level elevations between the three units for a specific time period. This time period is representative of typical Site conditions during no-flow river conditions. The figure illustrates that the water-level elevation in F1 is continually higher than the water-level elevations in units F2 and F3. Because water moves from higher elevation to lower elevation, there will be a tendency for groundwater to migrate downward at the Site. These small vertical gradients are due in part to the hydraulic conductivity contrasts between the alluvial layers that results in the slow movement of water through F2 and hydraulic loading that results from recharge and regional pumping centers.

No piezometers have been installed in Unit F4. However, comparing groundwater elevation data from F3 well EW-PZ3 and F4 Well EW-15, located approximately 30 feet apart, indicate a minimum 1.5 foot difference. This appears to support a slight downward vertical movement from F3 to F4. This is further supported by the presence of VOCs in groundwater samples collected at F4 Wells EW-15 and EW-26.

6.0 SITE CHARACTERIZATION AND NATURE AND EXTENT OF CONTAMINATION

This section presents detailed results of the work conducted to characterize the nature and extent of contamination at the Estes Landfill. The focus of the work was to identify impacted media, characterize the types of contaminants present at the Site, and evaluate the extent of contamination within the various media. The Site characterization data provide a basis for identifying the fate and transport of the contaminants, discussed in detail in Section 7.0, and ultimately will assist in the evaluation of remedial options.

6.1 Surface Soils

Surface soils at the Site have been characterized to evaluate the potential for contaminants to be present at levels which could pose an unacceptable risk to human health. A soil sampling plan, dated August 17, 1994, was developed in a manner consistent with EPA's Risk Assessment Guidance for Superfund, Vol. I (RAGS I) (EPA, 1989a). The soil sampling plan was designed to obtain data sufficient to examine two potential release mechanisms: wind erosion of soil particles and Landfill gas emissions. A grid developed for the surface soil sampling program is shown in Figure 6.1. Soil sampling activities were completed on August 1994.

Surface soils at the Site were evaluated quantitatively for chlorinated pesticides, PCBs and SVOCs that may have been applied during the period of agricultural use. Metals and VOCs were also evaluated as these constituents have been detected in groundwater (HLA, 1995a).

The surface soil samples were collected from the center of one-acre subparcels and composited by the laboratory into samples representing a five-acre parcel at the Site. These composite samples were analyzed for metals, organochlorine pesticides, and PCBs. In addition, a discrete soil sample, from the center of one randomly selected subparcel, per five-acre parcel, was selected for analysis of VOCs and SVOCs. A table detailing the analytical methods is provided below.

Analyses	Analytical Methods
Total Metals	
antimony	EPA Test Method 7041
arsenic	EPA Test Method 7060
beryllium	EPA Test Method 7091
barium, boron, copper, manganese, and nickel	EPA Test Method 6010
cadmium	EPA Test Method 7131
chromium	EPA Test Method 7191
lead	EPA Test Method 7421
mercury	EPA Test Method 7471
selenium	EPA Test Method 7740
silver	EPA Test Method 7761
thallium	EPA Test Method 7841
SVOCs	EPA Test Method 8270
VOCs	EPA Test Method 8010/8020
Organochlorine pesticides and PCBs	EPA Test Method 8080

Soil samples were never analyzed for organophosphorus pesticides or chlorinated herbicides because the use of these compounds is not as common as organochlorine pesticides. However, the latest subsurface soil sample results did include these compound groups (See Section 6.2.5). Detailed information on sample locations, equipment and procedures and QA/QC is provided in HLA's report titled *Surface Soil Sampling, Estes Landfill, Phoenix, Arizona* and dated March 17, 1995 (HLA, 1995a). Detailed information of the analytical results are discussed below.

Concentrations of SVOCs were less than the method reporting limit except for one sample which contained 0.27 mg/kg of bis(2-ethylhexyl) phthalate. This constituent is believed to be a laboratory contaminant. Detectable concentrations of organochlorine pesticides included the following four compounds: Beta-BHC, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Beta-BHC was detected in two samples with the highest concentration reported at 0.038 mg/kg. Detectable concentrations of 4,4'-DDD were also reported in two samples and the highest reported concentration was 0.06 mg/kg. The only PCB detected was Aroclor 1254 reported in two samples at a concentration of 0.08 mg/kg.

The composite soil sample results for the metals antimony, boron, mercury, selenium, and thallium were below the method detection limits in each of the soil samples analyzed. Detected concentrations of arsenic ranged from 2.6 mg/kg to 4.3 mg/kg. Detected concentrations of barium ranged from 47.5 mg/kg to 126 mg/kg. Detected concentrations of beryllium ranged from 0.25 mg/kg to a maximum of 0.38 mg/kg. Detected concentrations of cadmium ranged from 0.06 mg/kg to 0.80 mg/kg. Detected concentrations of chromium ranged from 2.6 mg/kg to 9.7 mg/kg. Detected concentrations of copper ranged from 11.3 mg/kg to 258 mg/kg. Detected concentrations of manganese ranged from 18.4 mg/kg to 269 mg/kg. Detected concentrations of nickel ranged from 8.1 mg/kg to 18.1 mg/kg. Detected concentrations of silver ranged from 0.03 mg/kg to 0.15 mg/kg. Detected concentrations of lead ranged from 7.9 mg/kg to 109 mg/kg. The results are summarized in Table 6.1 (HLA, March 1995). Background soil concentrations, average Arizona soil concentrations and ADEQ Soil Remediation Levels (SRLs) are also included in Table 6.1. If SRLs were not available for particular compounds, HBGLs and then EPA Region IX PRGs were compared.

Concentrations of detected organochlorine pesticides (excluding Beta-BHC), SVOCs, and PCBs were below their respective SRLs. Examination of the SRLs, HBGLs and PRGs indicates that a screening level for Beta-BHC has not been estabished. However, because Beta-BHC was detected in only two samples with the highest concentration of 0.038 mg/kg, no further consideration of this compound appears necessary. The detected metals, with the possible exception of copper and lead, were consistent with relevant background soil concentrations in Arizona (HLA, 1995c and Earth Technology, 1991). In addition, all detected metals were well below their respective SRLs. VOCs were not detected in surface soils at the Site.

6.2 Subsurface Soils

Subsurface soils have been evaluated in a number of ways by several different consultants.

6.2.1 HDR Soil Investigation

The earliest work in characterizing subsurface soils was conducted as part of the channelization and Landfill relocation effort in 1982 (HDR, 1982). In conjunction with the relocation effort, during the period of March 1982, ninety core holes were drilled and sampled in a grid over the area to be relocated to determine the types and quantities of materials to be relocated and to evaluate the presence of hazardous materials. More than 306 soil samples were collected from the test holes of which, approximately 124 underwent Fingerprint Analysis and Complete Profile. The Fingerprint analysis consisted of measurements of pH, flashpoint, cyanide content, and explosivity. The Complete Profile consisted of EP toxicity testing, solvent screening, and miscellaneous analyses (i.e., phenolic compounds, ammonia, and total solids). The results of the subgrade investigation (HDR, 1982) indicated that none of the collected samples were determined to be hazardous. Also, the results of the solvent screening did not show the presence of any solvents above the method detection limit for any of the soil samples collected. However, the solvent scan did not include, cis-1, 2-Dichloroethene or Vinyl Chloride. Consequently the presence of these compounds within the former Landfill could not be confirmed.

In addition to the test hole sampling, soils and landfill material removed from the riverbed were also screened for hazardous constituents using field instruments and an onsite mobile laboratory during the relocation. Materials suspected of being hazardous were segregated and tested. Approximately 20 cubic yards of such materials found to contain non-organic hazardous waste were shipped under manifest to an approved offsite RCRA Permitted facility. These materials consisted of several severely deteriorated 55-gallon drums in which the remaining contents and surrounding contaminated soil met appropriate hazardous waste characteristics. The contents of four drums were considered ignitable because the flashpoints of the contents were less than 140 degrees Fahrenheit. The contents of five other containers were classified as toxicity characteristic wastes because the EP-toxicity limits exceeded the hazardous waste limit for lead. The remaining non-hazardous materials were relocated on top of the remaining Landfill and in the area immediately east of the original Landfill boundary. No other information was available on whether or not confirmatory soil and groundwater samples were collected upon removal of the wastes. Consequently, there was no documentation, which demonstrated that all hazardous materials had been removed, and no residual hazardous constituent concentrations remain in the subsurface soil that could serve as a potential on-going source of VOCs in the soil and groundwater. Based on these findings further source characterization of the former Landfill (i.e., Salt River Bottom) was performed (See Section 6.2.5).

6.2.2 SH&B Soil Investigation

Physical characterization of subsurface soils and refuse along the northern boundary of the Site and along the eastern boundary of the Bradley Landfill was conducted by SH&B in 1987 for the East Papago-Hohokam-Sky Harbor Freeways and in particular State Route 153 (SR-153). During this investigation soil borings were drilled, test pits were excavated and gas monitor wells were installed (SH&B, 1987). The locations of the soil borings and test pits are illustrated in Figure 6.2.

Several of the test borings and pits along the northern boundary of the Site revealed the presence of landfilled material up to a depth of 45 feet. The majority of the material was classified as wood, glass, plastic, metal, paper and other innocuous materials. Samples were field screened for the possible presence of hazardous constituents but none were encountered. Landfilling appeared to be relatively continuous under the northern boundary of the Site. No landfill refuse was encountered in the test pits or borings installed in the river bed in the area of the former Estes Landfill, suggesting that materials were not left in place during the relocation effort. A summary of the materials encountered is included in Table 6.2. Because, no soil samples were collected for chemistry analysis the actual depth of potentially impact soil within the Landfill could not be determined. In addition, there is a concern that impacted soil could potentially extend well below landfilled waste depths. Consequently, further characterization of the subsurface waste and soils within the Landfill was conducted (See Section 6.2.5).

Based on the SH&B work, the material reported in the borings on the eastern end of Bradley consisted of domestic refuse and construction debris. (Note: The Bradley Landfill has reported that only construction debris is accepted. Also, soil gas data from the eastern end of Bradley indicated low concentrations of VOCs [SH&B, 1987].)

6.2.3 Hargis + Associates Soil Investigation

Additional analysis of subsurface soils was conducted by Bank One during May 1993. Bank One contracted with Hargis + Associates to evaluate whether hazardous materials had been relocated during the Landfill relocation work conducted in 1982. The area of investigation was the eastern portion of the relocated refuse (Figure 6.3). As part of the Hargis + Associates investigation, a total of seven soil borings were drilled using hollow stem augers until encountering native soil; encountering auger refusal; or detecting explosive concentrations of methane gas. Soil drive samples were collected at ten-foot intervals. The material encountered in the soil borings appeared to be predominantly sands, gravels and cobbles with varying amounts of construction or household garbage such as glass, wood, plastic, wire and rubber. Twelve soil samples were submitted for laboratory analysis of total metals, VOCs, organochloride pesticides, PCBs, Toxicity Characteristic Leaching Procedure (TCLP) lead, and moisture. However, organophosphorus pesticides and chlorinated herbicides were not performed as part of the analytical scan because the use of these compounds is not as common as organochlorine pesticides. However, the latest subsurface soil sample results did include these compound groups (See Section 6.2.5).

Of the samples submitted for analysis of VOCs, only low concentrations of 1,2- and 1,4-dichlorobenzene (DCB) were identified. These compounds were identified in every sample except two and concentrations ranged from 0.04 mg/kg to 2.0 mg/kg. One sample contained leachable lead at 0.14 mg/l, well below the maximum allowable toxicity characteristic concentration of 5.0 mg/l (40 CFR Part 261.24 (a)). Detectable concentrations of the organochlorine pesticides 4,4'-DDT, 4,4'-DDE and 4,4'-DDD were reported at less than 1 mg/kg in select samples and the PCB arochlor 1242 was detected at 0.03 mg/kg in one sample. No TCE was detected. Soil sample analytical data are included in Tables 6.3 and 6.4.

Based on the field data and the laboratory analytical results discussed above, it appears that very low levels of hazardous constituents were detected within the relocated refuse deposited east of the original Landfill boundary. The refuse encountered in the soil borings was predominantly composed of what would be classified as construction debris and typical household garbage. The following detected compounds were all below their respective ADEQ residential SRLs of 1100 mg/kg for 1,2-DCB, 13 mg/kg for DDE and DDT, and 2.5 mg/kg for PCBs. However, the total lead concentrations from samples EL-2 (10'-11') and EL-7 (40'-41') exceeded the residential SRL (400 mg/kg) but was below the non-residential SRL (2000 mg/kg).

6.2.4 HLA Drilling and Sampling

Lithologic logging of subsurface soils has been conducted since 1989, beginning with the installation of monitor wells EW-1 through EW-6 (HLA, 1990), and has continued through 1996 with the installation of soil borings B-1, B-2, and EW-19. Drilling methods utilized at the Site were unable to retrieve relatively undisturbed samples prior to 1996, when the Rotosonic™ drilling method was used. Monitor wells EW-1 through EW-14 and EW-RW1 were drilled using an air rotary drill rig equipped with a pneumatic casing hammer. In this drilling method a rotary drill bit is advanced as an outer casing is driven into the subsurface to keep the borehole open. Soil samples associated with this drilling method were limited to grab samples of the drill cuttings that were lifted to surface with compressed air and formation water. The disturbed drill cuttings collected from this drilling technique were used to log the boreholes according to the Unified Soil Classification System.

In an effort to obtain more detailed lithologic data for the Site, additional measures were taken to retain a greater percentage of fines in the grab samples from well EW-RW2. This well was drilled using a dual rotary drill rig that utilized a conventional rotary drill bit advanced ahead of an outer casing, which is rotated and advanced with the borehole. The drill cuttings were brought to the surface with compressed air that forced the cuttings up through the annulus between the drill rods and the outer casing and out through a separation cyclone. To obtain more detailed lithologic information a geologic sample bag holder was constructed from six-inch PVC casing and periodically inserted beneath the cyclone to collect more representative grab samples from defined intervals. Through this method, samples from fifteen intervals were selected for detailed sieve analysis to supplement the visual logging of drill cuttings.

During the subsequent drilling of monitor wells EW-15 through EW-18 and piezometers EW-PZ1 through EW-PZ6, continued efforts to obtain more detailed lithologic data were implemented. These wells were installed using dual wall percussion hammer techniques where a dual wall drive pipe is driven into the formation and cuttings are blown back up the inner pipe and out a separation cyclone with compressed air. Because this drilling method does not utilize a rotary bit, a much coarser fraction of the sample is left intact and discharged out the cyclone at the surface. Grab samples were also collected from the cyclone during this drilling method for visual classification. Selected intervals were collected in 55-gallon drums, the water was decanted and samples were submitted for sieve analysis, hydrometer testing, evaluation of Atterberg limits, and analysis of organic content. These geotechnical parameters were evaluated on eight intervals from EW-15 and seven intervals from EW-16.

The 1996 Rotosonic™ drilling method was utilized in an effort to obtain relatively undisturbed subsurface soil samples. This drilling method utilized a specifically designed hydraulic powered drill head or oscillator which generates adjustable high frequency vibrational forces to advance the drive pipe. The method allows for the collection of a continuous core of alluvial material and provides the best mechanism to evaluate the physical and chemical characteristics of soil within the aquifer. Two soil borings, B-1 and B-2, were drilled 375 feet west and 250 feet west of the source area, respectively (Figure 6.4).

Drive samples and subsamples obtained from the continuous core were collected during the drilling of borings B-1, B-2, and EW-19 for geotechnical, chemical and/or biological analyses. In an effort to further define the hydrostratigraphy, soil samples from borings B-1 at depths of 77, 80, and 90 feet bgs, B-2 at a depth of 54 feet bgs, and EW-19 at depths of 70 and 85 feet bgs, were analyzed for vertical permeabilities and specific gravity. Bulk samples from boring B-1 at the intervals 0-5 feet bgs, 6.5-11 feet bgs, 28-34 feet bgs, 46-51 feet bgs, 60-65 feet bgs, 75-80 feet bgs, 86-91 feet bgs, and 103-110 feet bgs were submitted for sieve analysis, hydrometer testing, and determination of specific gravity. In addition, drive samples from boring B-2 at depths of 5 feet bgs and 10 feet bgs were analyzed for moisture density and triaxial shear. As part of the biodegradation bench scale pilot test, soil samples were evaluated for the presence of microbial populations capable of biodegrading organic compounds.

Drive samples and subsamples from the continuous core were collected from units F2 and F3 using for physical, biological, and chemical analyses. Results from the physical analyses indicated that unit F2 had vertical permeabilities ranging from 1 x10^{-6} to 1 x10^{-8} cm/sec, whereas unit F3 had a vertical permeability of 1 x10^{-3} cm/sec (Table 4.2). These results illustrate the contrasts in permeabilities between the different hydrostratigraphic units. Results of the sieve analyses at soil boring B-1 showed diverse distribution of gravel, sands, and fines (Table 4.1). The highest percentage of fines was present in the upper eleven feet where 44.8% of the upper five feet were composed of fines and 39.0% of the interval from 6.5 feet to 11 feet were composed of fines. Below that, the percentage of fines ranged from 6.6% to 17.7% in the 28 to 34 foot depth and the 60-65 foot depth, respectively. These results indicate that the greatest percentages of fine-grained material is located above the water table in unit F1 and near the top of unit F2.

The results of chemical analyses of the soil samples from borings B-1 and B-2 indicated that VOCs were reported at concentrations below the residential SRLs. Review of the QA/QC data packages provided by Mckenzie Laboratories indicated that the detections of these VOCs (except for Dibromochloromethane) may be due to laboratory background contamination and that an "Out of Control Event Form" was generated for the detections (Table 6.5). Based on this information, it must be concluded that Dibromochloromethane was the only VOC detected in sample B-2-90 at a concentration below the residential SRLs. However, when comparing the reporting limit for Vinyl Chloride (i.e., 0.05 mg/kg), which was not detected in any of the samples, to the nonresidential SRL (i.e., 0.035 mg/kg) the reporting limit was too high. Consequently, no conclusion could be reached on the presence of Vinyl Chloride in the soil boring locations. No VOC contaminations were found in water leachability tests, during which the soil samples were saturated with water, and the water fraction was analyzed.

6.2.5 ESE Subsurface Soil Investigation of Former and Current Landfill

6.2.5.1 Investigation of Current Landfill

ESE's review of the draft RI data indicated that source characterization within the western and central portions of the current Landfill had not been conducted, and soil gas survey results indicated the potential presence of other VOC sources within the Landfill. Therefore, further source characterization of the Landfill was conducted on May 1999, which consisted of drilling 21 soil borings; QST-B1 through QST-B21 (Figure 4.1) to depths ranging from 50 to 90 feet below the ground surface (bgs). The rationale, soil boring procedures, soil and groundwater grab sample collection methods, and analytical requirements are summarized in Section 4.8.1.

The analytical results of the collected soil samples indicated the presence of VOCs in samples collected from QST-B2 @ 8 and 65 feet bgs; QST-B14 @ 50 feet bgs; QST-B16 @ 26 feet bgs; QST-B17 @ 15 feet bgs; QST-B20 @ 25 feet bgs; and QST-B21 @ 20 feet bgs. However, in all cases, the concentrations of the detected VOCs were well below their respective residential SRLs. One of the more common VOCs detected in the soil samples that is also a groundwater compound of interest was 1,4-DCB. Other groundwater compound of interest that was detected in the soil samples was Chlorobenzene. SVOCs were detected in samples collected from QST-B11 @ 66 feet bgs; QST-B14 @ 50 and 76 feet bgs; and QST-B16 @ 26 feet bgs, which were all below their respective residential SRLs. PCBs in the form of Aroclor 1242 were detected in samples collected from QST-B2 @ 8 feet bgs and QST-B15 @

39 feet bgs. The concentration of Aroclor 1242 in QST-B2 (3,200 ug/kg) exceeded the residential SRL (2,500 ug/kg) but was below the nonresidential SRL. Other organic constituents were detected in only a few samples (i.e., organochlorine pesticides), which were below their respective residential SRLs.

Total Metals were detected in all of the collected samples. Of these detected metals, Arsenic exceeded nonresidential SRLs in samples collected from QST-B3 @ 75 feet bgs; QST-B10 @ 50 feet bgs; and QST-15 @ 66 feet bgs. In addition, Thallium, which has no SRL or other regulatory action level, was detected in samples collected from QST-B14 @ 76 feet bgs; QST-B15 @ 66 feet bgs; and QST-B16 @ 26 feet bgs. Lastly, Manganese was detected in the sample collected from QST-B15 @ 66 feet bgs, which exceeded the residential SRL but was below the nonresidential SRL.

Based on these results, no significant sources of VOCs were identified in the areas sampled within the Western and Central portions of the Landfill. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit is the primary source of VOC within the Landfill. In terms of the detected metals, Arsenic and Thallium are considered compounds of interest in the Landfill because they exceeded appropriate action levels and were detected at a frequency of greater than 5 %. The soil sample results of the Landfill investigation is provided in Table 6.6.

The grab groundwater samples collected from the boreholes were used solely for screening purposes and cannot be used as valid data for the RI and FS assessment. The analytical results for organic compounds of the collected grab groundwater samples indicated the presence of VOCs in samples collected from Boring QST-B1 through QST-B8, and QST-B12 through QST-B21. As anticipated, the VOC concentrations were significantly higher in groundwater samples collected from the western portion of the Landfill than groundwater samples collected from the central (relocated) portion. This elevation of VOC concentrations in the western portion of the Landfill was obviously due to the existing groundwater plume.

In terms of the VOCs found in grab groundwater sample collected from the western Landfill soil borings (i.e., Boring QST-B1 through QST-B8) concentrations of VC that exceeded AWQSs in all of these collected samples.

Concentrations of cis-1,2-DCE exceeded AWQSs in borings QST-B2, QST-B5, and QST-B6. All other detected VOC in western boring groundwater samples were below their respective AWQSs. In addition, the VOCs detected in all of the remaining boring groundwater samples were either non-detect or below their respective AWQSs. Figure 4.3 provides a distribution of the predominant signature chemicals (i.e., VC & cis-1,2-DCE) in groundwater grab samples (collected May 1999) directly beneath the Landfill. Review of this figure would confirm the finding of the soil samples, that significant (other) sources of VOCs in the areas investigated were not present. Other organic compounds detected in the grab groundwater samples were below their respective AWQSs.

In terms of the results for Total Metals, the groundwater grab samples indicated the presence of majority of the analyzed metals at concentrations exceeding AWQSs. However, because the collection of the grab groundwater samples was for screening purposes only and was not collected from properly installed wells, the detection of these metals that exceeds AWQSs cannot be used as valid data in the RI assessment. The groundwater grab sample results of the Landfill investigation is provided in Table 6.7. The laboratory reports for the collected soil and groundwater grab samples are provided in Appendix K.

6.2.5.2 Investigation of Former Landfill

Because previous groundwater data indicated the presence of VOCs within wells downgradient to the former Landfill (i.e., EW-11 and EW-22) which exceed ADEQ s AWQSs, further investigation of the potential VOC sources within the former Landfill was necessary. Usually, determining potential subsurface sources is completed by placement of soil borings within the former Landfill. However, ESE was aware that the presence of cobbles within the Salt River Bed would make collection of soil samples extremely difficult (if not impossible). Consequently, ESE elected to install two groundwater monitoring wells (EW-24 and EW-25) within the former Landfill in lieu of soil borings. The locations of the two wells (Figure 4.1), north and northwest of the current Landfill configuration, would provide critical data on whether or not the former Landfill area was contributing to the impact of VOCs in groundwater. In addition, these wells would provide additional data points for determination of upgradient and crossgradient VOC degradation conditions. The rationale, well installation and soil sample collected procedures, and analytical requirements are summarized in Section 4.8.2.

The analytical results for organic compounds of the collected soil samples were all below their respective method reporting limits. In terms of the results for Total Metals Arsenic was detected samples collected from EW-24 @ 50 feet bgs and EW-25 @ 35 feet bgs at concentrations that exceeds the nonresidential SRLs. In addition, Thallium, which has no SRL or other regulatory action level, was detected in the sample collected from EW-24 @ 50 feet bgs.

Based on these results, no significant sources of VOCs were identified in the areas sampled within the former Landfill. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit within the existing Landfill is the primary source of VOC. In terms of the detected metals, Arsenic and Thallium are considered compounds of interest in the former Landfill because they exceeded appropriate action levels and were detected at a frequency of greater than 5 %. The soil sample results of the former Landfill investigation is provided in Table 6.6. The laboratory reports of the soil samples collected are provided in Appendix K.

6.2.6 Surface Geophysical Survey

In 1992, Geophysical surveys were conducted at the surface in an effort of delineate the extent of the Landfill and improve knowledge of the geologic structure beneath the Site (HLA, 1995b). Two geophysical techniques were used: electro-magnetic profiling and sounding (EM) and vertical electrical resistivity soundings (VES). EM surveys were performed using Geonics EM31-D and EM34-3 inductive terrain conductivity measuring systems. The VES survey was conducted using a four-electrode Schlumberger DC resistivity array. Both methods measure the electrical properties of earth materials. The locations for the surveys conducted as part of the study are illustrated on Figure 6.7.

Two EM34-3 test profiles intersecting at monitor well EW-3 were conducted within the study area. The first profile line began east of the Site at the southern boundary and extended 1,800 feet north through EW-3 and terminated approximately 450 feet north of the southern bank of the river. The second profile line began 500 feet east of EW-3 and extended 2,800 feet west through EW-3, over the relocated refuse and terminating in the river.

The analytical results for organic compounds of the collected soil samples were all below their respective method reporting limits. In terms of the results for Total Metals Arsenic was detected samples collected from EW-24 @ 50 feet bgs and EW-25 @ 35 feet bgs at concentrations that exceeds the nonresidential SRLs. In addition, Thallium, which has no SRL or other regulatory action level, was detected in the sample collected from EW-24 @ 50 feet bgs.

Based on these results, no significant sources of VOCs were identified in the areas sampled within the former Landfill. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit within the existing Landfill is the primary source of VOC. In terms of the detected metals, Arsenic and Thallium are considered compounds of interest in the former Landfill because they exceeded appropriate action levels and were detected at a frequency of greater than 5 %. The soil sample results of the former Landfill investigation is provided in Table 6.6. The laboratory reports of the soil samples collected are provided in Appendix K.

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Two EM34-3 test profiles intersecting at monitor well EW-3 were conducted within the study area. The first profile line began east of the Site at the southern boundary and extended 1,800 feet north through EW-3 and terminated approximately 450 feet north of the southern bank of the river. The second profile line began 500 feet east of EW-3 and extended 2,800 feet west through EW-3, over the relocated refuse and terminating in the river.

Results from the EM34-3 showed that the depth of landfilling could be partially delineated, but the results from the 131 foot coil spacing did not provide sufficient depth of investigation to clearly delineate the depth of landfilling or underlying geology. The maximum depth of investigation of 50 feet with a 6 foot coil spacing implied that the technique would provide data for 20 feet beneath the 30 foot high landfill mound. This technique would have been useful for delineating the areas of deeper landfilling under the mound. However, this technique could not clearly delineate the total depth of landfilling, and thus was not considered to be of a significant value to continue the survey.

The EM31-D data coverage included one profile line along the road on the south bank of the river between the Landfill and the Salt River. An area survey was conducted across the western portion of the Site between the main entrance on the west and the fence surrounding the relocated refuse on the east. The area survey data were collected along 24 north-south gridlines spaced at approximately 30-foot intervals. In addition, a reconnaissance survey was completed at the location of the liquid waste disposal pit. The reconnaissance survey was used to map the boundaries of the pit based on the differences in conductivity values.

The EM31-D survey conducted along the Salt River noted some high in-phase signal data for the areas near monitor wells EW-2 and EW-9. As previously noted, the SH&B well logs noted wire in this area. It is possible that these high in-phase readings are indicative of metal containing debris, which would correlate with wire that was noted by SH&B logs from this area. The measured conductivity values appear to be related to the depth of burial. The soil borings conducted by SH&B in 1987 (SH&B, 1987) indicated depths of 13 feet to refuse near EW-16, and only 5 feet west of EW-9. This would indicate substantial refuse is buried under the road near the eastern end of the relocated refuse at depth shallower than approximately 20 feet.

The gridded EM31-D survey conducted in the western portion of the Landfill also provided data on possible areas of landfilled material, although the results are not conclusive. Based on HLA's previous experience at landfill sites, the EM contour data suggest that landfilling activity has taken place area east of the main gate. The apparent conductivity values for the EM contour map (HLA, 1995b) show lateral changes in conductivity that are due to one or more of the following: variation in depth and volumes of landfilled materials, changes in soil type, or changes is soil moisture. The high conductivity values measured near the metal boundary fence along the Salt River mask the underlying conductivity variations due to landfilled material. The effect that metal fences have on the results was shown by elevated conductivity and in-phase signal along the north and south perimeter fences which bound the survey area.

The EM31-D successfully identified the buried pit area, and indicated that some landfilling had taken place west of the mound. The reconnaissance survey of the waste disposal pit area located a strong resistivity contrast between the presumed fill material and the surrounding soils. Location of this feature is clearly defined along its east-west extent, but delineation of the feature in a north-south direction proved difficult due to the presence of the power lines and fences (see Figure 6.17).

One vertical electrical resistivity soundings (VES) profile was performed at a location 50 feet east of monitor well EW-3 in a north-south orientation (Figure 6.7). For this survey, three sets of potential electrodes were utilized, with spacings of 1.64, 13.12, and 32.81 feet from the center point of the survey. This results in overlap of the data coverage as depth of measurement is a function of both current electrode spacing and cottage electrode spacing. VES measurements were made using a Bison Instruments Model 2390 signal averaging resistivity system. Current electrodes consisted of copper-clad steel stakes driven into the ground. Voltage readings were made using nonpolarizing copper-clad sulfate electrodes.

VES results are typically presented as columnar sections showing the layered earth resistivity values. Resistivity values range from 33 to 546 ohm-m for the upper 40-foot thick layer (alluvium composed of dry sandy gravel) and 2 ohm-m in the 18-foot thick lower layer (highly conductive material that may be sand and gravels saturated with water having high ionic content or saturated clays). Below the depth of 58 feet is material having resistivity of 22.5 ohm-m (moist to saturated gravelly sand with low to moderate silt and clay content). No other contrasting layers were identified below 58 feet, which indicates that the Tempe Beds have insufficient electrical conductivity contrast from the soils above to present a target for surface geophysics. Downhole geophysical logs completed by Welenco on January 11, 1989 at well EW-3, also show that the Tempe Beds have little resistivity contrast (resistivity increase from 25 to 40 ohm-m) from the overlying formation. Based on the results, no further VES soundings were performed.

Overall, the geophysical data collected indicate that refuse is likely buried under the western portion of the Site. Refuse also appears to be buried under the berm road along the Salt River from the area just east of EW-16 to the area just west of EW-9. The majority of the northern boundary of the Site appears to be underlain by refuse. The data do not indicate the presence of drum disposal. The survey conducted over the relocated refuse identified an area of deeper refuse burial that was noted in the aerial photographs. The survey data also confirmed that refuse was not present in the river at the two locations surveyed. The survey was most useful in accurately locating the east and west boundaries of the buried waste disposal pit that is the primary source area.

6.3 Soil Gas

The primary objective of soil gas sampling was to identify possible areas of subsurface soil impacted by VOCs. Two soil gas surveys were performed at the Site. A Phase I study was conducted in 1991 and a Phase II study in 1994. The secondary objective of the Phase II study was to evaluate potential landfill gas emissions. The discussions of soil gas are subdivided into three parts, the Phase I results, the Phase II results, and results of the landfill gas investigation. Overall, soil gas sampling indicated very low concentrations of VOCs in soil gas across the entire Site.

6.3.1 Phase I Soil Gas Study

A soil gas study was conducted in March 1991, the results of which were presented in the *Source Verification/Soil Gas Survey* (HLA, 1991b). The preliminary survey concentrated on two main portions of the Site, including the source area located along the southern boundary, and the western portion of the Site. The Phase I soil gas sample locations are shown on Figure 6.5. There were 16 soil gas sampling locations (SG-1 and SG-3 through SG-17) in the vicinity of the suspected source area. Sample locations in this area were selected by using a 100 x 100-foot grid style pattern. Sampling was conducted at the approximate corners of the grid. An additional 16 soil gas sampling locations were located on the western portion of the Site (SG-2 and SG-19 through SG-33). These locations were also selected using a grid pattern; however, the spacing was slightly more irregular and closer to 200 x 200 feet. No sampling was performed on the relocated portion of the Estes Landfill or along the northern Site boundary, adjacent to the river during this preliminary survey.

Three soil gas sample locations were selected along 40th Street just west of the Estes Landfill (SG-34 through SG-36). These locations were selected to evaluate VOC concentrations in soil gas downgradient and offsite. Two additional sampling locations (SG-18 and SG-37) were selected near the southeast limits of the original Estes Landfill boundary and east of the source area. These final two locations were selected hydraulically upgradient, based on the groundwater flow direction, from the source area because of detections of both halogenated and aromatic VOCs detected at the northeast corner of the Bradley Landfill (SH&B, 1987).

Soil gas vertical profiles were conducted at the first two locations (SG-1 near the eastern well cluster and SG-2 near the western well cluster) at depths of 5, 10, 15 and 20 feet bgs. Analysis of vertical contaminant distribution profiling was conducted to evaluate whether significant differences in chemical concentrations were observed with depth. Soil gas results from the first two points of this survey indicated concentrations increased between depths of 5 and 10 feet bgs, but remained relatively stable below 10 feet. Therefore, the remaining soil gas samples were collected at 10 feet bgs. The list of target chemicals was based on groundwater quality data. Using EPA Test Method 601, soil gas samples were analyzed in an onsite mobile lab for VC, cis-1,2-DCE, 1,1-DCE, TCE, 1,2-DCB, PCE, benzene and chlorobenzene. Two duplicate samples were submitted to a stationary laboratory for analysis of the full suite of 601 compounds. Only one additional 601 compound was present in the two duplicate samples; 1,4-DCB at 1.30 μg/l and 3.32 μg/l.

While all analytes of interest were detected in at least one sample, the overall concentrations of the analytes were very low. Concentrations of VOCs ranged from less than the detection limit of 0.01 (<0.01) μg/l to 21.60 μg/l. Concentrations of TCE, cis-1,2-DCE, and VC ranged from <0.01 μg/l to 10.60 μg/l. Specifically, concentrations for TCE were very low and only four locations had concentrations above the trace level established at 0.1 μg/l, and the greatest concentration detected was 0.35 μg/l at the northwest corner of the relocated refuse mound (Figure 6.8). Concentrations of cis-1,2-DCE were also low, with only five locations exceeding 1.0 μg/l. The greatest concentration of cis-1,2-DCE was 8.36 μg/l near the source area (Figure 6.9). Concentrations of VC were only slightly higher than the cis-1,2-DCE concentrations with 13 locations exceeding 1 μg/l (Figure 6.10). The greatest VC concentration, 10.1 μg/l, was also detected near the source area. Chlorobenzene had the greatest detected soil gas concentration at 21.6 μg/l (Figure 6.11). The results for cis-1,2-DCE, VC and chlorobenzene were generally outlined in two different areas on the Landfill. One area was the source area, and the other was on the west central portion of the Site. Soil gas results from samples collected along 40th Street were all below analytical detection limits. Analytical results are presented in Table 6.8. The detection of VOCs in soil gas reading across the site indicated that other potential VOC sources (in addition to the liquid disposal pit) may exist within the Landfill boundary. However, based on the results of ESE's subsurface soil investigation of the current Landfill (Section 6.2.5), no other significant sources of VOCs were identified. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit is the primary source of VOC within the Landfill.

6.3.2 Phase II Soil Gas Study

In August 1994, a Phase II soil gas study was conducted to evaluate areas not sampled during the Phase I study. Detailed results were presented in the Remedial Data Acquisition report (HLA, 1995b). A total of 46 soil gas locations were sampled and analyzed for a select suite of halogenated and aromatic VOCs (Figure 6.6). Phase II soil gas sample locations included the area of relocated refuse. Twenty soil gas probes were driven to between 25 and 30 feet bgs on a grid spacing of approximately 200 x 200 feet on top of the relocated refuse (SG-122 through SG-141). Elsewhere soil gas samples were collected from approximately 10 feet bgs on the original portions of the Site.

Another area evaluated during the Phase II survey was the northern area, between the relocated refuse and the Salt River, because refuse was reportedly present in this area (SH&B, 1987). Twelve soil gas points were surveyed, one approximately every 100 feet along the existing access road adjacent to the river (SG-110 through SG-121). Additionally, eight Phase I soil gas locations were resampled during the Phase II investigation for possible correlation purposes and to verify soil gas readings noted east of the source area during the earlier survey (SG-101 through SG-108). Six sampling points above and beyond the original scope of work were added near the source area and to the east of the pit (SG-107A, SG-107B, SG-108A, SG-109, SG-109A and SG-109B).

The concentrations of halogenated VOCs over the entire area surveyed were very low and generally less than 1.0 μg/l. The results for carbon tetrachloride, chloroform, 1,2-dichloroethane (1,2-DCA), Freon 11, Freon 113, methylene chloride, PCE and 1,1,1-TCA were each below detection. The concentrations of TCE were low and less than 1 μg/l except for sample SG-120, located near the northeast corner of the northern access road, where a concentration of 5 μg/l was detected (Figure 6.12). The greatest concentrations of total 1,2-DCE and VC were 2.0 μg/l, on the western portion of the Site near the northwest corner of the relocated refuse and near the source area (Figures 6.13 and 6.14, respectively). These concentrations were lower than those reported during the Phase I survey. The majority of the VC concentrations were less than 0.02 μg/l and the majority of the total 1,2-DCE concentrations were less than 0.5 μg/l.

Concentrations of the aromatic VOCs including benzene, toluene, ethylbenzene and xylenes (BTEX), chlorobenzene, and the dichlorobenzenes were also detected in several locations. While these concentrations were slightly higher than the halogenated constituents, only chlorobenzene and the dichlorobenzenes have been routinely detected in groundwater. Concentrations of chlorobenzene ranged from below detection to less than 3 μg/l across the original Landfill and from below detection to 59 μg/l beneath the relocated refuse (Figure 6.15).

During Phase I, two soil gas samples, collected several hundred feet east of the source area, showed detectable concentrations of cis-1,2-DCE and VC (Figures 6.9 and 6.10). This location, east of the source area, was further evaluated during the Phase II investigation. The results from the Phase II sampling in this area (SG-108) showed soil gas detections east of the source area and outside of the original Estes Landfill. Additional samples collected further south and east (SG-108A and SG-109, -109A, and -109B) indicated that concentrations were greater in the samples collected closer to the Bradley Landfill for several compounds, including TCE, PCE, total xylenes, and VC.

The greatest concentrations of soil gas constituents reported were for methane. Concentrations of methane ranged from less than 1,000 μg/l to 190,000 μg/l, suggesting that methane production is occurring at the Site despite the age of the Landfill. Analytical results are presented in Table 6.8.

While soil gas concentrations were generally low in both surveys, those measured during the Phase II Soil Gas Study were less than those reported during the Phase I survey. The difference in concentrations may be the result of different depths to groundwater at the time of sampling events. The depth to water was approximately 15 feet shallower during the Phase II survey then during the Phase I investigation. Low soil gas concentrations were found at the source area, the western portion of the Landfill, near the northwest corner of the relocated refuse, and areas below the relocated refuse. The detection of VOCs in soil gas reading across the site would indicate that other potential VOC sources (in addition to the liquid disposal pit) may exist within the Landfill boundary. However, based on the results of ESE's subsurface soil investigation of the current Landfill (Section 6.2.5), no other significant sources of VOCs were identified. Although, this does not imply that VOC sources do not exist, it does provide a higher level of confidence that the former liquid waste disposal pit is the primary source of VOC within the Landfill.

6.3.3 Landfill Gas Monitoring

In September 1994, HLA monitored the installation and sampling of 26 shallow and deep permanent landfill gas monitoring probes located at 13 different locations around the Estes Landfill (HLA, 1995b). Installation of permanent landfill gas monitoring probes was completed to provide a method for measuring methane and other atmospheric gasses including carbon dioxide, oxygen, and nitrogen. The locations of the permanent probes, PP-1 through PP-13, are shown on Figure 6.16. Landfill gas monitoring was conducted on September 1 and 2, 1994. Landfill gas samples were collected in precleaned Summa™ canisters provided by the laboratory. Additional details regarding the installation and sampling of the permanent probes were presented in HLA's Remedial Data Acquisition report (HLA, 1995b).

Concentrations of methane were detected in Landfill gas samples from 23 of the 26 locations. Detected concentrations ranged from less than 5% to greater than 60% by volume in shallow and deep subsurface probe samples. The greatest methane concentrations were reported for samples collected from the eastern portion of the relocated refuse (PP-12 and PP-13). Methane was below detection limits in samples collected from the western-most probes (PP-1 and PP-2), indicating that methane is not migrating offsite under 40th Street, and that there is no buried refuse at that location. The presence of methane and methane production along the southern portion of the Landfill is likely influenced by the presence of the Bradley Landfill, which is also a source of methane. Subsurface concentrations of methane ranging from approximately 10% to 45% were detected along the river bank. However, lateral migration of methane in this area would likely occur as diffusion out of the river bank. There are no structures at the Site where Landfill gas can accumulate to cause a potential explosion hazard. However, should future site redevelopment include the construction of enclosed structures, methane build up in these structures could create an explosive condition.

During June 1995, three deep permanent gas probes were sampled and analyzed for VOCs using EPA Test Method TO-14. These probes included PP-4, located near the western well cluster, PP-6, located near the source area, and PP-7, located approximately 800 feet hydraulically upgradient from the source area (Figure 4.4). Results indicated VOC concentrations (Table 6.9) were very similar to those reported during the Phase II soil gas survey. Detected compounds included BTEX, chlorobenzene, 1,1-DCA, total 1,2-DCE and VC. Concentrations of halogenated VOCs were very low and generally less than 1.0 μg/l. The greatest detected aromatic VOC concentration was chlorobenzene at 69 μg/l in the soil gas sample from PP-6 located near the source area.

To evaluate offsite migration of methane west of the relocated refuse, HLA installed eight additional shallow and deep permanent Landfill gas monitoring probes at four different locations east of the existing Site (PP-14 through PP-17) on City owned property. These probes were sampled in July 1995. Again, Landfill gas samples were collected in precleaned Summa™ canisters provided by the laboratory. Installation and sampling details were presented in the Third Quarter 1995 Quarterly Report (HLA, 1995d). The locations of these probes were shown on Figure 6.16. Methane was below detection levels in all eight samples, indicating that methane is not migrating offsite to the east. The results of the methane monitoring conducted in 1994 and 1995 are summarized in Table 6.10.

On July 23, 1997, HLA perform methane monitoring on all 34 shallow and deep Landfill gas probes. When collecting the methane samples, HLA followed the same procedures as above. In general the result of the methane concentration were lower than previous monitoring results with methane detected in 16 of the 34 probes in concentration that ranged from 0.6 to 23.7 % by volume. Like previous results the greatest methane concentrations were reported for samples collected from the eastern portion of the relocated refuse (PP-12 and PP-13). Methane was below detection limits in samples collected from the western-most probes (PP-1 and PP-2), indicating that methane is not migrating offsite under 40th Street, and that there is no buried refuse at that location. In addition, methane was not detected in probes PP-14 through PP-17, indicating that methane is not migrating offsite to the east. The results of the methane monitoring conducted in July 1997 are summarized in Table 6.11.

In May 1999, ESE performed methane monitoring on all 34 shallow and deep Landfill gas probes. The rational, sample collection procedure, and analytical requirements for the methane monitoring performed by ESE are summarized in Section 4.8.5. In general the result of the methane concentration were much higher than the 1997 monitoring results, but was similar to the 1994/95 results. In this round of monitoring Methane was detected in 19 of the 34 probes in concentration that ranged from 1 to 68 % by volume. Like all of the previous results the greatest methane concentrations were reported for samples collected from the eastern portion of the relocated refuse (PP-13). Methane was below detection limits in samples collected from the western-most probes (PP-1 and PP-2), indicating, again that methane is not migrating offsite under 40th Street, and that there is no buried refuse at that location. In addition, methane was not detected in probes PP-14 through PP-17, indicating that methane is not migrating offsite to the east. The results of the methane monitoring conducted in May 1999 are summarized in Table 6.12. The laboratory report of the methane results collected during this round of sampling is presented in Appendix K.

In order to compare the trend of methane production, all three rounds of methane results were compared together (Table 6.13). Although the concentration of methane did vary from one sampling round to another no clear trend could be established except that methane appeared to have the highest concentrations within the relocated portions of the Landfill. In addition, it has been established that methane is not migrating west or east offsite. In addition, as previously stated by HLA, the presence of methane and methane production along the southern portion of the Landfill is likely influenced by the presence of the Bradley Landfill, which is also a source of methane. The current concentrations of methane could create explosive conditions if low lying areas or enclosed structure were present. However, because these types of site conditions are not present explosion potential due to build up of methane is currently not an issue. Should future site redevelopment be planned which includes the construction of enclosed structures, the potential of methane creating an explosive condition would be an issue of concern.

6.4 Groundwater

Groundwater samples collected from wells located in the vicinity of the Site were analyzed for specific chemical compounds to evaluate Site groundwater quality. Thirty-one rounds of groundwater samples were collected during the period September 1988 through December 1996. The results of these groundwater samples are presented in Appendix A.

6.4.1 Monitor Well Network

The Site monitor wells were installed in six phases. The first phase was overseen by ADHS and consisted of four wells (EW-NE, EW-E, EW-W and EW-NW) installed in 1982. These wells provide nearly 15 years of water quality history for the Site. Because of their unusual design a brief description of these wells is provided. The wells were constructed with a 4-inch diameter PVC casing screened from 80 to 100 feet bgs, and an outer 8-inch diameter steel casing slotted from 20 to 100 feet bgs. The annular space between the two casings is filled with pea gravel. This design indicates that the groundwater sampled from these wells is potentially from multiple hydrostratigraphic units. Therefore, the water quality results are used to represent average groundwater conditions.

Phases 2 through 5 of the monitor well installation program were overseen by HLA. The second well installation phase, which included monitor wells EW-1 through EW-6, was conducted in 1988 and 1989 (HLA, 1990). The third phase, which included monitor wells EW-7 through EW-14 and the aquifer test/recovery well EW-RW1, was conducted in late 1990 and early 1991 (HLA, 1992g). A second aquifer test/recovery well (EW-RW2) was installed in late 1991 (HLA, 1992g). Phase 4 included monitor wells EW-15 through EW-18 and piezometers EW-PZ1 through EW-PZ6 and was conducted in late 1993 (HLA, 1994b). Phase 5 included the installation of monitor well EW-19 and piezometers EW-PZ7 through EW-PZ10 during early 1996. Monitor well EW-22, was installed in mid-1994 by Earth Technology as part of a separate investigation.

Phase 6 was conducted by ESE, under contract to the ADEQ, and included the installation of monitor wells EW-23 through EW-26. Further details of the Phase 6 well installations are presented in Section 4.8 of this report. All of the well completion specifications are provided on Table 6.14. The location of all of the wells are shown on Figure 1.3.

The Site monitor wells, excluding the piezometers and Well EW-2, are equipped with dedicated electric submersible pumps and a sampling tee to facilitate the collection of groundwater VOCs for analysis, while minimizing volatilization. The sampling tee also eliminates back pressure on the pump, thus reducing agitation of the groundwater. The sampling and analysis procedures have been detailed in two Quality Assurance Project Plans (QAPPs) (Dames & Moore, 1986 and HLA, 1992a) and various Sampling and Analysis Plans (SAPs) (HLA, 1991a, 1992b, and 1996a) which have been prepared, submitted and approved by ADEQ. The following summarizes wells used to characterize groundwater conditions during the course of the Remedial Investigation.

Estes wells:

- EW-1 through EW-19
- EW-22
- EW-23 through EW-26 (installed May, 1999)

- EW-PZ1 through EW-PZ10
- EW-NE, EW-E, EW-W and EW-NW
- EW-RW1 and EW-RW2
- EW-OE

Bradley wells:
- BW-NES (shallow) and BW-NED (deep)
- BW-SES (shallow) and BW-SED (deep)
- BW-SS (shallow) and BW-SD (deep)
- BW-WS (shallow) and BW-WD (deep)
- BW-P (production)

Tanner wells:
- TW-1 through TW-5
- TW-P (production)

Southbank wells:
- SB-1 through SB-7

Arizona Design Center wells:
- ADC-1 through ADC-4

Thomas-Hartig wells:
- TH-1, TH-8, TH-12 and TH-24

Tovrea/USGS well:
- TW-USGS

6.4.2 Groundwater Sampling Program

In order to establish a baseline of data for groundwater at the Site, the four original wells (EW-E, EW-W, EW-NE, and EW-NW), three Bradley wells (BW-WD, BW-SD, and BW-NED), and the Tanner production well (TW-P) were sampled in September 1988, prior to installation of the second phase of Estes wells (EW-1 through EW-6). These groundwater samples were each analyzed for VOCs and SVOCs by EPA Methods 624 and 625. Additionally, these groundwater samples were analyzed for metals (antimony, arsenic, barium beryllium boron cadmium, total chromium, copper, iron lead manganese, mercury, nickel, selenium, silver, thallium, and zinc) major ions (calcium magnesium, potassium, sodium, ammonia, chloride, fluoride, nitrate, bicarbonate, carbonate, total cyanide, and TKN), and indicators (pH and total dissolved solids).

Following installation of the second phase of Estes wells in late 1988 and early 1989, routine quarterly monitoring was initiated (first quarter 1989). An evaluation of the VOC results from these sampling rounds indicated that VOC analyses by EPA Methods 601 and 602 could be used to identify detected compounds and a lower detection limit would result. This change in method was approved by the ADEQ, and similar gas chromatograph methods are still being used at the Site. The ADEQ also approved the elimination of SVOCs from the sampling program, due to the lack of SVOCs in groundwater. Bis(2-ethylhexyl)phthalate, commonly associated with PVC wells, was the only SVOC detected. During the first two sampling events of 1989, radionuclides were also sampled at the onsite monitor wells. These parameters were also eliminated from the sampling program with ADEQ approval, because they were not detected. Based on the review of aerial photographs that contained evidence of active agriculture at the Site, pesticides and PCBs were analyzed for the onsite wells during the second quarter of 1989. Analysis of pesticides and PCBs were also eliminated from the sampling program with ADEQ approval because no pesticides or PCBs were detected. Groundwater samples were never analyzed for organophosphorus pesticides or chlorinated herbicides because the use of these compounds is not as common as organochlorine pesticides. However, the latest groundwater monitoring results did include these compound groups.

The phase one and two Estes wells and the background wells were routinely monitored from 1989 through 1991 for VOCs, metals, general inorganics, and indicators as outlined above. The third phase of wells (EW-7 though EW-14) were added to this routine after their installation in 1991. In 1992, a *Groundwater Monitoring and Sampling Plan, Estes Landfill, Phoenix, Arizona* (HLA, 1992b) was approved by ADEQ and implemented at the Site. Changes to the list of analytes was minimal and included the elimination of inorganic compounds cyanide and total Kjeldahl nitrogen, and the addition of the inorganic compounds total alkalinity and hydroxide alkalinity. Other changes to the sampling routine included limiting the analysis to VOCs for five of the Estes wells (EW-1, EW-5, EW-6, EW-10, and EW-13), the Bradley wells (BW-P, BW-WD, and BW-SD), and other offsite wells (TW-P, TW-1, TW-4, SB-4, and SB-6). The wells EW-1, EW-2, EW-OE, EW-RW1, and EW-RW2 were set up for sampling on an annual basis.

Installation of the fourth phase of Estes wells (EW-15 through EW-18 and EW-PZ1 through EW-PZ6) was completed in late 1993. These wells were sampled for VOCs, metals, and general inorganic compounds for three consecutive rounds (fourth quarter 1993 through second quarter 1994). After that period, the analyte list for these wells was limited to VOCs because a sufficient amount of metals and general inorganic data had been collected.

ADEQ approved a modification in the number of wells sampled and a modification in the suite of analytes in a letter dated October 20, 1995. This change limited the list of wells for quarterly sampling to EW-NW, EW-1, EW-4, EW-9, EW-11, EW-14, EW-17 and EW-18 for analysis of VOCs by EPA Method 601 and 602, which was subsequently been replaced by EPA Method 8021. This list is supplemented by biannual sampling of wells and piezometers located in the eastern and western well clusters for VOCs and annual sampling to include metals and major ions. Following installation of wells EW-19, EW-22 and EW-PZ7 through EW-PZ10, EW-22 was added to the quarterly monitoring program and the remainder of the wells were slated for four consecutive quarters, followed by biannual sampling for VOCs and annual sampling for metals and major ions.

The sampling rounds from June 1995 and June 1996 were also supplemented with constituents that reveal the nature and extent of biological processes at the Site. These parameters included redox potential, DO concentrations, COD, BOD, ferrous and ferric iron, orthophosphate, TOC, TKN, and the C1 through C4 hydrocarbons.

Details of the June 1999 sampling round is presented in Section 4.8.3 of this report.

6.4.3 QA/QC Program

The collection of field quality assurance/quality control (QA/QC) samples, laboratory QA/QC, and data validation were conducted to ensure reliable the RI data quality.

6.4.3.1 HLA's Groundwater Sample QA/QC Program

In order to assess whether the analytical methods were introducing systematic error into the program, analytical data generated from the 13 rounds of groundwater sampling were validated according to accuracy, precision, and completeness of both the analytical laboratory and field sample collection programs. The groundwater samples collected were analyzed over time by four different laboratories: Enseco, Vista, Analytical Technologies, Inc., and Hazelton Environmental Services. Seven of the 13 rounds were selected for rigorous validation to assess laboratory and field sampling performances at different times during the RI. The seven rounds selected included four of the more recent rounds, consisting of the period October 1995 through June 1996, and at least one round from each different laboratory. Data qualifiers were assigned to these data based on the EPA Contract Laboratory Program (CLP) procedures (EPA, 1994).

A data quality control review was conducted for each of the remaining rounds. Appropriate data qualifiers were assigned to the generated groundwater quality data. Ten percent of the data for arsenic were qualified separately for the purposes of the risk assessment.

The groundwater analytical data collected were evaluated by the above procedures. Field data forms were routinely reviewed for the measurement of all field parameter and well discharge characteristics. Laboratory data forms were also routinely reviewed for the completion of required measurements including parameter results, limits of detection, method detection limits, and dilution factors. The representativeness and comparability of data were evaluated in relation to historical results and to QC measurements of precision, accuracy, and blank concentrations.

Based on this evaluation, each analytical result was classified as unqualified, qualified, or rejected. Data that were unqualified were complete, representative, and comparable. No systematic errors from field and/or laboratory procedures were identified in the collection, handling, or reporting of unqualified data. Data that were qualified were considered acceptable with specific minor exceptions. These exceptions were provided with the data as a qualifier represented by a letter. These data qualifiers are as follows:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the groundwater sample.
N	The analysis indicated the presence of an analyte for which there was presumptive evidence to make a "tentative identification".
NJ	The analysis indicated the presence of an analyte that was "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the groundwater sample.
D	The groundwater sample itself was diluted because an analyte was suspected to be at a concentration that was greater than the upper calibration range of the measuring instrument.
B	The analyte was detected in the blank. Therefore, the analytical result for that analyte may not be representative of the concentration in the groundwater sample.

Data that were rejected, represented by the letter "R", had serious deficiencies in the ability to analyze the groundwater sample and meet QC criteria. The presence or absence of the analyte could not be verified. Approximately 0.1% of the groundwater quality data collected were rejected as a result of quality control problems. Most of these rejected data were related to the compound of 2-chloroethyl vinyl ether. This compound is not present at the Site.

Both unqualified and qualified groundwater analytical data were used to determine the groundwater conditions of the Study Area. Rejected groundwater analytical data were not used. The data validation documentation conducted by HLA is provided in Appendix L.

6.4.3.2 ESE's RI QA/QC Program

During the performance of the RI field activities and laboratory analysis, appropriate QA/QC programs were implemented in the field and within the laboratory in accordance with the June 7, 1999 QAPP. Upon receipt of the laboratory data packages, ESE conducted data validation and QA/QC evaluation on approximately 50 % of the data according to accuracy, sensitivity, representativeness, precision, comparability and completeness criteria. In addition, ESE also evaluated performance evaluation (PE) samples that were submitted blind to the laboratory with an known concentration of certain analytes. Data qualifiers (See Section 6.4.3.1) will be assigned once all of the data has been evaluated, which will be presented as an addendum to this report.

The soil and groundwater analytical data collected were evaluated by the above procedures. Field data forms were reviewed for the measurement of all field parameters and procedures. Laboratory data forms were also reviewed for the completion of required measurements including parameter results, limits of detection, method detection limits, and dilution factors.

Based on this evaluation, each analytical result was classified as unqualified, qualified, or rejected. Data that were unqualified were complete, representative, and comparable. Appendix M provides the results of the data evaluation performed for 50 % of the soil and groundwater samples collected during the period from May to June 1999.

Generally all data evaluated (50 %) were properly preserved, collected, met appropriate holding times, and did not have detectable analytes in any associated blanks (i.e. trip and method blanks). In addition, all samples were analyzed with appropriate standard analytical methods required in the June 7, 1999, QAPP. Consequently, majority of the data evaluated meets the representativeness and comparability criteria. In terms of accuracy, sensitivity, and percision, data evaluation found the following:

Soil Samples

In terms of Accuracy (Appendix M-1), the following samples and corresponding analytical group exceeded applicable acceptance limits.

- QST-B2-S/8 for SVOCs and PCBs – In both cases the surrogate standard recovery was diluted out due to matrix effects for PCBs and insufficient sample volume for SVOCs. In terms of the PCB results, because this occurrence is not associated with laboratory QA/QC problems, any analyte positively identified in these groups will be qualified as approximate concentrations. The SVOCs results will be invalid.
- QST-B8-S/35, QST-B7-S/55, and QST-B7-S/37 for VOCs – In all cases the surrogate standard recovery was just below the lower limit of the acceptance limit, due to matrix effects. Because this occurrence is not associated with laboratory QA/QC problems, any analyte positively identified in these groups will be qualified as approximate concentrations.
- EW-25-S/35 and EW-25-S/45 for Organophosphorous Pesticides (OPP) – In both cases the surrogate standard recovery was below the lower limit of the acceptance limit. No explanation was provided by the laboratory. Consequently, the results for this analytical group will be considered invalid until the analytical laboratory can provide an appropriate explanation.
- QST-B5-S/20 for Organochlorine Pesticides (OCP) and PCBs – In both cases the surrogate standard recovery was diluted out due to insufficient sample volume. Consequently, these results will be invalid.
- QST-B14-S/50 for VOCs, SVOCs, OCPs, and PCBs - In all cases the surrogate standard recovery was just below the lower limit of the acceptance limit, due to matrix effects. Because these occurrences are not associated with laboratory QA/QC problems, any analyte positively identified in these groups will be qualified as approximate concentrations.

- QST-B15-S/39 for OCPs - In this case the surrogate standard recovery was just below the lower limit of the acceptance limit, due to matrix effects. Because this occurrence was not associated with laboratory QA/QC problems, any analyte positively identified in this groups will be qualified as approximate concentrations.
- QST-B17-S/15, QST-B17-S/65, QST-B16-S/26, QST-B16-S/30 (Duplicate), and QST-B16-S/75 for SVOCs - In all cases the laboratory control sample recovery for Pyrene was below the lower limit of the acceptance limit. This means that a "biased low" is present for any reported Pyrene results, which will be quantified.
- QST-B17-S/15, QST-B16-S/26, and QST-B16-S/30 (Duplicate) for OCP and PCBs – In all cases the surrogate standard recovery was diluted out due to matrix effects. Because this occurrence is not associated with laboratory QA/QC problems, any analyte positively identified in these groups will be qualified as approximate concentrations.

In terms of Sensitivity (Appendix M-1), all soil samples collected for VOC analysis was notated because, the method detection limit for Vinyl Chloride (i.e., 0.25 mg/kg) was higher than ADEQ's Residential SRL of 0.016 mg/kg. ESE has contacted the laboratory to try to lower the detection limit, which will be provided in a later addendum to this report. However, ESE believes that the SRL for Vinyl Chloride may be too low for this analytical and any other standard analytical method for VOCs in soils. For sample QST-B14-S/50, dilution of the sample due to matrix effects raised the method reporting limit for Arsenic (20 mg/kg) above the residential/non-residential SRL of 10 mg/kg. ESE has contacted the laboratory to try to lower the detection limit, which will be provided in a later addendum to this report.

The percision result (Appendix M-2) of sample QST-B16-S/26 and its corresponding duplicate (QST-B16-S/30) showed that the relative percent difference (RPD) for 4,4-DDE, Chlorobenzene, Naphthalene, Fluoranthene, Copper, Lead, and Nickle exceeded the overall RPD goal of 30 %. Although, this is a very common occurrence within soil samples since an exact duplicate cannot be collected using normal sampling means, any of these parameter positively identified will be qualified as approximate concentrations.

In terms of Representativeness (Appendix M-3), review of split spoon sampler rinsate blanks QST-B33-GW/65 and QST-B50-GW/45 detected the following VOCs, in both cases: Bromodichloromethane, Chloroform, and

Dibromochloromethane. Because, these constituents were not detected in corresponding samples, cross-contamination was not in suspect. Results of all evaluated trip and method blanks were all below their respective method reporting limits.

All evaluated sample met the Comparability criteria (Appendix M-5).

Groundwater Samples

In terms of Accuracy (Appendix M-6), the following samples and corresponding analytical group exceeded applicable acceptance limits.

- Method Blank for Batch PIF00940 to PIF00943 for PCBs and OPPs – In both cases the surrogate standard recovery for the method blank was below the lower limit of the acceptance limit. In terms of the PCB results, because the individual sample surrogates are acceptable no further action needs to be taken. In terrms of the OPP results, this analytical group will be considered invalid until the analytical laboratory can provide an appropriate explanation.
- Method Blanks for Batches PIF01002 to PIF01219 for OPP – In all cases the surrogate standard recovery was just below the lower limit of the acceptance limit. No explanation was provided by the laboratory. Consequently, the results for these analytical groups will be considered invalid until the analytical laboratory can provide an appropriate explanation.
- Method Blanks for Batches PIF01002 to PIF01041 for Chlorinated Herbicides – In all cases the surrogate standard recovery was just below the lower limit of the acceptance limit. No explanation was provided by the laboratory. Consequently, the results for these analytical groups will be considered invalid until the analytical laboratory can provide an appropriate explanation.
- EW-33-GW and EW-PZ1-GW for OPP - In all cases the surrogate standard recovery was just below the lower limit of the acceptance limit. No explanation was provided by the laboratory. Consequently, the results for these analytical groups will be considered invalid until the analytical laboratory can provide an appropriate explanation.

In terms of Sensitivity (Appendix M-5), all groundwater collected for VOC, SVOC, OCP, and PCB analysis was notated because, the method detection limit for the following parameters:

- Methylene Chloride (10 ug/l)
- Bis(2-ethylhexyl)phthalate (100 ug/l)
- Aldrin (0.10 ug/l)
- Dieldrin (0.10 ug/l)
- Toxaphene (4.0 ug/l) and
- All Aroclors (1 ug/l)

were higher than their respective AWQSs or PRG. ESE has contacted the laboratory to try to lower the detection limits of these compounds, which will be provided in a later addendum to this report. However, ESE believes that the action levels for some of these constituents may be too low for this analytical and any other standard analytical soil method.

The Percision result (Appendix M-6) of sample EW-5-GW and its corresponding duplicate (EW-31-GW) showed that the RPD for Carbon Dioxide and Total Kjeldahl Nitrogen (TKN) exceeded the overall RPD goal of 30 %. The Percision result (Appendix M-6) of sample EW-15-GW and its corresponding duplicate (EW-33-GW) showed that the RPD for Carbon Dioxide and Dissolved Ethene exceeded the overall RPD goal of 30 % (Dissolved Ethene was exceeded by a large magnitude). Although, this is a very common occurrence within groundwater samples since an exact duplicate cannot be collected using normal sampling means, any Carbon Dioxide positively identified in the original sample will be qualified as approximate concentrations. Further evaluation will be performed for Dissolved Ethene to determine the validity of the data.

In terms of Representativeness (Appendix M-7), review of groundwater sampling rinsate blanks EW-30-GW, EW-32-GW, and EW-35-GW, detected the following VOCs, in all cases: Bromodichloromethane, Chloroform, and Dibromochloromethane. Because, these constituents were not detected in corresponding samples, cross-contamination was not in suspect. Results of all evaluated trip and method blanks were all below their respective method reporting limits.

All evaluated samples met the Comparability criteria (Appendix M-8).

In terms of the PE sample evaluation (Appendix M-9), the laboratory results for spiked analytes in methods 8082, 8081A, and 8141A were well outside the performance acceptance limits. These occurrences will be further evaluated with the laboratory and the results will be summarized in a later addendum to this report.

6.4.4 Data Analysis

Site groundwater quality was evaluated by comparing analytical results of groundwater samples collected from different wells and comparing analytical results of groundwater samples collected at different times from the same well. As a result of the evaluation, the vertical and horizontal extent of chemical compounds in the groundwater were determined, the sources of the chemical compounds were identified, and the fate and transport of the chemical compounds were assessed. Fate and transport of the chemical compounds are discussed in detail in Section 7.0

Previous investigations conducted at the Site indicated that the Estes Landfill accepted a variety of wastes. In addition, reviews of historical aerial photographs suggested that portions of the Site were used sporadically for agriculture and that stockyards had been located upgradient of the Site. Therefore, initial groundwater samples collected from Site wells were analyzed for a wide variety of chemical compounds, including VOCs, SVOCs, inorganic compounds including metals, pesticides and PCBs. Because SVOCs, pesticides and PCBs were not detected, groundwater samples were subsequently not analyzed for these compounds. Through December 1996, groundwater samples have been analyzed for a substantial number of VOCs, inorganic compounds, and metals. Discussions of groundwater sampling methodologies and analytical methods are presented in sections 4.0 and 6.4.

The data generated from each of the 31 groundwater sampling rounds were assessed. The assessments concluded that the primary contaminants detected in the groundwater samples were VOCs. Select metals and nitrate were also detected, but less frequently and at low concentrations.

Analytical results of groundwater samples collected from sampling events, that were not inferred to be influenced by significant groundwater recharge events, were compared with one another to establish chemical compound concentration trends. The rationale for comparing samping event data was based on an evaluation of groundwater elevation data for each event, that would indicate recharge during higher elevation data.

The trend evaluations concluded that VOC concentrations in the groundwater have declined since 1982. Chemical concentration graphs of VC, cis-12,-DCE, and TCE detected in the groundwater samples collected from well EW-E demonstrate this decline (Figures 6.18 and 6.19). In contrast, metals and nitrate concentrations remain relatively consistent over time. The relative consistency of the inorganic water quality suggests that declines in VOC levels are not due to dilution. Groundwater quality trends are described in detail in Section 7.0.

The groundwater data were further evaluated to identify chemical compounds that may be indicative of Site conditions, and thus, aid in recognizing potential onsite and offsite sources. Specific chemical compounds that characterize Site conditions are those that were detected more frequently and at greater concentrations than other chemical compounds. Concentrations of these specific chemical compounds were used to characterize Site groundwater conditions and to determine fate and transport.

Finally, the groundwater analytical data assessments concluded that specific VOCs were detected at greater concentrations in the groundwater samples collected from offsite wells than those collected from onsite wells. The differences in VOC concentrations indicate the presence of offsite source areas.

Landfill soil conditions (former and existing) were evaluated by comparing analytical results of soil samples collected from different soil borings and comparing analytical results with the residential/nonresidential SRLs. As a result of the evaluation, no additional significant VOC sources were identified. However, metals in the form of Arsenic and Thallium, were present in both areas investigated that exceeded their appropriate action level. Consequently, further evaluation on the potential risk to human health and the environment of these metals present in the subsurface soils will have to be conducted.

6.4.4.1 Compounds of Interest

A general statistical analysis of the groundwater data was conducted to facilitate the identification of specific chemical compounds in the groundwater that were the result of onsite and offsite activities. The general statistical summary subjected the groundwater data to distinct, non-biased criteria. A chemical compound was identified as a Compound of Interest if that particular chemical compound met all of the following distinct, non-biased criteria:

- The chemical compound was detected at a concentration that exceeded the ADEQ AWQS or other regulatory standards;
- The chemical compound was detected that has no ADEQ AWQS or other regulatory standards; and
- The chemical compound was an analyte for a minimum of 20 rounds of groundwater sample analyses and the chemical compound was detected at least once during those 20 rounds (five percent).

As demonstrated in Tables 6.15 and 6.16, the Groundwater Compounds of Interest that met the criteria presented above are as follows:

- VOCs
    - Vinyl Chloride (VC)
    - trans-1,2-Dichloroethene (trans-1,2-DCE)
    - cis-1,2-Dichloroethene (cis-1,2-DCE)
    - Trichloroethene (TCE)
    - 1,2-Dichlorobenzene (1,2-DCB)
    - Chlorobenzene
    - 1,1-Dichloroethene (1,1-DCE)
    - 1,4-Dichlorobenzene (1,4-DCB)
    - Tetrachloroethene (PCE)
    - Benzene
    - 1,2-Dichloroethane (1,2-DCA)
    - Chloroform
- SVOCs
    - Bis(2-ethylhexyl)phthalate
- Inorganics
    - Arsenic
    - Barium
    - Chromium
    - Cadmium

Lead
Manganese
Nitrate as N

Groundwater quality data for the 20 Compounds of Interest are extensive. In addition, the amount of groundwater data available for a particular well varies, as wells were installed at different times. Construction dates of wells installed for this RI and other investigations are presented in Table 6.14.

In following the same statistical criteria, the Landfill soil Compounds of Interest that met the criteria are as follows:

Arsenic (Former and Current Landfill)
Lead (Eastern Portion of Current Landfill)
Thallium (Former and Current Landfill)

6.4.5 VOCs in Groundwater

The following section describes the distribution of VOC in groundwater in accordance with previous and recent (June 1999) groundwater data collected. The laboratory reports for the June 1999 round of sampling is provided in Appendix K. Of the 12 VOC Compounds of Interest, VC, cis-1,2-DCE, and TCE were detected in more than 50 percent of the groundwater samples analyzed (Table 6.15). VC and cis-1,2-DCE had both the highest maximum concentrations and the highest mean concentrations. In addition, VC and TCE has the lowest AWQSs of the VOC Compounds of Interest, which correlates to the higher toxicity value of these compounds. Therefore, VC, TCE, and cis-1,2-DCE are considered signature chemicals for the onsite source area and thus, are the primary focus of this groundwater quality discussion.

As discussed in earlier sections of this report, an offsite source of TCE has been identified south of the Site. This offsite source accounts for the high number of detections. In general, the highest reported TCE concentrations are from offsite wells located southwest of the Site. TCE has been detected in select onsite wells at concentrations generally less than 10 µg/l, with the exception of EW-19 which has had reported concentrations ranging between 11 and 25 µg/l that exceeds AWQS of 5 ug/l. Because offsite TCE sources are also present, the discussion of TCE is divided into offsite and onsite sources.

As noted in previous sections of this report, hydrostratigraphic units F1, F2, and F3 play an important role in the movement of groundwater, and thus, the migration of VOCs. The hydraulic conductivities of these units are especially important in the vicinity of the source area (Figure 5.7). Unit F2, which is an east-west trending ellipsoidal unit that roughly extends from well EW-3 on the east to well EW-4 on the west, is the least permeable of the three alluvial hydrostratigraphic units. The differences between units F1 and F3 are subtle, and, accordingly, are considered to be one unit where unit F2 is not present.

To evaluate what effect, if any, the lower permeability of unit F2 has on the horizontal and vertical migration of the VOCs, eastern and western cluster wells were installed in the different hydrostratigraphic units (Figure 2.1 and 5.7). Eastern cluster wells EW-PZ2, EW-PZ1, EW-PZ3, EW-6, and EW-15, were installed in hydrostratigraphic units F1, F2, F3, F3, and F4, respectively, in the vicinity of the former source area. Western cluster wells EW-PZ6, EW-PZ5, EW-5, and EW-8 were installed in hydrostratigraphic units F1, F2, F3, and F4, respectively, downgradient of the pit. Wells EW-PZ7, EW-PZ8, EW-PZ9, and EW-PZ10 were installed downgradient of the eastern cluster wells in hydrostratigraphic units F1, F2, F2, and F3, respectively, during 1996. Long term groundwater data is not available for these four new wells.

6.4.5.1 Distribution of VC

VC makes up the greatest percentage of potential risk to human health (see Section 8.0). The general trend depicted by recent monitoring well and soil boring (groundwater) indicates that the greatest concentrations of VC were located in the vicinity of the source area and just downgradient (west) of the source area. The greatest VC concentrations were detected in the groundwater samples collected from wells EW-PZ1 (unit F2) and EW-PZ3/EW-6 (unit F3). Only one set of groundwater samples were collected from wells EW-PZ1 and EW-PZ3 in December 1993 shortly after the wells were installed. Subsequent data indicated that the greatest VC concentrations were detected in groundwater samples collected from well EW-PZ1 located in unit F2.

Horizontal Extent of VC

In general, VC concentrations decrease downgradient and cross-gradient from the source area, (Figure 6.20a and 6.20b). Annual mean VC concentrations are greater in the groundwater samples collected from wells located closer to the source area than those located farther away from the source area. Upgradient from the source area, VC was not detected in the groundwater samples collected from wells EW-PZ4, EW-16, EW-2, EW-NE, EW-3, and EW-25 (6/99).

Comparing VC concentrations at wells along the inferred groundwater flow path (west), from dates representative of relatively low groundwater elevations, indicates a decrease of VC concentrations away from the Estes Landfill. In March 1992, Wells EW-E, EW-W, EW-4 and EW-1 (screened in shallow alluvium, F1/F2) had reported VC concentrations of 210 , 9.2, 2.5 and <0.2 µg/l, respectively. In December 1996, these wells had reported VC concentrations of 38, 110, 7 and <0.5 µg/l, respectively. A similar distribution of VC concentrations is indicated in the June 1999 data (Table 6.17), with concentrations at 38, 230, 2.2 and <2.0 µg/l, respectively. Based on these observations, and data from other wells screened in the shallow alluvium, it would appear that VC concentrations have generally decreased in the area of the eastern well cluster. However, VC appears to be more evenly distributed between the east and west well clusters, based on data from 1996 through 1999. Well EW-4 is located approximately 900 feet west-southwest of the western well cluster. Therefore, the VC concentrations in the groundwater decreased approximately two orders of magnitude within 900 feet downgradient from the source area.

Further downgradient, west and southwest of the Landfill, VC concentrations have been below laboratory reporting limits since June 1995, at Well EW-1, and since the intitial sampling at Well EW-2, in March 1991. Therefore, wells EW-1 and EW-12 define the lateral downgradient extent of VC in groundwater.

As of June 1995, the southern extent of the VC plume appears to be defined by Wells BW-SD and EW-14, based on data from these wells that did not indicate dectable concentrations of VC. Prior to this date, the southern extent appeared to fluctuate somewhere between wells BW-SD and EW-10/EW-13. VC was not detected in the majority of the groundwater samples collected from wells located south of the Site, cross-gradient from the source area (Figure 6.20a and 6.20b).

VC was not detected in the groundwater samples collected from wells EW-10 and EW-13 during 1991 through 1996 (these wells were not sampled after 1996). These wells are located 2,400 feet and 2,000 feet south-southwest, respectively, of the source area. VC was not detected in the groundwater samples collected from well EW-17 except for the groundwater sample collected during October 1995 (Appendix A). Well EW-17 is located approximately 1,200 feet southwest of the source area and 700 feet directly north of well EW-13.

VC was not detected in the groundwater samples collected from well BW-SD, except for the groundwater samples collected during June and September 1992 and during March and December 1993. Well BW-SD is located approximately 700 feet south-southwest of the source area on the south side of the Bradley Landfill. These data indicate that decreases in VC concentrations may have been as much as four orders of magnitude between the source area and approximately 700 feet cross-gradient to the south-southwest. During the 1992 and 1993 river flow events, the southern and southwestern lateral extent shifted to the south by an additional 400 feet. During these periods, the southern and southwestern lateral extent was defined by wells EW-17 and SB-4.

VC was detected in the groundwater sample from well BW-SES during December 1992, at a concentration of 1.0 μg/l. Well BW-SES is located approximately 1,100 feet southeast of the source area. Based on the inferred groundwater flow, this relatively low concentration may be anomalous or from a source other than Estes Landfill.

Distribution of the VC plume, cross-gradient and downgradient, north and northwest of the source area appears to be more complex and dynamic than distribution to the west, southwest or south of the source area (Figure 6.20a and 6.20b). Comparing VC concentrations at wells to the west/northwest (downgradient/cross-gradient), from dates representative of relatively low groundwater elevations indicates a change in the distribution of VC concentrations away from the inferred primary source area. In June 1992, Wells EW-E, EW-9, EW-NW and EW-11 (screened in shallow alluvium, F1/F2) had reported VC concentrations of 370, <0.2, <0.2 and <0.2 μg/l, respectively. In

December 1996, these wells, in addition to Well EW-22, had reported VC concentrations of 38, 100, 190, 30 and 19 µg/l, respectively. Similar distribution of VC concentrations is indicated in the data from 1997. Comparison of these data appears to support a northwest flow component, at least for the more recent data. In addition, groundwater elevation and analytical data from June 1999 indicates a potential northwest flow component to the groundwater in alluvial hydrostratigaphic units (See Tables 6.17 & 6.18). This trend is presented in the data from EW-W, EW-9, EW-11, and EW-23, with respective VC concentrations of 230, 51, 12 and 12 µg/l, respectively, across a distance of approximately 2300 feet.

In general, the VC concentrations in the groundwater samples collected from southern cross-gradient wells were less than those in the groundwater samples collected from the northwestern cross-gradient wells (Figure 6.20a and 6.20b). There appears to be a general trend of decreasing concentrations along the northwest path of EW-W, EW-9. EW-11, and EW-23. This is further reinforced by an inferred northwest flow component, most apparent in groundwater elevation data from F3 wells (Table 6.18), and may account for the observed distribution of higher VC concentrations.

Vertical Extent of VC

As discussed previously, VC concentrations were greater in the groundwater samples collected from eastern cluster well EW-PZ1, installed in hydrostratigraphic unit F2, than in those collected from wells EW-PZ2, EW-PZ3, EW-6, and EW-15, installed in units F1, F3, and F4 (Figure 6.21). The eastern cluster wells are located in the vicinity of the source area. Two exceptions were noted regarding PZ1. During initial sampling of the wells in December 1993, the results from EW-PZ3 (unit F3) (10,000 µg/l) were higher than those from EW-PZ1 (unit F2) (8,100 µg/l). However, the VC concentration detected in groundwater samples from well EW-6, also installed in unit F3, were only 7,600 µg/l. Also, during the June 1999 sampling event VC concentrations (Table 6.17) at EW-15 (100 µg/l) were higher than PZ1 (45 µg/l).

In general, VC concentrations in the groundwater samples collected from well EW-PZ1 declined from 8,100 µg/l in December 1993 to 45 µg/l in June 1999. The high concentrations observed in 1993 are related to the high river flows during that year and are attributed to hydraulic loading on unit F2. VC concentrations in the groundwater samples collected from well EW-PZ3 declined from 10,000 µg/l in December 1993 to 33 µg/l in December 1996. In groundwater samples collected from well EW-PZ2, installed in unit F1, VC concentrations appeared to fluctuate with groundwater elevations, but generally declined from December 1993 to December 1995. Groundwater samples were not collected subsequent to December 1995 from well EW-PZ2 because the well was dry.

Wells EW-6 and EW-15, were installed in units F3 and F4, respectively. Groundwater samples collected from Well EW-6 ranged in VC concentration from a high of 7600 µg/l in December 1993 to a low of 54 µg/l in December 1996, these high and low values correspond with high and low groundwater elevation data. VC concentrations in the groundwater samples collected from well EW-15 declined from 1,700 µg/l in December 1993 to 100 µg/l in June 1999. However during the period from June 1994 to June 1996, VC concentrations were relatively consistent at this well. Newly installed Well EW-26, screened from 240 to 260 feet in Unit F4, was sampled in June 1999. VC was not detected in this well at a concentration exceeding the laboratory reporting limit (Table 6.17).

In contrast to the eastern cluster wells, the highest VC concentrations in the groundwater samples collected from the western cluster wells were detected in well EW-PZ6, installed in hydrostratigraphic unit F1. In general, VC concentrations in the groundwater samples collected from EW-PZ6 fluctuated with groundwater levels. The lowest and highest VC concentrations, at 98 µg/l and 870 µg/l, were reported in June and December 1995, respectively. Groundwater samples collected from Well EW-PZ5, installed in unit F2, declined from 340 µg/l in February 1995 to 21 µg/l in June 1999. The two remaining wells in the western cluster, Wells EW-5 and EW-8, were installed in units F3 and F4, respectively. Groundwater samples collected from Well EW-5 also fluctuated with the groundwater levels, but have remained below 100 µg/l since December 1993. With the exception of the initial sampling in June 1991, VC concentrations have not exceeded the ADEQ AWQSs in the groundwater samples collected from Well EW-8. In fact, VC has not been detected in the groundwater samples collected from well EW-8 since September 1992, with the exception of 0.4 µg/l in June 1997.

VC has been detected in groundwater samples collected from Well EW-15, screened to a depth of 160 feet, at concentrations as high as 1700 µg/l (initial sampling December 1993). However, based on depth-specific groundwater sampling activities performed during the installation of Well EW-26 (Table 6.19), and the intial sampling of EW-26 (Table 6.17), the vertical extent of VC doesn't appear to exceed below a depth of approximately 220 feet in this area. In addition, the characteristics of unit F4, coupled with the relative lack of detectable VC in groundwater samples from well EW-8, also located in unit F4 but downgradient, reinforce the contention that the vertical extent of VC is limited.

6.4.5.2 Distribution of cis-1,2-DCE

Cis-1,2-DCE is a degradation product of TCE. As such, cis-1,2-DCE concentrations detected in the groundwater samples collected from wells located in the vicinity of the Site were used to aid in identifying the extent of groundwater contamination from the source area.

The highest concentrations of cis 1,2 DCE were predominantly detected in the groundwater samples collected from the wells located in the vicinity of the source area (EW-E, EW-PZ1, EW-6 and EW-15). The greatest concentration of cis-1,2-DCE was detected in the groundwater samples collected from the unit F2 well EW-PZ1, at a concentration of 8300 µg/l. The cis-1,2-DCE concentrations decreased to 240 µg/l in the groundwater sample collected from Well EW-PZ1 in June 1999 (Table 6.17), however, this was the highest concentration reported during that sampling event.

Horizontal Extent of cis-1,2-DCE

Cis-1,2-DCE concentrations are greatest in the groundwater samples collected from wells located in the source area, and decrease downgradient and cross-gradient from the source area (Figure 6.22a and 6.22b). Cis-1,2-DCE has not been detected in the groundwater samples collected from the wells EW-PZ4, EW-16, EW-2, EW-NE, EW-3, and newly installed Wells EW-24 and 25 (Table 6.17), located upgradient and north of the source area.

Downgradient from the source area, cis-1,2-DCE concentrations were less in the groundwater samples collected from well EW-4 than those collected from wells located in the vicinity of the source area. The highest cis-1,2-DCE concentration in the groundwater samples collected from well EW-4 was 130 µg/l in March 1994. The cis-1,2-DCE concentrations in the groundwater samples collected from well EW-4 have been below the ADEQ AWQS of 70 µg/' since December 1994. Further downgradient, the cis-1,2-DCE concentrations have not exceeded 17 µg/l at Well EW-1, and have been below laboratory reporting limits since December 1997. Similarly cis-1,2-DCE concentrations have not exceeded 17 µg/l at Well EW-12, and have been below 2.0 µg/l since April 1996. In general, wells EW-1 and EW-12 define the lateral downgradient extent of cis-1,2-DCE. These are the same wells that define the lateral downgradient extent of VC.

Cis-1,2-DCE concentrations were less in the groundwater samples collected from cross-gradient wells located northwest and south of the Site than those located in the vicinity of the source area (Figure 6.22a and 6.22b). Cis-1,2-DCE concentrations of groundwater samples collected from cross-gradient wells EW-9, EW-NW, EW-11, EW-22, and EW-23 located northwest of the Site, and from cross-gradient wells BW-SES, BW-SD, EW-17, EW-13, and EW-10, located south of the Site demonstrate this occurrence. The highest cis-1,2-DCE concentrations in the groundwater samples collected from wells EW-9, EW-NW, EW-11, EW-22 and EW-23 (sampled initially in June 1999) were 74 µg/l, 69 µg/l, 16 µg/l, 10 µg/l, and 6.7 µg/l, respectively. The highest cis-1,2-DCE concentrations in the groundwater samples collected from wells BW-SES, BW-SD, EW-17, EW-13, and EW-10 were 4.5 µg/l, 92 µg/l, 2.9 µg/l, 1.6 µg/l, and 0.87 µg/l, respectively. Wells BW-SD and EW-17 generally define the southern extent of cis-1,2-DCE in groundwater from Estes. However, the results may be affected by the Bradley Landfill. Trace concentrations, annual averages of less then 1 µg/l, in groundwater samples from well EW-13 do not appear to be associated with the Site. These concentrations do not appear to be impacted by river flow events and therefore, are likely related to other sources.

In general, concentrations of cis-1,2-DCE in the groundwater samples collected from the five southern cross-gradient wells were less than those detected in the groundwater samples collected from the five northwestern cross-gradient wells. There appears to be a general trend of decreasing concentrations along the northwest path of

EW-19, EW-9. EW-11, EW-22 and EW-23. This is further reinforced by an inferred northwest flow component, most apparent in groundwater elevation data from F3 wells, and may account for the observed distribution of higher cis 1,2 DCE concentrations.

Vertical Extent of cis-1,2-DCE

Concentrations of cis-1,2-DCE concentrations were consistently greater in the groundwater samples collected from eastern cluster well EW-PZ1, installed in F2, than from eastern cluster wells EW-PZ2 (F1), EW-6 (F3) and EW-PZ3 (F3), and EW-15 (F4). The highest reported cis-1,2-DCE concentrations for these wells were 8300 µg/l, 380 µg/l, 6700 µg/l, 460 µg/l, and 1100 µg/l , respectively.

In general, cis-1,2-DCE concentrations in the groundwater samples collected from well EW-PZ1 declined from 8,300 µg/l in March 1994 to 240 µg/l in June 1999 (Table 6.17). The high concentrations observed in 1994 are probably related to the high river flows during late 1993 and may be attributed to hydraulic loading on unit F2. Groundwater samples collected from Well EW-6 ranged in cis-1,2-DCE concentration from a high of 6700 µg/l in September 1992 to a low of 46 µg/l in December 1996, these high and low values correspond with high and low groundwater elevation data. Cis-1,2-DCE concentrations in the groundwater samples collected from well EW-15 declined from 1,100 µg/l in December 1993 to 120 µg/l in June 1999. Newly installed Well EW-26, screened from 240 to 260 feet in Unit F4, was sampled in June 1999. Cis-1,2-DCE was detected in this well at a concentration of 15 µg/l (Table 6.17). In addition, depth specific sampling , conducted during installation of Well EW-26 (Table 6.19), indicated concentrations of 28 µg/l, 20 µg/l, 22 µg/l, 8.0 µg/l, 8.4 µg/l, at depths of 180, 200, 220, 240 and 260 feet, respectively.

The greatest cis-1,2-DCE concentrations in the groundwater samples collected from western cluster wells, in contrast to the eastern cluster wells, were detected in well EW-5, installed in unit F3 (Figure 6.23). Cis-1,2-DCE concentrations in the groundwater samples collected from well EW-5 ranged from 490 µg/l in June 1991 to 10 µg/l in December 1996. Groundwater samples collected from well EW-PZ5, installed in unit F2, ranged from 64 µg/l in December 1994 to 9.4 µg/l in June 1998. The greatest cis-1,2-DCE concentrations in western cluster wells EW-PZ6 and EW-8, installed in units F1 and F4, were 32 µg/l in December 1995 and 0.76 µg/l in June 1991, respectively. With the exception of 0.65 µg/l in June 1997, concentrations of cis-1,2-DCE have been below laboratory detection limits in groundwater samples collected from EW-8 (unit F4) since 1993.

Cis-1,2-DCE has been detected in groundwater samples collected from Well EW-15, screened to a depth of 160 feet, at concentrations as high as 1100 µg/l (initial sampling December 1993). However, based on depth-specific groundwater sampling activities performed during the installation of Well EW-26, and groundwater samples at EW-15 and EW-26 in June 1999 (Tables 6.17 & 6.18), cis-1,2-DCE concentrations appear to decrease from 120 µg/l at approximately 160 feet to 15 µg/l at approximately 260 feet. In addition, the characteristics of unit F4, coupled with the relative lack of detectable VC in groundwater samples from well EW-8, also located in unit F4 but downgradient, reinforce the contention that the vertical extent of VC is limited.

6.4.5.3 Distribution of TCE

The greatest and most consistent TCE concentrations were detected in the groundwater samples collected from wells located south and southwest of the Site. Figures 6.24a and 6.24b and 6.25 present the relative TCE concentrations detected in the groundwater samples collected from select wells in the study area. These figures show that TCE is not generally present or present at low concentrations at the Site, where the degradation products, cis-1,2-DCE and VC are present. Figure 6.25 also shows that TCE is present in areas primarily southwest of the Site where cis-1,2-DCE and VC are not present. The data indicate that one or more TCE source(s) are located southwest of the Site.

TCE from Offsite Sources

The analytical data indicate that the occurrence of TCE in groundwater samples collected from offsite wells is the result of an offsite source or sources located south and/or southeast of the Site. This TCE contamination appears to impact certain wells also impacted by VC and cis-1,2-DCE from Estes. However, because the concentrations of TCE generally increase downgradient from the Site, its presence in groundwater does not appear to be related to the Site.

The greatest offsite TCE concentration detected in any of the groundwater samples in the study area wells was 93 µg/l collected from well SB-6 during December, 1991 (Appendix A). Well SB-6 is located over 3,000 feet southwest of the source area (Figure 6.24a and 6.24b). TCE concentrations in the groundwater samples collected from this well ranged from 93 µg/l in December 1991 to 24 µg/l in March 1993. TCE concentrations were 40 µg/l in June 1995 (last round of sample data). Elevated TCE concentrations were also detected in the groundwater samples collected from offsite wells SB-4, EW-10, and EW-13. The highest TCE concentrations of the groundwater samples collected from these three wells were 38 µg/l (September 1993), 72 µg/l (March 1991) and 86 µg/l (December 1992), respectively. These wells are located at the southern end of the study area. TCE concentrations appear to decrease at these well along the predominantly western groundwater flow path.

North and northeast of wells SB-4, EW-10, and EW-13, towards the Site, TCE concentrations decreased (Figure 6.25). For example, TCE concentrations in the groundwater samples collected from wells EW-17, located directly north of EW-13, ranged from 11 µg/l in December 1993 to 3.5 µg/l in December 1996. Well BW-WD, located north of EW-17, and thus even closer to the Site than EW-17, had TCE concentrations that ranged from 7.3 µg/l in June 1991 to <1.0 µg/l in September 1994. The horizontal decrease of TCE concentrations from the southern study area perimeter wells to the Site, indicate that there is at least one offsite source area.

Onsite TCE

As noted previously, isolated occurrences of TCE have been detected in groundwater samples from onsite monitor wells. These concentrations are generally low. For the eastern cluster wells, the greatest concentration of TCE was in the groundwater samples collected from well EW-PZ1, installed in unit F2 (Figure 6.26). TCE concentrations in the groundwater samples collected from this well ranged from 120 µg/l in March 1994 to < 10 µg/l in June 1999 (Table 6.17). TCE concentrations in groundwater samples collected from the two eastern cluster wells installed in unit F3 were lower than those collected from well EW-PZ1. The greatest TCE concentrations in the groundwater samples collected from wells EW-6 and EW-PZ3 were 22 µg/l in June 1991 and 13 µg/l in December 1994, respectively. TCE was not detected in the groundwater samples collected from well EW-PZ2, installed in unit F1.

The TCE concentrations in well EW-15, installed in unit F4, have varied between 3.2 μg/l and 1.6 μg/l. In many cases TCE was not detected at EW-15, however, the reporting limits generally ranged from 5.0 to 10.0. The groundwater samples collected at Well EW-26 in June 1999 did not indicate concentrations of TCE, above the laboratory reporting limit of 2.0. However, TCE concentrations of 1.4 μg/l and 0.82μg/l were detected in the groundwater samples collected at depths of 220 and 260 feet, respectively, during the installation of EW-26.

The greatest TCE concentrations in the groundwater samples collected from the western cluster wells were detected in the groundwater samples collected from well EW-5. Well EW-5 was screened in unit F3. TCE concentrations in the groundwater samples collected from well EW-5 declined from 16 μg/l in June 1991 to 1.2 μg/l in December 1996. TCE was only detected once in all the groundwater samples collected from well EW-PZ5, installed in unit F2 (Appendix A). TCE was not detected in the groundwater samples collected from wells EW-PZ6 or EW-8, installed in units F1 and F4, respectively.

Northwest of the eastern well cluster, and north of the western well cluster, TCE has been detected at concentrations as high as 25 μg/l at EW-19 in June 1996 and 8.6 μg/l at EW-9 in December 1996. TCE concentrations of generally less than 1.0 μg/l have been detected at Wells EW-NW, EW-11, and EW-22, though on a relatively infrequent basis.

The vertical extent of TCE is limited. Near the source, TCE occurs primarily in unit F2. Detections of TCE in units F3 and F4 are intermittent over time. Downgradient from the source area, TCE is present at low concentrations in unit F3 but the concentrations have declined over time. TCE is not present in unit F4 downgradient from the source area.

6.4.5.4 Distribution of Other VOCs

Other VOCs were detected in the groundwater samples collected from study area wells. As mentioned previously, VOC Compounds of Interest include 1,2-DCB, chlorobenzene, 1,1-DCE, 1,4-DCB, PCE, benzene, and 1,2-DCA, as well as VC, cis-1,2-DCE, and TCE, described above. Excluding VC, cis-1,2-DCE, and TCE, the detected mean concentrations for the remaining VOC Compounds of Interest were below their corresponding AWQS (Table 6.15).

Therefore, the remaining VOC Compounds of Interest were lumped into other VOCs and are not considered an important part of the SCM.

The most frequently detected other VOC Compounds of Interest were 1,2-DCB, chlorobenzene, 1,1-DCE, and 1,4-DCB (Table 6.15). The compounds 1,2-DCB, chlorobenzene and 1,4-DCB were detected in groundwater samples from onsite and offsite wells. The compound 1,1-DCE was primarily detected in groundwater samples collected from offsite wells to the south and southwest. Figures 6.26 and 6.27 present the annual mean concentrations of 1,2-DCB, chlorobenzene, 1,1-DCE, 1,4-DCB, PCE, benzene, and 1,2-DCA that were added together for each year and designated as the annual means for other VOCs.

The lateral extent of other VOCs associated with the Estes Landfill has not been determined because of the presence of other sources in the study area. While annual mean concentrations of other VOCs decrease laterally in groundwater samples collected from wells located downgradient and cross-gradient from the source area, the individual constituents can vary.

The greatest concentrations of other VOCs were detected in the groundwater samples collected from wells EW-PZ1, EW-PZ2, EW-PZ3, and EW-6 (Figure 6.27). These eastern cluster wells were installed in hydrostratigraphic units F2, F1, F3, and F3, respectively.

The vertical extent of the other VOCs near the source area is limited to the alluvial hydrostratigraphic units F1, F2 and F3. This is similar to the vertical extent of VC and cis-1,2-DCE. While low concentrations occur in groundwater samples collected from the unit F4 well EW-15, they have not been detected in the groundwater samples from the unit F4 well EW-8 since 1994. Prior to 1994, the annual mean concentrations for other VOCs were all less than 1 μg/l.

6.4.6 VOC Assessment

Based on inferred westerly to southwesterly groundwater flow in the area of the Estes Landfill, Wells EW-NE and EW-3 are upgradient of the inferred source of VOC contaminants identified at the Site. No VOCs have been reported in groundwater samples at these wells, which were initially sampled in September 1988 and June 1989, respectively. It can therefore be inferred that no VOC contaminants have migrated onto the Site from an upgradient source.

Based on inferred westerly to southwesterly groundwater flow indicated since groundwater monitoring began at Estes Landfill, the Bradley Landfill is downgradient to cross-gradient of the Estes Landfill. Based on these inferred groundwater flow conditions, it is not likely that any potential VOCs in groundwater from the Bradley Landfill have migrated north onto the Estes Landfill boundary.

Groundwater quality assessments verify the SCM element (discussed in Section 2.0) that the extent of groundwater contamination, as indicated by VOC concentrations, is generally stable at the Site. The stabilization of VOC contamination is the result of an ongoing natural attenuation process, represented by the decline of VC and cis-1,2-DCE concentrations over time and with distance from the source area. The occurrence of natural attenuation is discussed in detail in Section 7.0.

Short-term changes in the groundwater contamination equilibrium occur during Salt River flow events. River flow events, discussed in Section 5.5, cause the water table to rise, and temporarily change the direction of groundwater flow. In general, groundwater flow will shift to the southwest from the west in direct proportion to the volume and length of the river flow event. The shift in groundwater flow direction results in the increase of VOC concentrations in groundwater samples collected from the wells located south and southwest of the Site and the decrease of VOC concentrations in groundwater samples collected from wells located along and near the Salt River. From the period 1989 to 1996, three river flow events significant enough in volume and duration to cause changes to VOC groundwater quality have occurred. These events were during 1992, 1993, and 1995. Water quality data collected during the 1993 river flow event, which was the largest, were used to demonstrate groundwater conditions during a flow event. The change of VOC concentrations is apparent when comparing relative concentrations of VOCs, represented by pie diagrams, during a flow event (March 1993) and a non-flow period (June 1996), as presented in Figures 6.28 and 6.29, respectively.

A comparison of analytical results of groundwater samples collected from the eastern cluster wells identified that VOC concentrations were generally higher in the groundwater samples collected from the unit F2 well EW-PZ1. The higher concentrations of VOCs in unit F2 are due to the lower permeability of unit F2 that restricts migration of VOCs and causes unit F2 to act as a source.

During a rise in the water table due to flow conditions in the Salt River, VOC concentration increase in the groundwater samples collected from wells screened in the F2 and F3 hydrostratigraphic units. Increased hydraulic head or hydraulic loading caused by rising water levels enhances the potential for VOCs to migrate vertically. The hydraulic loading on unit F2 also alters the equilibrium between the units, driving the VOCs within unit F2 downward to unit F3. The downward vertical migration of VOCs were observed by the increase of VOC concentrations in groundwater samples collected from wells EW-6/EW-PZ3 and EW-15, completed in hydrostratigraphic units F3 and F4, respectively. Greater VOC concentrations were also observed in unit F1 during 1993 as compared with more recent data. No data are available on groundwater concentrations in unit F1 prior to 1993. Therefore, trends in water quality in unit F1 prior to 1993 cannot be assessed. VOC concentrations decreased in the groundwater samples collected from the wells screened in units F1, F2, and F3 when water levels declined. A more detailed analyses of the fate and transport of VOCs are discussed in Section 7.0.

VOC concentrations in the groundwater samples collected from western cluster wells also demonstrate the low permeability effect of the unit F2. Unlike the eastern cluster wells, a comparison of analytical results of groundwater samples collected from the western cluster wells identified that VOC concentrations were not higher in the groundwater samples collected from the well installed in unit F2. The greatest concentrations of VOCs were detected in well EW-PZ6, screened in hydrostratigraphic unit F1. Even though unit F2 in the vicinity of the source area may be a residual source of VOCs, the horizontal migration of these VOCs through unit F2 is restricted by the low permeability of unit F2. Therefore, VOCs will migrate further in unit F1 than in unit F2, hence the greater

VOC concentration in the groundwater samples collected from EW-PZ6. This phenomenon is demonstrated further upgradient in well EW-PZ7, screened in unit F1, and in well EW-PZ8, screened in unit F2. VOC concentrations were greater in the groundwater samples collected from well EW-PZ7 than in those collected from well EW-PZ8. VOC concentrations increase in the groundwater samples collected from the western cluster wells during flow conditions in the Salt River. VOC concentrations increased the most in the groundwater samples collected from well EW-PZ6, screened in unit F1, and in well EW-5, installed in unit F3. The VOC increases observed in groundwater samples collected from the western well cluster during flow conditions are likely due to the advective transport of contaminants that have migrated into units F1 and F3 from F2.

A review of the spatial distribution and concentration of the signature compounds detected in the groundwater samples collected from Site and offsite wells indicated the presence of onsite and offsite sources of these VOCs (Figures 6.28 and 6.29). The signature compounds originating from the Site have been identified as VC, TCE, and cis-1,2-DCE. Based on the dispersion pattern of the signature compounds, TCE delineates a separate plume to the south of the Site.

6.4.7 Metals and Other Inorganics in Groundwater

The Compounds of Interest include the inorganics, arsenic, barium, chromium, manganese, and cadmium and nitrate as N. Arsenic and barium were detected in more than 50 percent of groundwater samples analyzed for metals (Table 6.16). Both chromium and cadmium were only detected in six percent of the groundwater samples analyzed for metals. Nitrate as N was detected in over 70 percent of the samples analyzed for nitrate as N. Analytical results of the June 1999 groundwater sampling (Table 6.20a and 6.20b) detected the presence of manganese exceeding AWQSs in seven of the nineteen wells samples.

Overall inorganic concentrations have not varied significantly over time (Appendix A). These inorganic compounds may be due to natural geologic conditions and the degradation of solid waste, grass and tree trimmings, sludges from waste water treatment systems, and fertilizer use. Concentrations of major ions and TDS in the study area groundwater are also discussed.

To create a manageable data subset for metals and nitrate as N, the arithmetic mean, or statistical average, concentration of each compound detected in the groundwater samples collected from each well was calculated. This averaging of the data is similar to the averaging performed with the VOC analytical results, except that the concentrations of a particular compound detected in the groundwater samples were averaged to create one mean result per compound per well over time. For example, concentrations of arsenic detected in the groundwater samples collected from well EW-E from 1989 through 1996 were averaged to obtain the total mean arsenic concentration of 0.0059 mg/l. This averaging was repeated for each metal and for nitrate as N, for each well. If a specific metal or nitrate as N was not detected in the groundwater samples collected from a particular well, the letters "ND" were used for the mean, thus indicating that the compound was not detected. If groundwater samples were not collected from a particular well, or a specific metal or nitrate as N was not part of the analyte list for groundwater sample analyses, the letters "NA" were used for the mean, meaning not analyzed. Figures 6.30 and 6.31 present the results, by well, of the mean concentration for each metal. The mean concentrations for nitrate as N by well are shown on Figures 6.32 and 6.33. The presentation of the groundwater quality data in this manner is appropriate because the standard deviation of each mean for each metal and nitrate as N for each well is much less than each mean.

The spatial distribution of the overall mean concentrations of arsenic, barium, cadmium, and chromium are presented in Figures 6.30 and 6.31. These figures demonstrate that arsenic was the most frequently detected metal. The greatest arsenic mean was 0.0549 mg/l, as detected in the groundwater samples collected from well EW-E. The greatest barium mean was 2.6117 mg/l, as detected in the groundwater samples collected from well EW-18. The greatest cadmium and chromium means were 0.0063 mg/l and 0.0116 mg/l, respectively, as detected in the groundwater samples collected from well EW-13 and EW-17. With the exception of arsenic, the greatest metal concentrations were offsite.

The mean metal concentrations indicate that, in general, metal concentrations were similar in upgradient and downgradient wells. For example, mean concentrations detected in groundwater samples collected from the upgradient well EW-NE and the downgradient well EW-1 for arsenic, barium and chromium were 0.0059 and 0.0047 mg/l, 0.0715 and 0.0770 mg/l and 0.0061 and 0.0062 mg/l, respectively.

Metal concentrations in the groundwater samples collected from the eastern and western cluster wells were used to evaluate onsite groundwater quality. Generally, the highest metal concentrations were detected in the groundwater samples collected from the wells located in hydrostratigraphic units F1 and F2 (Figure 6.32). The greatest arsenic mean concentration was 0.0213 mg/l, as detected in the groundwater samples collected from well EW-PZ5 (Figure 6.32). Well EW-PZ5 was screened in unit F2 and is part of the western cluster wells. The greatest barium mean concentration was 0.4924 mg/l, as detected in the groundwater samples collected from well EW-PZ6. Well EW-PZ6 is also part of the western cluster wells and was screened in unit F1. Cadmium was only detected in wells EW-PZ1, EW-6, and EW-8, installed in units F2, F3, and F4, respectively. The cadmium means as detected in the groundwater samples collected from these wells were 0.0006 mg/l, 0.0018 mg/l, and 0.0026 mg/l. Chromium was detected in wells EW-PZ1, EW-PZ2, and EW-8. Well EW-PZ2 was screened in unit F1. Chromium means for these three wells were 0.0041 mg/l, 0.0062 mg/l, and 0.0841, respectively. The higher mean concentration of chromium in groundwater samples collected from EW-8 is thought to be naturally occurring because chromium is generally very low or not detected elsewhere on the Landfill.

The groundwater quality data indicate that metals, namely arsenic, barium, chromium, and cadmium were present both onsite and offsite. Metal concentrations were similar in groundwater samples collected from upgradient and downgradient wells. In addition, the greatest concentrations of barium, chromium and cadmium were detected in groundwater from offsite wells. Therefore, the Site is not a significant source of these metals in groundwater.

Arsenic was present in groundwater samples collected from onsite and offsite wells and the greatest concentration was reported for groundwater samples collected from well EW-E. Because arsenic is a naturally occurring metal in groundwater within the SRV, a background arsenic study was performed as part of the risk assessment (see Section 8.0). Based on the results of the background arsenic study, offsite concentrations of arsenic in groundwater were within the background concentrations for the area.

Figures 6.33 and 6.34 show the spatial distribution of the major ions as Stiff diagrams, and TDS and nitrate as N. A Stiff diagram is a graphical method of illustrating the concentrations of the sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), chloride (Cl), bicarbonate (CO3, HCO3) and sulfate (SO4) ions. Concentrations of sodium, calcium, and magnesium cations were plotted to the left of a vertical axis and concentrations of chloride, bicarbonate, and sulfate were plotted to the right of the same vertical axis. Ion concentrations were reported in milliequivalents per liter (me/l), which was obtained by dividing the ion concentration in mg/l by the weight of the ion. Overall changes in inorganic water quality can be observed by comparing the relative shapes of the various Stiff diagrams.

The Stiff diagrams show that the groundwater type in the study area was primarily sodium chloride to sodium bicarbonate, and primarily sodium bicarbonate beneath the Site (Figures 6.32 and 6.33). Nitrate as N means ranged from 0.05 mg/l, as detected in the groundwater samples collected from well EW-PZ6, to 10.15 mg/l, as detected in the groundwater samples collected from well EW-10. Elevated concentrations of nitrate are common in the groundwater of Arizona, particularly in areas that were used for agriculture. The greatest concentrations of nitrate as N were detected in the groundwater samples collected from offsite wells located on the southern and southeastern portions of the study area. The nitrate concentrations may due to past land uses of agriculture and stockyards or from older septic systems. TDS means ranged from 338 mg/l, as detected in the groundwater samples collected from well EW-8, to 915 mg/l, as detected in the groundwater samples collected from well EW-PZ6.

Significant variations in inorganic water quality were not observed. TDS concentrations were generally highest in groundwater samples collected from wells located south and southwest of the Site. Nitrate concentrations were observed to decline across the Site and then increase again downgradient. Onsite, groundwater samples collected from the F4 well EW-8 had the lowest TDS, at a mean concentration of 338 mg/l while the greatest TDS concentrations were detected in groundwater samples from the unit F1 wells EW-PZ2 and EW-PZ6.

6.4.8 Metals in Former and Existing Landfill Soils

Metals in the form of Aresenic and Thallium were present in both areas investigated that exceeded their appropriate action level. In addition, Lead was present in the eastern portion of the existing Landfill. Because these metals were in subsurface soils, direct human exposure is not a concern at this time. However, the potential of these metals to leach into the groundwater and potential future exposure during site redevelopment is of concern. Consequently, further evaluation on the potential risks to human health and the environment of these metals present in the subsurface soils will have to be conducted in the form of a risk assessment. The leachability potential of the metals to groundwater should also be evaluated using ADEQ's groundwater protection levels.

7.0 CONTAMINANT FATE AND TRANSPORT

This section describes the mechanisms involved in fate and transport of groundwater contaminants at the Site. The contaminants most frequently identified in the study area groundwater are halogenated VOCs, and to a lesser degree metals and nitrates. The mechanisms involved in fate and transport of contaminants are the same mechanisms that control natural attenuation of contaminants. There are two main types of processes that control the fate and transport and natural attenuation of contaminants. These include physical and biological processes in the aquifer that act to reduce contaminant concentrations and limit the extent of migration of contaminants. Chemical transformations can also contribute to the attenuation of contaminants. However, direct measurement in an aquifer is difficult and chemical processes are thought to represent only a small portion of the total contaminant attenuation at the Site.

7.1 Description of Natural Processes

The primary physical processes that affect the distribution of a contaminant in groundwater include advection, dispersion, sorption, volatilization, and dissolution from residual contaminants located in a source area. Advection and dispersion will reduce the chemical concentrations in groundwater, but will not cause a net loss in the mass of chemicals in the aquifer system. Sorption will tend to reduce the dissolved chemical concentration and limit the migration of the aqueous phase, but will not result in a loss of contaminant mass from the aquifer. Volatilization is also a partitioning process of the chemical from the aqueous phase to the vapor phase. Although volatilization actually removes chemical mass from the aquifer, it has not historically been thought of as a significant attenuation mechanism. Dissolution is the process of residual chemicals located in a source area dissolving into the aqueous phase of the aquifer. Chemicals may be held in the soil matrix above or below the water table at residual saturation (residuals) or at saturation. Seasonal fluctuations in the water table can dissolve contamination from previously unsaturated aquifer material. Dissolution, dispersion and advective transport are three of the more significant physical processes that control the magnitude and extent of contamination at the Site.

Aerobic and anaerobic biological processes, which are present at the Site, account for both chemical concentration reduction and loss of chemical mass from an aquifer. Aerobic biodegradation relies on dissolved oxygen as the electron acceptor used by the microorganisms. Although aerobic biodegradation takes place at relatively higher rates than anaerobic processes, it is often limited by the available supply of oxygen to the chemical plume. Anaerobic processes refer to a variety of biodegradation mechanisms that use nitrate, sulfate, iron, and carbon dioxide as terminal electron acceptors by the microorganisms.

7.2 Physical Processes

As previously noted, there are several types of physical processes that affect contaminant fate and transport at the Site. The physical processes that have been characterized at the Site include advection, dispersion, sorption, volatilization and dissolution. Because the effects of these processes are sometimes additive, it can be difficult to quantify the cause and effect relationships between a particular process and the observed result. Therefore, the physical processes related to fate and transport effects at the Site are discussed in terms of observed trends at select locations. These observed trends can then be extrapolated over similar areas.

7.2.1 Advective Transport

Advective transport results in the movement of contaminants at the same rate and in the same direction as the average linear velocity of the groundwater. The two major flow regimes at the Site, no flow and flow, result in advection in two primary directions at varying velocities, depending on the hydrologic properties of the aquifer and the horizontal gradients. The predominant flow regime at the Site is no river flow conditions that result in a westerly flow direction. The secondary regime is river flow conditions that result in a southwesterly flow direction. The predominant advective pathways are best established by comparing the groundwater quality and flow directions from a period of westerly groundwater flow conditions to that from a period of southwesterly groundwater flow conditions. This was briefly discussed in Section 6.4.6.

The June 1996 quarterly sampling event represents a period of relative long term stability from dynamic recharge conditions (primarily river flow). During this period the generalized groundwater flow direction is west (Figure 5.14a and b). For this same period the relative distribution of VOC Compounds of Interest, subdivided into the four categories of VC, cis-1,2-DCE, TCE and other VOCs, are shown on Figure 6.29. Advective transport during this period clearly follows the general groundwater flow direction, with a generally westerly component of migration. This is illustrated in Figure 6.29, where the total concentration of VOCs is greatest near the source with elevated concentrations extending along a westerly centerline. For example, the total VOCs were 513 µg/l in groundwater near the source at monitor well EW-E. The next highest total VOC concentrations were 379 µg/l in groundwater at monitor well EW-W, which is located approximately 920 feet west of monitor well EW-E.

In comparison, the March 1993 sampling round corresponds to a period of flow in the river. During this period, the advective transport results in migration of contaminants along a southwesterly centerline that trends similar to groundwater flow for this period (Figures 5.16 and 6.28). In this example, the total VOC concentration in groundwater near the source was 5,440 µg/l at monitor well EW-E, with the next highest groundwater concentration at 928 µg/l from well BW-WD, 840 feet to the southwest. In contrast to the no flow scenario, the March 1993 groundwater concentrations to the west of the source area were only 72.4 µg/l at monitor well EW-W.

In general, a trend similar to that described above, where the greatest concentrations are at the source and concentrations decline away from the source, exists at the Site. However, it should be noted that some of the individual compounds, particularly VC, do not always follow the same trend with higher concentrations at the source and declining away from the source. This is illustrated in Figure 6.29 with 160 µg/l of VC at monitor well EW-E and 240 µg/l of VC at monitor well EW-W. This is caused by degradation of cis-1,2-DCE to VC and is not related to advective transport. The degradation process is discussed below in Section 7.4.

On the basis of the relative distribution of VOCs and the groundwater flow directions in the March 1993 and June 1996 data, there is a shift of approximately 30 degrees between the two primary advective transportation pathways created under flow and no flow conditions. Similar trends of the greatest VOC concentrations following the prevailing groundwater flow directions are repeatedly illustrated in the quarterly sampling data (HLA, 1992g, Appendix C).

7.2.2 Dispersion

Dispersion is the process by which chemical constituents in groundwater are spread and mixed within the formation water by diffusion and mixing caused by microscopic variations within and between the pores. Dispersion is caused by differences in the velocity that water travels at the pore volume and differences in the rate at which water travels through different strata in the flow path. Dispersion causes dilution of contaminants both longitudinally and laterally to the groundwater flow direction. There is no loss of contaminant mass through dispersive processes, and the dilution occurs by spreading the contaminant over a larger area. Thus dispersion is in part responsible for lateral or cross-gradient migration of contaminants in groundwater.

On the basis of the relatively uniform composition (gravel, sand and silt), but heterogeneous nature of the alluvium at the Site, lateral dispersion is believed to have a braided appearance that results when groundwater flow is disrupted as it moves through the sediments. Lateral dispersion at the Site is relatively low, because of the overall high groundwater flow velocity, noted in Section 5.0, that results from the generally coarse-grained nature of the alluvium at the Site.

The cross-gradient extent of groundwater contamination varies because of the shifting groundwater flow directions. The cross-gradient extent is estimated in the north-south direction because the predominant groundwater flow direction is to the west. Using VC, the apparent cross-gradient extent of contamination, at its maximum point, appears to be from EW-22 to EW-14 (Figure 6.20a and 6.20b). This is a north-south distance of approximately 2,000 feet. This cross-gradient extent is larger than that predicted from hydraulic modeling and potential contaminant transport scenarios in which the source area is the only source of VC.

7.2.3 Sorption

Sorption is the process by which chemicals are sorbed onto the surface of sediments. This process results because the surfaces of solids, especially clays and organic soil material, have an electrical charge due to isomorphous replacement, broken bonds, or lattice imperfections. The electrical charge is imbalanced, and may be satisfied by adsorbing a charged ion. HVOCs characteristically have a high affinity to organic material, and can be adsorbed to the surface of organic material in an effort to achieve an ionic balance.

Sorption is caused by the partitioning of dissolved consitiuents onto immobile soil grains. Organic carbon in the soil matrix typically provides most of the sorption sites. As a result of this sorption, VOC migration is slower than the groundwater pore velocity. In general, the larger the soil organic carbon content (foc), the slower the VOC transport rate. A retardation factor, R, may be calculated for each constituent of concern using the following formula:

$$R = 1 + \frac{\rho_b f_{oc} k_{oc}}{\theta}$$

where:

R = retardation factor

ρ_b = soil bulk density

f_{oc} = fraction organic carbon in soil

k_{oc} = organic carbon partition coefficient

θ = soil porosity

Using site-specific f_{OC} values, retardation factors have been calculated for the signature VOCs at the site. Site-specific R values for TCE, cis-1,2-DCE and VC are calculated to be 3.05, 1.74 and 1.04, respectively. These calculations, as well as contaminant transport velocity calculations are given in Appendix N of this document.

Based on the nature of sediments at the Site, which are relatively low in amount of organic material and the absence of VOCs detected in the soil, it appears that sorption plays a relatively small role in the distribution of VOCs at the Site, with the possible exception of unit F2 beneath the source area. Sediments at the Site are typically coarse grained with very little fines as demonstrated in the sieve analyses that have been performed on various samples (Table 4.1). The percentage of clay at the Site is very low. In addition, groundwater sampling conducted for TOC at the Site showed relatively low concentrations of TOC. The concentrations of TOC ranged from less than the detection limit to 19.1 µg/l in groundwater samples collected from monitor well EW-15 (Table 7.1). Analyses of soils for VOCs at the Site, conducted during the Rotosonic™ drilling, did not identify detectable concentrations of VC, cis-1,2-DCE, or TCE from borings B-1 and B-2. The presence of contaminants in unit F2 beneath the source area is likely the result of sorption to some degree along with the other physical characteristics of the material.

7.2.4 Volatilization

Volatilization refers to mass transfer from liquid and soil to the gaseous phase. Thus, depending on the nature of contamination at different sites, chemicals in the soil gas may be derived from the presence of nonaqueous phase liquids (NAPL), dissolved chemicals, or adsorbed chemicals. Chemical properties affecting volatilization include vapor pressure and solubility. Other factors influencing volatilization rates are: concentration in soil, soil moisture content, soil air movement, sorptive and diffusive characteristics of the soil, soil temperature, and bulk properties of the soil such as organic-carbon content, porosity, density, and clay content. As there are no NAPLs observed at the Site, volatilization can only occur from dissolved or adsorbed chemicals.

The rate of VOC volatilization at the Site is low. This is illustrated by the Phase I and Phase II soil gas investigations conducted as part of the RI. During the Phase I investigation, the greatest VC concentration in soil gas was reported in the vicinity of the source area at a concentration of 10.1 μg/l (Figure 6.10). In comparison, the greatest concentration of VC from the Phase II soil gas investigation was 2 μg/l (Figure 6.14). This concentration was reported at two locations, near the former source area and at the northwest corner of the relocated refuse mound. Soil gas results for cis-1,2-DCE showed the greatest concentrations during the Phase I to be 8.36 μg/l (Figure 6.9) and during the Phase II to be 2 μg/l (Figure 6.13). These concentrations of cis-1,2-DCE were reported in the vicinity of the source area in both the Phase I and Phase II, and also at the northwest corner of the relocated refuse mound in the Phase II. The soil gas investigations showed the greatest concentrations of TCE to be 0.35 μg/l (Figure 6.8) and 5 μg/l (Figure 6.12) in the Phase I and Phase II investigations, respectively. The TCE concentration in the Phase I investigation was recorded at the northwest corner of the relocated refuse and in the Phase II along the northern boundary of the Site near the original eastern landfill boundary. There were no VOCs detected in soil gas along 40th Street in the Phase I soil gas investigation.

The overall low concentrations of VOCs in the soil gas, suggest that there are not areas with residual DNAPL or abundant adsorbed chemicals in the vadose zone and support the conclusion that volatilization from both soils and groundwater plays a minor role in the distribution of contaminants at the Site.

7.2.5 Dissolution

Dissolution is the process by which soluble organic components dissolve in groundwater or dissolve in infiltration water and form a groundwater contaminant plume. The highest concentrations of dissolved contaminants at the Site are present in the groundwater from beneath the source area in unit F2. This suggests that unit F2, beneath the source area, acts as a source for dissolution of cis-1,2-DCE and VC into the groundwater. Supporting data for unit F2 acting as a cis-1,2-DCE and VC source include: the soil gas data that indicates soil gas concentrations are too low to provide a significant source in unit F1, the lack of VOCs in surface and subsurface soils down gradient of the source area, source monitor wells and piezometers completed in unit F2 have the greatest VOC concentrations, groundwater contaminant concentrations vary more in units F1 and F3 than in unit F2, and a sharp increase in cis-1,2-DCE and VC concentrations is observed in the alluvium during a river flow event.

The existence of DNAPL in unit F2 is not apparent. Typically, groundwater concentrations must be on the order of one percent of the compounds solubility to indicate the presence of DNAPL. The solubility values for TCE, cis-1,2-DCE and VC in water at 25 degrees Celsius are 1,100 mg/l, 3,500 mg/l and 1,100 mg/l, respectively (Montgomery and Welkom, 1990). VC would not exist as a DNAPL because it is a gas at the temperatures and pressures encountered in the subsurface at the Site. The greatest single groundwater concentration for cis-1,2-DCE was 12,000 µg/l or 12 mg/l (Appendix A). This concentration is 0.33% of the solubility for cis-1,2-DCE. As of December 1996, the greatest cis-1,2-DCE contamination was 300 µg/l. The greatest single reported onsite concentration of TCE was 120 µg/l, which represents approximately 0.01% of the solubility for TCE. As of December 1996, the greatest onsite TCE concentration was 21 µg/l. These concentrations are not indicative of the presence of DNAPLs.

As noted previously in the groundwater quality section, the analytical data clearly show that concentrations of TCE, cis-1,2-DCE and VC are generally greater in unit F2 than unit F3 in the vicinity of the source. In addition, the concentrations for unit F3 are consistently greater than those from unit F1. Evidence for the magnitude of contaminant contribution from unit F2 is illustrated by comparing the combined totals for the parent and daughter products (TCE + cis-1,2-DCE + VC) for units F1 (EW-PZ2), F2 (EW-PZ1), and F3 (EW-PZ3. These concentrations are dominantly daughter products and the percentage of TCE constitutes less than 2% of the total concentration. The magnitude of the total VOC concentrations in unit F2, versus units F1 and F3, are indicative of continued dissolution of daughter products from unit F2 into the groundwater.

Contaminant concentrations in the vicinity of the source area show a marked increase during a river flow event followed by a rapid decline. The concentration increases or spikes are most dramatic in units F2 and F3 (Appendix A) and appear to be the result of dissolution from unit F2. Because the unit specific piezometers were not installed until 1993, which was at the end of a large flow event, the impact and trends resulting from flow are best illustrated in wells with a longer history of data. With minor exceptions, the contaminant concentrations are typically higher in unit F2 than unit F3 in the vicinity of the source area (Appendix A), providing further support that unit F2 is the principal area of continued dissolution. The contaminant increases, with respect to water-level rises that result from river flow, are evident, for example, when examining data from EW-E and suggest that dissolution of VOCs increases when water levels rise (Appendix A). Inorganic water quality does not vary significantly in response to river flows.

The contaminant concentration increases, particularly in units F2 and F3, are believed to occur from hydraulic loading caused from the rapid water-level rises that accompany river flow. The rising water-levels exert additional stress on the lower permeability F2 unit, causing an increased downward vertical gradient that disrupts the physical equilibrium. Unit F1 contaminant concentrations in the vicinity of the source area also show increases, associated with water-level rising, but the increases are smaller in magnitude than those in units F2 and F3. The mechanisms by which water-level rises produce concentration increases in unit F1 are believed to primarily be related to the equilibrium imbalance created by the loading of unit F2. The general trend of contaminant spikes that are associated with water-level rises are graphically illustrated in Figure 7.1. In this figure, the annual mean concentrations for VC and cis-1,2-DCE concentrations from EW-W and EW-6 are plotted with the mean water levels from EW-E and EW-6. This figure illustrates the concentration increases that are observed near the source area when water levels rise. In this example, VC concentrations are initially decreasing, then increase in 1992 and 1993 in response recharge induced by river flow and the resulting water level rises. This is followed by a decrease in 1994, a slight increase in 1995 again in response to river flow, and finally decrease again in 1996. The concentrations of cis-1,2-DCE follow a similar trend to VC, except that the cis-1,2-DCE peaks slightly ahead of the VC at EW-6. The time difference between peaks is probably a function of the degradation process where by cis-1,2-DCE is degraded to VC. These concentration trends over time also indicate that the magnitude of the peaks is declining with time.

The dissolution of contaminants, primarily from unit F2, is responsible for the cis-1,2-DCE and VC concentrations observed in groundwater at the source area. Dissolution of cis-1,2-DCE and VC at the source area appears to temporarily increase during times of increased water levels that result from river flow. However, the process of dissolution appears to be restricted to the vicinity of the source area. Therefore, contaminant concentrations away from the source are primarily controlled by the physical process of advective transport and dispersion. These processes are apparent in the general trends for some of the individual wells that are illustrated in Figures 7.1 through 7.4. When the data from wells in the vicinity of the source are compared to downgradient data, some differences in the responses are apparent. For example, Figure 7.2 includes data from wells EW-W, EW-1, and EW-4.

As previously illustrated, concentrations in the source wells follow a trend where dissolution increases as the water levels rise. That is concentration spikes result from water-level rises at the source area. Conversely, the concentrations in the wells to the west of the source area (EW-W, EW-4 and EW-1) are controlled by advective transport and dispersion that show a decline in concentrations when water levels rise and the flow direction shifts. This decline is followed by a concentration increase that coincides with the water-level declines. The inverse relationship between downgradient contaminant concentrations and water levels, results from the shift in groundwater flow direction which is the same as the contaminant transport direction. Therefore, when the river flows, the wells to the west are no longer downgradient of the source area. In addition, wells to the southwest of the source area (BW-W/EW-18, EW-14 and BW-S) show contaminant concentration increases that coincide with water-level rises, because the groundwater flow and contaminant transport directions shift to the southwest (Figure 7.3).

The data in this figure used the combined results for BW-W and EW-18, because EW-18 was installed to replace EW-W, which is no longer sampled.

Figure 7.4 indicates concentration trends for wells EW-9, EW-11, and EW-NW located to the northwest of the Site. Groundwater samples collected from these wells and well EW-22, historically contain concentrations of signature Site VOCs (cis-1,2-DCE and VC). In addition, groundwater samples collected from EW-23 (installed in May 1999) also contain these VOCs, which generally decrease with distance downgradient from the site along a northwestern flow path (Figure 7.5). Historical water level data have indicated a northwest flow component from the site towards these wells. Concentrations of signature Site VOCs decrease when water-levels rise and the flow direction shifts to the southwest, suggesting that advective transport is the primary physical process controlling cis-1,2-DCE and VC concentrations at the wells. This is followed by concentration increases when water levels decline.

7.3 Bioactivity - Introduction

Biotic transformations are caused by microorganisms and are generally the most important transformation mechanisms in groundwater systems (Wiedemeier et al., 1996). The biotransformation of chlorinated aliphatic hydrocarbons (CAH) has been documented to occur in the laboratory and in the field via three main mechanisms: reductive dechlorination, primary substrate (direct) oxidation, and cometabolism. These mechanisms can work alone or in combination.

Reductive dechlorination is the most widely studied and documented of these mechanisms. The document entitled *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water* (Wiedemeier et al., 1998) states that, while reductive dechlorination is an important process, oxidation and cometabolism also contribute to the biodegradation of CAH. Numerous publications have documented successful field and laboratory studies involving direct oxidation (e.g., Bradley and Chapelle, 1998; 1997) and cometabolism (e.g., Vancheeswaran et al., 1999; Sutfin, 1996; Hopkins and McCarty, 1995; Semprini and McCarty, 1992). The three mechanisms of CAH biodegradation identified above are discussed in detail in the following sections.

7.3.1 Reductive Dechlorination

Reductive dechlorination refers to the process by which ubiquitous aquifer microorganisms acquire metabolic energy by utilizing the CAH and various inorganic compounds as electron acceptors (respiration) and available organic molecules as electron donors (food source) in a biologically mediated redox reaction. The process of reductive dechlorination begins after aerobic respiration has depleted the oxygen in the aquifer (oxygen is the preferred electron acceptor, as the most metabolic energy is derived by microorganisms through its utilization). Reduction subsequently proceeds anaerobically as the microorganisms utilize nitrate, manganese, iron, sulfate and carbon dioxide (methanogenic conditions) for respiration (Bradley and Chapelle, 1997). In this process of anaerobic respiration, the CAH are dechlorinated in a sequential manner by the stepwise transfer of two electrons from the donor to the CAH, forming intermediate daughter products (Sewall and Gibson, 1997). This process may proceed to complete mineralization of the parent product, e.g., PCE, (resulting in carbon dioxide [CO_2], water and chloride), or the reaction may terminate at the formation of an intermediate daughter product (e.g., DCE). The causes of termination may be, among others: a limitation in the electron donor or acceptor supply in the aquifer; changes in microbial population densities or metabolism of organisms within the active microbial consortium; or a change in redox or other environmental conditions (Gossett and Zinder, 1997).

With respect to the CAH detected at the Estes Landfill Site, reductive dechlorination of parent products (such as TCE) may proceed through a series of oxidation/reduction reactions, to the general intermediate daughter products shown below:

$$\text{PCE} \rightarrow \text{TCE} \rightarrow \text{DCE} \rightarrow \text{VC} \rightarrow \textit{ethene} \rightarrow \textit{ethane} \rightarrow CO_2$$

All of the chlorinated ethenes may be degraded by reductive dechlorination, though the rate of transformation typically decreases with decreased chlorination (Wiedemeier et al., 1996). Consequently, dechlorination of TCE to DCE can occur under mild to moderate reducing conditions whereas dechlorination of DCE to VC generally requires more strongly reducing conditions (Semprini et al., 1995). If, as discussed above, complete mineralization of the CAH does not occur, intermediates such as DCE may be potentially mineralized via direct oxidation (see discussion below) in a process of sequential anaerobic/aerobic biodegradation, may cometabolize, or may accumulate in the system, unable to be utilized for metabolism by the existing microbial consortium.

Evidence of reductive dechlorination has been observed at the site. DCE detected at the site occurs most predominately in the biologically produced form of *cis* 1,2-DCE, an indication of the reductive dechlorination of parent product (TCE). Further evidence of reductive dechlorination is the detection of the daughter product vinyl chloride in the majority of monitoring wells sampled at the site.

In an effort to assess the degree to which reductive dechlorination is occurring at the Site, certain geochemical parameters indicative of the process were measured, as described in detail below.

An examination of the parameters used to assess natural attenuation indicates that this unique set of environmental conditions currently exists at the Site. Figure 7.5 shows a typical prevailing westerly groundwater flow direction and displays the spatial relationship between wells EW-NE (upgradient), EW-PZ1 (source area), EW-4 (downgradient), and EW-1 (further downgradient). The chemical and biochemical parameters evaluated for these four wells and several additional wells are plotted on Figure 7.6. A comparison of the key parameters redox, DO, nitrate, methane, and ethene concentrations for these wells indicates that the groundwater environment near the source area is anoxic (which would promote reductive processes). Downgradient, in the vicinity of EW-4, the groundwater enters an aerobic zone (which would promote oxidative processes).

A preliminary screening of the June 1999 groundwater sampling results for evidence of reductive dechlorination was conducted as described in EPA s *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water* (Weidemeier et al., 1998). The screening process utilizes indicator parameters, including natural electron acceptors, to recognize geochemical environments where reductive dechlorination is possible. This method relies on the fact that reductive dechlorination will cause predictable changes in groundwater chemistry

(Weidemeier et al., 1998). It is important to recognize that this analysis does not factor in any transformation mechanisms besides reductive dechlorination (Weidemeier et al., 1998).

Seven wells sampled during June 1999 indicative of background, source area downgradient and leading edges of the plume were evaluated using the EPA screening protocol. These wells are: EW-NE, EW-PZ1, EW-E, EW-4, EW-9, EW-1 and EW-22. Indicator parameters evaluated and their associated weighting factors are provided in Table 7.2. The results of this analysis are presented in Table 7.3. Six wells located within or close to the core of the plume were rated as having inadequate or limited evidence of reductive dechlorination. The seventh well, EW-NE was utilized for purposes of comparison as an upgradient (background) well. Wells EW-1 and EW-22, located near the leading edge of the plume were noted as having inadequate and limited evidence, respectively for reductive dechlorination, which would be expected because the greatest geochemical changes associated with reductive dechlorination would be observed in the core of the plume. Conversely, "source" wells EW-PZ1 and EW-E and downgradient wells EW-4 and EW-9 were shown to exhibit limited evidence of reductive dechlorination.

This is graphically illustrated on Figure 7.6, where geochemical and biochemical indicators are plotted from four of the above wells along one groundwater flow path. This plot includes data from June 1995, and displays data from an upgradient well (EW-NE), a source area well (EW-PZ1), and two downgradient wells (EW-4, EW-1). These data graphically support the previously discussed development of a reducing anaerobic zone (the source area) where a decreasing redox is accompanied by decreasing DO and coincides with increasing methane concentrations. In addition to the presence of the anaerobic zone, this plot displays the three primary indicators that are indicative of biodegradation. These include a sharp decline in the supply of election acceptors (DO and nitrate) in the source area, an increase in degradation by-products (methane and ethene), and a sharp decline in contaminant concentrations (cis-1,2-DCE and VC) downgradient.

Methane concentrations may increase along the plume centerline as biodegradation is occurring. The presence of methane in groundwater is indicative of strongly reducing (i.e., methanogenic) conditions (Weidemeier et al., 1998). Methane was detected in 11 of the 16 wells analyzed. Detections ranged from 4.5 to 240 µg/L. VC oxidizes at methane concentrations less than 500 µg/L. However, at concentrations of methane greater than 500 µg/L, VC, which is the daughter product of DCE, may accumulate (Weidemeier et al., 1998).

The presence of an iron reducing environment at the Site is indicated by the increase in dissolved iron concentrations at the source area. Groundwater samples from the upgradient monitor well EW-NE indicate a dissolved iron concentrations of 0.58 parts per million (ppm). Near the source area, dissolved iron concentrations increase to 7.81 at well EW-PZ2. This increase in dissolved iron indicates that iron reducing conditions are present. The presence of these iron reducing conditions, coupled with the presence of the VC degradation product ethene, suggest limited VC mineralization at the source area.

Although manganese is not one of the indicator parameters included in EPA's Preliminary Screening Protocol, manganese is a potential electron acceptor under anaerobic conditions (Weidemeier et al., 1998). Dissolved manganese, which is an indicator for reductive dechlorination, was detected at greater than twice the background concentration in 11 of the 16 wells.

7.3.2 Direct Oxidation (Metabolism)

In the process of direct oxidation, microorganisms utilize the CAH as the electron donors in a series of redox reactions. Unlike reductive dechlorination, the CAH are oxidized (i.e., used as the primary growth substrate by the microbial consortium) instead of reduced. Compounds such as *cis*-DCE and VC may be directly metabolized by subsurface microorganisms, again resulting in the formation of intermediate daughter products (e.g., ethene) or complete destruction via mineralization to carbon dioxide, water and chloride. The lesser chlorinated CAH species (e.g., DCE and VC) are more reduced and therefore are generally more susceptible to oxidation by direct metabolism. This is the opposite of reductive dechlorination, where the more chlorinated CAH (e.g., PCE and TCE) are more susceptible to degradation (Wiedemeier, 1998). It is important to note that this process may be either aerobic or anaerobic. For example, direct oxidation of *cis*-1,2-DCE has been shown to occur either aerobically (Bradley and Chapelle, 1998, Sewall and Gibson, 1997) or anaerobically during the reduction of manganese and naturally occurring organic matter (Bradley, Chapelle and Lovley, 1998; Bradley, Lanmeyer and Dinicola, 1998).

Several studies have indicated that DCE and VC can be oxidized in iron reducing and methanogenic conditions in addition to aerobic conditions (Bradley and Chapelle, 1997, 1996; Klier et al., 1998).

Although reductive dechlorination daughter products of TCE and DCE biodegradation (e.g., DCE and VC) have been detected in groundwater at the site, if reductive dechlorination were the sole mechanism affecting the attenuation of CAH at the site, more frequent detections of these and other daughter products (e.g., ethene and ethane) would be expected. Additionally, if reductive dechlorination at the site terminated at the production of DCE, a build-up of DCE in the aquifer would be observed, assuming no other mechanism acted upon this compound to reduce its concentration. Other mechanisms potentially contributing to concentration reductions at the site are: dilution, dispersion, abiotic transformations, and cometabolic biodegradation. However, observed CAH concentration reductions can not be completely attributed to either rainwater infiltration or dispersion , and abiotic transformations likely contribute little to the overall mass reduction that has been at the Site. The absence of daughter compounds accumulating in the aquifer is therefore conspicuous, and suggests that mechanisms other than reductive dechlorination are acting upon DCE and possibly VC to reduce their concentrations.

A plausible explanation for the apparent lack of daughter products normally expected with reductive dechlorination (e.g., ethane, ethene) is the direct oxidation of DCE and VC to carbon dioxide, water and chloride. As noted previously, this metabolism of DCE or VC may occur in either aerobic or anaerobic conditions. The redox potential of the site during the June1999 groundwater sampling round was oxidizing to moderately reducing, i.e., suitable conditions for VC or DCE oxidation. Increased concentrations of carbon dioxide and chloride, two of the ultimate end products of the mineralization of DCE and VC, would provide direct evidence that direct oxidation is occurring at this site. However, the background concentration variability of these two analytes at the site is significant enough to mask any change in concentration potentially produced by direct oxidation . Therefore, while appropriate conditions exist at the site to support direct oxidation of DCE and VC, it is not possible to determine conclusively whether this biomechanism is or is not acting on the plume.

Nonetheless, due to the decrease in DCE and VC concentrations, and the general absence of ethane and ethene across the site, there is a strong possibility that direct oxidation of DCE and VC may be occurring.

7.3.3 Cometabolism

While CAH are most readily biodegraded by reductive dechlorination, under certain circumstances they may also be degraded through cometabolism. Cometabolism occurs when an enzyme or cofactor, produced by a microorganism as part of their normal metabolism, degrades the CAH. The microorganism obtains no direct benefit from the transformation. The presence of these enzymes results in the hydroxylation, oxidation, denitration, deamination, hydrolysis, acylation or cleavage of the cometabolized organic compound, depending upon the structure and composition of the compound (Alexander, 1994). For example, enzymes (e.g., toluene monooxygenase and dioxygenase, or methane monooxygenase) produced by microorganisms during the utilization of toluene and methane as the primary substrate serve as a catalyst for transformation of the CAH molecule, producing a daughter product. Degradation of CAH such as TCE, *cis*-DCE and VC may occur during cometabolism of other organic substrates (e.g., toluene or methane) or naturally occurring organic matter, producing intermediate daughter products and may ultimately result in the production of carbon dioxide and water (mineralization). TCE, DCE, and VC may be degraded through cometabolism under both aerobic and anaerobic conditions (Vogel, 1994). DCE may be used in cometabolism under anaerobic conditions (McCarty and Semprini, 1994).

Therefore, cometabolism represents a third mechanism potentially responsible for the attenuation of CAH at the site. As with direct oxidation, carbon dioxide and chloride data may be examined for concentration increases attributable to cometabolism. As additional verification, concomitant decreases in organic compound concentrations (anthropogenic or naturally occurring; e.g. toluene or methane) should be observed. As is the case for direct oxidation, cometabolism is difficult to prove or disprove at the site. Only methane has been identified as a potential primary substrate at the site. Intermediate products (e.g., epoxides) are not included in the list of VOC analytes, and, therefore, would go undetected in groundwater samples collected at the site. Byproducts of cometabolism (with mineralization ultimately producing carbon dioxide, water and chloride) may not be significantly above the background concentrations detected in the aquifer.

7.4 Declining Concentration Trends

As noted in Section 6.4 concentrations decline over time and with distance from the source area. Graphs illustrating declining concentration spikes for VC, cis-1,2-DCE and TCE in groundwater samples over time are presented on Figure 7.6. The figure illustrates that the concentrations of VC, cis-1,2-DCE and TCE in groundwater samples were higher in the early 1980's than they are today despite the occurrence of concentration spikes as recently as 1995. This concentration decline over time is expected because the mass of contaminants is continually being reduced.

An examination of the data from EW-E for TCE, 1,2-DCE and VC indicates that chemical concentrations have consistently decreased by approximately 98% (TCE), 90% (1,2-DCE), and 90% (VC) during the selected time intervals (Figure 7.6). When a river flow event occurs, the chemical concentrations usually spike. However, the chemical concentrations will decrease to levels at or below those that existed prior to the river flow event.

The same declining chemical concentration trends for groundwater samples from well EW-E were observed at well EW-4 and well EW-1. Although the chemical concentrations are approximately one order (EW-4) to two orders (EW-1) of magnitude lower than EW-E, a similar significant decrease was observed at EW-4 (92% VC; 95% 1,2-DCE) and EW-1 (97% VC; 99% 1,2-DCE).

In addition to concentrations decreasing with time, concentrations also decrease with increasing distance from the source area. For example, the VC concentrations in the groundwater samples collected during June 1995 showed a decrease of approximately 96% over 1,900 feet from EW-E (1,700 µg/l) to EW-4 (61 µg/l). During this same period, VC concentrations in groundwater samples were reduced an additional 99% over approximately 1,700 feet from EW-4 (61 µg/l) to EW-1 (<0.5 µg/l). The concentration declines with distance combined with various bioactivity parameters are illustrated on Figure 7.6.

The groundwater environment at EW-4 and EW-1 is progressively more aerobic as evidenced by the increasing redox and DO concentrations and the decrease in methane and ethene. These aerobic environmental conditions are conducive to the aerobic degradation of 1,2-DCE and VC, which results in the absence of detectable concentrations of 1,2-DCE and VC (<0.50) at EW-1. Furthermore, the DO concentrations in groundwater at EW-1 (2.36 ppm, June 1995) indicate that aerobic microorganisms may be available to oxidize VC. The evaluation of groundwater data at wells EW-E, EW-4, and EW-1 indicates that chemical mass removal mechanisms exist in the aquifer and these mechanisms are sufficient to reduce chemical concentration (TCE; 1,2-DCE; VC) spikes associated with river flow events by 90% or greater.

Evaluations of these analytical results suggest the following general observations:

- General decrease in contaminant concentration over time;
- The sample data, show moderate to strong reducing immediately downgradient of the source area and less reducing or aerobic conditions in fringe areas;
- DCE detected at the site occurs in the biologically produced form of cis-1,2-DCE, an indication of reductive dechlorination
- Nitrate and sulfate are generally present at only low concentrations within the plume, and will therefore not significantly inhibit reductive pathways; and
- Based on EPA protocol, evidence of reductive dechlorination exists within portions of the site, particularly near the source area.

7.5 Summary

A temporal reduction in dissolved TCE concentrations has been observed at the site. Daughter products of TCE, including 1,2-DCE and VC, have been detected at the site. In addition, DCE detected at the site occurs as the biologically produced form, *cis* 1,2-DCE, generated from the biodegradation of TCE. There has been no apparent accumulation of *cis*-DCE, or of its reductive dechlorination daughter products, such as VC and ethene. A plausible mechanism accounting for these conditions is biotransformation by means other than reductive dechlorination, such as direct oxidation of DCE to carbon dioxide.

The following conclusions can be made regarding evidence for biotransformation pathways that may be active at the Estes Landfill Site:

- Using EPA protocol as a guideline, limited evidence of reductive dechlorination does exist at the site; and
- Other biotransformation mechanisms, such as direct oxidation or cometabolism, are likely occurring at this site, and provide a plausible explanation for the lack of accumulation of daughter products such as DCE and VC, in conjunction with the continuing decrease in parent compound concentrations.

8.0 ASSESSMENT OF RISK

This section provides a summary of the Human Health Risk Assessment (RA) (HLA, 1995e). The RA document is included in Appendix O of this report. The purpose of the RA was to assess the nature and extent of potential human health risks associated with current conditions and future uses of the Site and adjacent areas. The RA was prepared in a manner consistent with EPA's Risk Assessment Guidance for Superfund, Volume I (EPA, 1989a). The Arizona Department of Health Services (ADHS) has also conducted a baseline risk assessment for the Site, which is briefly discussed in Section 8.4.3.

The RA followed a four-step process: hazard identification, toxicity assessment, exposure assessment, and risk characterization. Each of these steps, as applied to the Site, is discussed in the sections that follow.

8.1 Hazard Identification

This section describes the selection of chemicals (chemicals of concern [COCs]) evaluated for defined exposure areas at the Site (i.e., onsite and adjacent offsite areas). Hazard identification identifies those chemicals of concern that may pose a risk to human health. The hazard identification process evaluates the available data concerning the toxicity of contaminants found in the environmental media onsite and offsite by media and location (e.g., onsite or offsite). Locations and media evaluated include:

- Onsite Soils
- Onsite Soil Gas
- Onsite Groundwater
- Offsite Groundwater

The selection of chemicals of concern (COCs) for each of the media: soils, soil gas, onsite groundwater, and offsite groundwater was based on comparison of the site investigation data to several criteria. Data for chemical constituents in each environmental medium were compared to EPA Region IX Preliminary Remediation Goals (PRGs) to eliminate those candidate COCs that, even though detected, would not present a significant risk. Further, chemicals that were not detected at all among all samples, ranging from as low as 10 samples to over 500 samples, were also eliminated. In some cases, a candidate COC might have exceeded the corresponding PRG, but was eliminated because the frequency of detection (also called % detection in the tables) based on as many as 500 samples was less than 5 percent. In such case, the exposure risk/hazard constituted by the Site is *de minimis*, and the candidate COC was eliminated from further evaluation. A few candidate COCs, for instance parachlorophenyl methyl sulfide, were eliminated based on the lack of a toxicity factor for either risk or hazard. In that case, the risk/hazard that might be contributed by such a chemical must be included as part of the uncertainty of the risk assessment. For groundwater data, consideration of maximum contaminant limits (MCLs), as appropriate regulatory criteria, were also considered in eliminating candidate COCs.

As discussed in Section 6.2.1, surface soils at the Site were evaluated for chlorinated pesticides, PCBs, SVOCs, VOCs, and metals (see Table 6.2 for analytical results). The concentrations of chemicals detected in onsite surficial soils were compared to EPA Region IX PRGs (EPA, 1995b) for industrial soils (Table 1 of Appendix O). A risk-based PRG, as defined by EPA, is a concentration of a chemical in media (i.e., soil, water, or air) that would not result in adverse noncarcinogenic health effects or a cancer risk greater than 1×10^{-6} (one in one-million) under a set of defined (default) exposure assumptions. EPA Region IX has published PRGs based on conservative exposure assumptions associated with either residential or industrial uses of a property. The concentration of chemicals detected were all well below EPA Region IX PRGs. Therefore none of these chemicals was identified as COCs in Site soils.

Onsite soil gas samples were collected during two phases. The results of soil gas sampling, summarized in Table 6.8, indicated low concentrations of several VOCs. Chemicals of concern in onsite soil gas were identified as those chemicals detected at a frequency of 5% or greater (Table 2 of Appendix O). EPA Region IX guidance suggests that chemicals present in less than 5% of the samples from any one media or area can be eliminated from further assessment (EPA, 1989b). This methodology was used because there are no PRGs or other standards for soil gas samples. On this basis, soil gas COCs included benzene, chlorobenzene, 1,2-DCB, 1,3/1,4-DCB, 1,1-DCA, 1,1-DCE, total 1,2-DCE, ethylbenzene, Freon 11, Freon 113, toluene, PCE, 1,1,1-TCA, TCE, VC, and total xylenes.

Since it is highly unlikely that a potable water well would ever be drilled on the Estes Landfill (EPA, 1989a and

1991a), COCs were not evaluated for onsite groundwater. However, COCs for potable use of offsite groundwater were evaluated, as there is a theoretical exposure pathway associated with future potable use of groundwater offsite. Because the identification of COCs in offsite groundwater (e.g., downgradient) is highly dependent on whether the chemicals were detected in onsite wells, chemicals detected in onsite groundwater were evaluated specifically to assist in the identification of COCs for offsite groundwater. For a complete description of the selection process for COCs in groundwater, see Section 3.4 in Appendix O. Using COCs for offsite groundwater is a conservative estimation. Groundwater near the Salt River bed is generally unsuitable for potable use due to natural factors. In addition, other sources of groundwater contamination have been identified offsite.

Well location information and monitoring data collected during Site investigations conducted from September, 1988 to September, 1994 were evaluated for selecting COCs in offsite groundwater. A complete listing of the data is included in Appendix A. COC selection criteria for VOCs and metals in groundwater are presented in Tables 3 and 4, respectively, of Appendix O.

8.2 Toxicity Assessment

This section presents the toxicity assessment for the COCs evaluated in this RA. Toxicity assessment includes identification of the types of potential toxicities associated with each COCs (e.g., cancer and/or noncancer toxicity) and the chemical-specific dose-response relationships. The dose-response relationship characterizes the relationship between the dose of a chemical and the probability of an adverse health effect in an exposed population.

For evaluating the potential for noncancer hazard, the chemical-specific EPA reference dose (RfD) was used. The RfD is identified as a dose level that is not expected to result in adverse noncancer health effects in persons exposed for a lifetime, even among the most sensitive members of the population. Therefore, if the predicted chemical dose for a receptor divided by the RfD (the hazard index [HI]) is less than 1.0, there is not a potential for an adverse noncancer effect for that receptor.

Cancer risks for exposure to carcinogens are defined in terms of probabilities. The probabilities identify the likelihood of a carcinogenic response in an individual receiving a specific dose of a particular chemical (based on mathematical modeling of the animal or human data). These probabilities are expressed in terms of the slope factor (SF). The SF represents the probability of a carcinogenic response (per unit dose). The SF, multiplied by the predicted chemical dose, provides an estimate of the upperbound incremental potential cancer risk.

Consistent with EPA guidance (1989a), the primary source for toxicity criteria for the COCs at the Site included the online EPA database IRIS (EPA, 1996a), and the Health Effects Assessment Summary Tables [HEAST] (EPA, 1995a). Toxicity criteria for the COCs are presented in Table 6 of Appendix O.

8.3 Exposure Assessment

Exposure assessment is the estimation of the timing (frequency and duration), route, and magnitude of the dose experienced by a population exposed to the COCs. Populations of persons that could potentially be exposed to contaminated environmental media at and from the Site are identified in the exposure assessment. Relevant routes of exposure and the methods used to estimate these exposures are also described. The Conceptual Site Model (CSM) for the Site is shown on Table 8.1. All the complete exposure pathways indicated on the figure are evaluated in the risk assessment. Description of pathways and receptor populations is included in the following paragraphs.

8.3.1 Potential Exposure Scenarios

Both onsite and offsite exposed receptor scenarios were evaluated. The exposure scenarios were identified on the basis of relevant environmental transport media, locations of potential human contact, and routes of exposure necessary for a complete exposure pathway.

8.3.1.1 Past Potential Offsite Exposure

One of the offsite receptors evaluated in the RA was a hypothetical worker at the Bradley Landfill, where a production well was used in the past for non-potable uses. VOCs were detected in groundwater from the Bradley Landfill production well. The water was not used as a drinking water source at the facility. The Bradley Landfill is connected to the City of Phoenix water supply and also receives bottled water. In the past, water from the Bradley Landfill well could be pumped into a 5,000 gallon water truck and sprayed on roads at the landfill to suppress dust. Workers at the Bradley Landfill could potentially be exposed to VOCs volatilizing from the use of the groundwater. However, as noted in the RA, this well has not been used since the RA was initiated.

8.3.1.2 Current Potential Onsite Exposure

The Site is currently vacant. Site access is restricted by a metal fence and a locked gate entrance. Therefore, individuals are not likely to trespass onto the Site. Accordingly, it was assumed that there are no current or potential onsite receptors.

8.3.1.3 Potential Future Onsite Exposure

The Site is currently within the buffer zone of the Phoenix Sky Harbor International Airport. It is unlikely that the land use restrictions associated with the airport buffer zone will be lifted. It is more likely that the need for the buffer zone will continue. Airport land use restrictions prevent the development of the Site as a commercial or industrial facility with buildings. The Site has limited industrial or commercial future uses that would not involve enclosed structures. Materials storage area land near the Site may be converted to a green belt, as discussed in Section 3.1 concerning land use. The most highly exposed individual in the potential land use scenarios would be a hypothetical full-time outdoor worker at the Site. Accordingly, a future onsite worker scenario was evaluated in the RA.

8.3.1.4 Potential Future Offsite Exposure

Current zoning for the area is primarily A-2 (heavy industrial) and A-1 (light industrial), with no residential zoning. Therefore, a future receptor in the form of an offsite worker exposed to industrial use of groundwater containing the signature chemicals that may migrate from the Site was evaluated, in accordance with EPA guidance (EPA, 1989a). Although it is unlikely, there is potential for installation of an offsite well by current or future businesses, with consumption of water from the well. Accordingly, future exposure to offsite groundwater was evaluated.

8.3.2 Exposure Pathways for Environmental Media

The discussion in this section elaborates on the conceptual site model (CSM) presented on Table 8.1.

8.3.2.1 Soil

As explained in Section 8.1 on Hazard Identification, none of the chemicals detected in onsite surface soils were selected as COCs, based on comparison with background soil concentrations or comparison with EPA Region IX PRGs for industrial land use (EPA, 1995b). Therefore, exposure to onsite soils was not evaluated as an exposure pathway.

8.3.2.2 Air

The primary constituents detected in groundwater at the Site are VOCs. Although not found, VOCs may also be present in solid waste and subsurface soils. These chemicals may volatilize from water, soil, and solid waste and migrate through solid waste and soil as vapor. Biodegradation of solid waste at a landfill results in the production of gases such as methane and carbon dioxide. Although these gases themselves are nontoxic, the presence of the gases may produce a convective flow that may increase emissions of VOCs from Site soils. As discussed in Section 8.4, the health risks associated with vapor emissions onsite were negligible, and therefore characterization of offsite exposures to airborne chemicals (which would be considerably less) was deemed unnecessary.

8.3.2.3 Groundwater

Because the Site is a former landfill, and because municipal drinking water is readily and more cheaply available, it is unreasonable to assume a groundwater production well will be installed at the Site. Therefore, onsite use of groundwater was not evaluated in the RA. EPA guidance agrees that it is unreasonable to assume that a well would be installed at a former landfill. Specifically, EPA (1989a) states that "in a few situations it may not be reasonable to assume that water will be drawn directly beneath a specific source (e.g., a waste management unit such as a landfill) in the future." Another EPA guidance document (EPA, 1991a), specific to conducting RI/FS studies at landfill sites, also suggests that hypothetical future exposure to groundwater would not normally be evaluated in a RA, as this pathway is highly unlikely. Also, the Groundwater Management Act of 1980 restricts the use of groundwater in an Active Management Area (AMA). The Site is located in the Phoenix AMA.

Potential future offsite exposures to groundwater were evaluated in the RA.

8.3.3 Dose Estimates

For purposes of risk assessment, dose (intake) is defined as the amount of chemical taken into the body per unit time. The dose may be received through inhalation, ingestion, and skin absorption. For environmental decision making, toxicity standards based on *administered* dose rate (intake rate) are used. For noncarcinogenic effects, the exposure scenario intake rate (dose rate) is averaged over the period of exposure and is referred to as the average daily dose (ADD). For carcinogenic effects, the intake rate is averaged over a lifetime and is referred to as the lifetime average daily dose (LADD). The exposure concentrations are incorporated into the dose (rate) equations to yield a dose estimate.

The following dose equation was used from EPA guidance (EPA, 1989a) to assess uptake for each complete exposure pathway considered in this assessment:

$$\mathrm{ADD} = \frac{C \times IR \times EF \times ED}{BW \times AT}$$

Where:

ADD = Average daily dose (mg/kg-day)
C = Chemical concentration in environmental medium (mg/m^3 or mg/l)
IR = Intake rate (m^3/day or mg/l)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (days)

For noncarcinogenic effects, AT = ED x 365 days/year
For carcinogenic effects, AT = 70 years x 365 days/year (The dose calculated is a Lifetime Average Daily Dose [LADD] in mg/kg-day, rather than an ADD.)

The specific dose equations for all applicable exposure routes are presented in Section 5.3 of Appendix O. Exposure parameter values (*e.g.*, intake rates, *etc.*) for each receptor and exposure pathway are summarized in Tables 7 and 8 of Appendix O.

8.3.3.1 Deterministic Dose Estimates

The deterministic evaluation employed single point estimates for each of the input parameters to develop single point dose estimates for each scenario. Doses were calculated by using exposure parameters associated with reasonable maximum exposure (RME) and average exposure scenarios (EPA, 1989a). This approach provides a conservative measure of the range of potential risks. An RME, as defined by EPA, is the "highest exposure that is reasonably expected to occur" and is estimated by using upperbound values (90th or 95th percentile values or 95% upper confidence limit values) of human exposure factors (EPA, 1989a). An average exposure scenario provides a conservative estimate of the central tendency for exposure at the Site by using average or median values for human exposure factors. A table of the default exposure parameters used for the RME and the average exposure scenarios may be found in Attachment D of Appendix O, Spreadsheets for Dose Estimates and Risk Characterization.

8.3.3.2 Probabilistic Dose Estimates

A probabilistic dose estimate was developed to reduce uncertainty in the dose estimate for future ingestion of offsite groundwater. Chemicals that contributed most significantly to potential health risk at the Site (i.e., greater than 95% probability) were identified through the deterministic risk evaluation. Based on the results of the deterministic evaluation, arsenic and VC were further evaluated using a probabilistic analysis, which provides a statistical estimate of uncertainties in the dose and risk estimates.

For the probabilistic analysis, risk probability distributions were developed for key exposure parameters (Table 13 of Appendix O). These include groundwater exposure concentrations, groundwater ingestion rate, exposure duration (job tenure), and body weight. Distributions were developed by using data presented in EPA's Exposure Factors Handbook (EPA, 1990) to ensure consistency with EPA guidance. Many of these distributions have been applied to regulatory risk assessments and have been published elsewhere (Roseberry and Burmaster, 1992;

Copeland et al., 1993, and 1994; and Finley et al., 1994).

8.3.4 Environmental Media Concentrations

This section describes the choices of concentrations for risk assessment for each of the environmental media evaluated.

8.3.4.1 Groundwater Concentrations

Data obtained from monitor wells downgradient and cross gradient to the Site, were used to conservatively estimate potential future concentrations of chemicals in groundwater. The monitor wells evaluated (bolded on Figure 8.1) were grouped to estimate representative exposure concentrations based on EPA guidance, which states, "it generally should be assumed that water could be drawn from anywhere in the aquifer" (EPA, 1989a).

Wells within the boundary of the Bradley Landfill were not included in the groundwater ingestion scenario because, as described above, it is inappropriate to assume that a groundwater production well would be installed at a landfill. Wells in the Salt River were also not included in the determination of representative exposure concentrations, as it is unlikely that groundwater would be drawn from below the river bed. In addition, ADWR regulations require land owner approval to install a well. Therefore, the State would be required to approve the installation of a well within the river bottom.

Groundwater characterization data obtained from 1988 to 1994 were used to estimate the mean concentration and 95% upper confidence limit (95% UCL) concentration, for each chemical of concern. The mean and 95% UCL concentrations were employed to evaluate the average, and RME exposure concentrations, respectively (Table 9 of Appendix O).

For the probabilistic analysis, arithmetic mean concentrations were initially calculated for each individual well that was included in the grouped well analysis. For each chemical, a discrete probability distribution of the groundwater concentration was developed from the arithmetic mean concentrations for each well in the immediate offsite area (Gilbert, 1987). This approach to characterizing a representative exposure concentration is more accurate than assuming a default normal or lognormal data distribution (Gilbert, 1987).

The risk estimates were based on historic groundwater quality for the entire period of record since the Phase I GQI through 1994. However, the data show decreases in contaminant concentrations over time through natural attenuation. Therefore, the RA probably overestimated potential future risks posed by the groundwater, whose contaminant concentration, have decreased over time.

8.3.4.2 Air Exposure Concentrations

A potential future onsite worker was assumed to be exposed through inhalation of on-site air containing VOCs. Conservative environmental fate and transport modeling was used to estimate potential concentrations of COCs in onsite air (Table 10 of Appendix O) (Attachment B of Appendix O). The mean and 95% UCL soil vapor concentration, for each chemical, was input into an EPA approved equation for estimating average and RME vapor emissions (EPA, 1988a). Exposure concentrations in air were developed from chemical-specific vapor emissions using an EPA-approved air dispersion equation (EPA, 1988a). Potential risks from air exposures are expected to decline over time as contaminant levels decrease in the future. However, the air exposure scenario conservatively assumed that onsite concentrations would continue at current levels.

8.4 Risk Characterization

Risk characterization provides an evaluation of the potential health risks posed by the chemicals of concern. Noncancer hazard and cancer risk were evaluated for each exposure scenario by using a deterministic analysis. Additionally, cancer risk associated with VC and arsenic in offsite groundwater was evaluated using a probabilistic analysis. Spreadsheets for the deterministic assessment are presented in Attachment D of Appendix O. Model output for the probabilistic assessment are presented in Attachment E of Appendix O.

8.4.1 Noncancer Hazard

A hazard quotient is calculated for noncancer hazards to evaluate each chemical individually, for each exposure pathway. The hazard quotient is the average daily chemical dose divided by the EPA reference (i.e., acceptable) dose. The hazard quotients are then added for all chemicals and all relevant pathways for each scenario evaluated. The sum of hazard quotients is referred to as the HI. If only one chemical is considered, the hazard quotient equals the HI. If the HI total is less than 1.0, there are no noncancer hazards for any potential receptor, including the most sensitive members of the population.

8.4.1.1 Potential Future Onsite Worker

Inhalation of vapors released from soil gas into the atmosphere was considered the only route of exposure to chemicals for the hypothetical future onsite worker. The estimated RME and average HIs associated with this pathway were 0.07 and 0.02, respectively (Table 14 and Attachment B of Appendix O). These values are 14 and 41 fold lower respectively than the acceptable HI of 1.0. Accordingly, adverse noncancer health effects for a full-time worker at the Site are unlikely. Because there are no noncancer hazards associated with the hypothetical full-time worker, the Site would not present a noncancer hazard for intermittent use associated with recreational or commercial use.

8.4.1.2 Potential Future Offsite Worker

The hypothetical future offsite worker was assumed to work offsite, but within the adjacent downgradient area shown on Figure 8.1 (shaded area). It was assumed that the worker consumed untreated groundwater contained anywhere within the evaluated area, but not from a well within the Estes or Bradley landfills.

The noncancer HI associated with ingestion of groundwater for the potential future offsite receptor was 1.4 for the RME and 0.7 for the average exposure (Table 16 of Appendix O). These values were based on the RfD for manganese that was applicable at the time the RA was prepared. The EPA has since revised the RfD for manganese. As a result of application of the EPA revised RfD, the corrected HI associated with ingestion of groundwater is 0.5 for the RME. Accordingly, there is not a potential for a noncancer hazard associated with the potable use of offsite groundwater.

8.4.2 Cancer Risk

Incremental cancer risks from exposure to an environmental contaminant is defined as the risk above the expected (background) cancer incidence. The normal rate of cancers for the large United States population is roughly one in three, or 333,000 cancers per million persons over a lifetime, nominally 70 years. HLA estimated the predicted incremental cancer risk from three hypothetical scenarios by using deterministic statistical methods (EPA, 1989a). Additionally, a probabilistic risk characterization was conducted for arsenic and VC in offsite groundwater to more accurately characterize risks associated with these two chemicals, which contribute to over 95% of the risk. Per EPA guidance, total incremental cancer risk associated with each scenario is expressed with one significant digit. Discussions of the incremental cancer risks for each evaluated scenario are presented below.

8.4.2.1 Potential Future Onsite Worker

The potential future onsite worker assumes eight hours per day and five days per week for a total of 25 years. Inhalation of vapors released from soil gas emitted the atmosphere was identified as the only potential route of exposure for the hypothetical onsite worker. The estimated RME and average cancer risks associated with this pathway were 1×10^{-5} (one in one-hundred thousand) and 8×10^{-7} (eight in ten-million), respectively (Table 17 and Attachment B of Appendix O). These values are within the acceptable range for cancer risk for a nonresidential Site in the State of Arizona and under EPA risk policies. Further, the average risk is over an order of magnitude lower than the RME risk, and it is likely that the incremental exposure will be averaged (and mitigated) by the variation of work location over the open, undeveloped land. Accordingly, there is not significant cancer risk for a full-time worker at the Site. Because there is not a significant cancer risk associated with the hypothetical full time worker over a duration of 25 years onsite, the Site would not present a hazard for intermittent use associated with recreational or commercial use.

8.4.2.2 Potential Future Offsite Worker

The potential future offsite worker was assumed to work within the adjacent downgradient area shown on Figure 8.1 (shaded area). The worker was assumed to consume untreated groundwater contained anywhere within the evaluated area but not within the Estes or Bradley landfills. This was a health-conservative assumption because the Safe Drinking Water Act would require most employers to treat the water to comply with MCLs. Because there is currently no potable use of groundwater within the area, this exposure pathway is incomplete for a current exposure scenario. In the deterministic assessment, used to identify relative contributions of COCs to total risk, VC contributed to 79% and arsenic to 18% of the total cancer risk in the RME scenario (Table 19 of Appendix O). (Note: based on a quantitative evaluation of background arsenic in groundwater, arsenic may not be a Site-related chemical.) Other Site and non-Site related VOCs contributed the remaining 3% of the total cancer risk in the RME scenario.

ADEQ and EPA support the probabilistic approach to risk assessment in that, when adequate data are available, it is believed to provide a more complete characterization of potential risk. Additionally, the probabilistic assessment provides risk characterization information in an optimal format for use by risk managers. In the probabilistic analysis, intended for use in risk management decision making for the Site, the incremental cancer risks were 7 x 10^{-6} (seven in one million) for the 50th percentile individual, 6 x 10^{-5} for the 90th percentile individual, and 1 x 10^{-4} for the 95th percentile individual (Table 20 of Appendix O). The upper limit of acceptable risk for risk management in the state of Arizona for a receptor at a non residential Site is 1 x 10^{-4} for the 95th percentile individual (ADEQ, 1995). Both the 1995 ADEQ Cleanup Policy and the subsequent 1997 ADEQ SRLs reference risk management decisions based on a risk range of 1 x 10^{-4} to 1 x 10^{-6}. Accordingly, potential use of offsite groundwater as drinking water would not pose an unacceptable risk.

8.4.3 ADHS Risk Assessment

As noted in the introduction to Section 8.0, ADHS also has conducted a RA for this Site. Although the RAs prepared by ADHS and HLA are similar in many respects, there are some differences in the assumption, particularly with respect to the potential consumption of groundwater. These differences are summarized below.

1. ADHS calculated a risk estimate for future onsite ingestion of groundwater (a pathway deemed to be incomplete under EPA guidance) in the characterization of future onsite risks. Based upon this EPA guidance, HLA

determined that this risk was not likely to ever occur and did not evaluate future onsite ingestion of groundwater.

2. The ADHS exposure unit consisted of each individual well. HLA collectively considered all appropriate offsite wells to evaluate a representative exposure unit concentration in accordance with EPA guidance (1989a).

3. HLA characterized future offsite exposure to groundwater via ingestion by using statistical distributions for body weight, water consumption, and exposure duration. ADHS estimated exposure using EPA upper-bound default exposure factors. Such practice results in risk estimates that lie above the 99th percentile risk (Burmaster, D. E. and R.H. Harris, 1993, The Magnitude of Compounding Conservatisms in Superfund Risk Assessments, Risk Analysis, Vol. 13, No. 2, p. 131-134

The differences in RA approaches resulted in significantly different estimates of hypothetical future risk. In the ADHS risk assessment, the highest calculated excess cancer risk was 2×10^{-3}, based upon assumed potable use of groundwater from a specific monitor well located onsite. In the HLA risk assessment, the highest risk, associated with potable use of offsite groundwater was, 1×10^{-4}. While the ADEQ result represents a conservative, upper-bound risk, the HLA probabilistic evaluation represents the range of more likely exposures associated with potable use of the groundwater.

The HLA RA is consistent with EPA's risk assessment guidance. This evaluation is based on using a probabilistic (e.g. Monte Carlo) simulation risk assessment approach rather than a deterministic approach*. The risks calculated by both HLA and ADHS must be considered upper bound maximum potential risks. Given that groundwater contaminant levels are decreasing, that the areal extent of the plume is not increasing, and that the restrictions State and Federal law place on drilling new groundwater production wells and using the groundwater without treatment, it is unlikely that the calculated upper-bound risks will ever apply to the Site.

* Note: The USEPA document referenced in the Estes risk assessment was "Guiding Principles for Monte Carlo Analysis (EPA/630/R-97/001). Since that time, that document has been integrated into Part E of the Risk Assessment Guidance for Superfund (USEPA, 1998. Supplemental Guidance to RAGS: The Use of Probabilistic Analysis in Risk Assessment, Part E. Office of Solid Waste and Emergency Response, February).

9.0 COMMUNITY INVOLVEMENT PLAN

This section provides a summary of the established process to respond to issues of community concern, detailed in the recently completed *Community Involvement Plan - Estes Landfill State Superfund Site* (the Plan). The Plan was prepared to assist the City, Bank One and ADEQ in disseminating information about the Site to the local community. Generally, the Plan discusses Site history, physical description, findings from the ongoing Site investigation and key issues of concern to the local community.

9.1 Historical Summary

The community surrounding the Estes Landfill has evolved from residential and small farm properties in the 1930's and 1940's to light industrial by 1970. Since 1970, the properties near the Site are almost exclusively light industrial and commercial in character.

Public involvement with activities with regard to the Site date to 1980, when ADHS discovered groundwater contamination in wells downgradient of the Site. Since that time issues regarding the Site and the partial Site relocation have been discussed during numerous City Council meetings and Arizona State Legislative sessions. The Site has also been discussed at meetings of the Phoenix Environmental Quality Commission and the Phoenix City Council Environmental and Natural Resources Subcommittee. Because the Site is on the WQARF Priority List, it is subject to annual public notice and comment with respect to funding priorities. Copies of numerous technical reports, quarterly status reports and proposed Site activities have been filed with and are publicly available from ADEQ. An information repository for technical documents and informational material has been established at the City of Phoenix Ocotillo Public Library.

The City has conducted several specific efforts to enhance community involvement in the Site activities. In 1991, the City published advertisements in local newspapers requesting information about the Estes and Bradley Landfills. An informational mailing list was created in 1993 and an informational fact sheet was jointly produced with ADEQ for distribution to the local community in February, 1995.

Representatives of the City and ADEQ conducted interviews with 20 local community members and local officials in September, 1995. These interviews identified several general categories of common interest to the local community:

Economic issues - interviewee concerns included total costs and cost effectiveness of Site related cleanup activities;

Redevelopment - interviewees generally expressed interest in seeing the Site redeveloped following cleanup efforts, possibly as part of the Rio Salado project;

Bradley Landfill - interviewees expressed concerns regarding the appearance of the landfill; and,

Technical - interviewees were briefed on Site technical issues and challenges and seemed to understand the complex hydrogeologic conditions.

Other Site specific issues were discussed with participants, and generally the fact sheet distribution was judged to be the most effective method of communicating future Site activities to the local community.

9.2 Community Involvement Plan

The primary objective of the Plan is to provide a framework to facilitate an ongoing dialogue with the surrounding community. To achieve this goal the Plan includes the following elements:

Maintenance of a Site mailing list;
Preparation and distribution of bilingual fact sheets;
Maintenance of an information repository;
Public meetings and workshops;
Assistance with responding to information requests from the general public; and
Briefing of public officials.

A copy of the Plan is provided as Appendix P to this report. Also included in Appendix P is a copy of a fact sheet distributed in Spring 1995. A schedule of proposed Community Involvement activities is included as Table 8-1 of the Plan. This schedule establishes public comment periods, and status of various planned activities.

10.0 SUMMARY AND CONCLUSIONS

This section briefly summarizes the major components of the SCM and provides conclusions from which the consideration of technologies and alternatives for groundwater remediation can be based. Characterization of the various environmental media at the Site has been extensive. Based on that characterization data, the media of interest is groundwater and the chemicals of interest are VOCs, specifically vinyl chloride, cis-1,2-DCE and TCE. Key interrelated elements of the SCM are: complex hydrogeology; onsite and offsite sources; and groundwater chemistry.

HYDROGEOLOGY

The Site is underlain by 115 to 175 feet of heterogeneous alluvial sediments that overlies several hundred feet of consolidated sedimentary bedrock. These alluvial sediments consist of varying amounts of silt, sand, gravel, and cobbles. In general, alluvial sediments along the Salt River have high hydraulic conductivities upwards of several hundred feet/day or 10^{-1} cm/sec. Detailed geologic characterizations indicate that the alluvial sediments near the source and beneath the Site have three distinct hydrostratigraphic units, designated F1, F2 and F3. Units F1 and F3 are considered sand and gravel aquifers with K values ranging between 10^{-1} and 10^{-2} cm/sec. Unit F2 acts as a localized aquitard and has a K value on the order of 10^{-7} cm/sec . Where F2 is absent, the alluvium is considered a single aquifer. The bedrock (unit F4) is composed of consolidated sedimentary material ranging from a well bedded sandstone/siltstone to a matrix supported conglomerate. Geologic core samples collected at the Site indicate that the sedimentary bedrock correlates with the local Tertiary Tempe Beds formation. The K values for this formation are also very low, estimated at 10^{-6} cm/sec.

Groundwater is encountered beneath the Site at depths ranging from 25 to 65 feet bg. The Salt River has the greatest hydrologic impact on groundwater conditions beneath the Site. During periods of no river flow, which is the dominant flow regime, groundwater flow is to the west and water levels generally decline. During periods of river flow, groundwater flow will shift to the southwest and water levels rise. The degree to which the groundwater flow direction shifts and the magnitude of the water level rise is dependent on the amount of flow in the river and the duration.

Groundwater gradients vary areally and with changing river conditions. The horizontal groundwater gradient is steepest across the middle of the Site, flattening to the east and west. The change in gradient is the result of a thinning of the saturated thickness and thus a decrease in the transmissivity of the aquifer near the middle of the Site. The steepest horizontal gradient is about 50 feet per mile and the gentlest is about 10 feet per mile. Horizontal gradients do not vary significantly during river flows. Vertical gradients are also present at the Site. A small downward vertical gradient is present and ranges from negligible to 1 to 2 feet under low water table conditions and up to 4 feet during high water table conditions.

GROUNDWATER VOC PLUMES

In the vicinity of the Site, two plumes of dissolved VOCs in groundwater have been identified through the evaluation of groundwater quality data. One plume is located onsite and generally defined as the Estes Landfill Site, as shown on the ADEQ WQARF Registry Map (Figure 1.2). The other plume is located to the south and southwest of the Estes Landfill.

The Site plume is suspected of originating from an onsite former liquid waste disposal pit (primary source). Dissolved concentrations of VC, cis-1,2-DCE, TCE, and other VOCs in groundwater define this plume. The south plume is defined by dissovled concentrations of TCE, 1,1-DCE, and other VOCs in the groundwater.

At the onsite source, releases of solvent waste such as TCE probably occurred. This waste TCE was likely mixed with other liquid wastes including septage, greases, and waste oils. The precise quantities, character and nature of the liquid wastes are unknown, although considerable historic evidence confirms solvent disposal in the source area. The primary contaminant migration pathway included infiltration of the mixed wastes and solvents through the bottom of the pit, and then percolation through the underlying unsaturated zone to the aquifer. The parent solvent, TCE, has subsequently been degraded to cis-1,2-DCE and VC. There are no indications of the existence of DNAPLs at the Site. Where detected, TCE makes up less than 1% of the total mass of contaminants. Concentrations of dissolved cis-1,2-DCE are generally less than 0.1% of its respective solubility, and VC exists as a gas at the pressures and temperatures found at the Site.

LANDFILL SOIL CONDITIONS

Metals in the form of Aresenic and Thallium were present in both the former landfill and the western and central portions of the existing landfill that exceeded their appropriate action level. In addition, Lead was present in the eastern portion of the existing landfill that also exceeded the SRL. Because these metals are present in subsurface soils, direct human exposure is not a concern at this time. However, the potential of these metals to leachate into the groundwater, and potential future exposure during site redevelopment are of concern. Consequently, further evaluation on the potential risks to human health and the environment of these metals present in the subsurface soils will have to be conducted in the form of a risk assessment.

LANDFILL METHANE PRODUCTION

Based on comparing methane results of all three rounds, there is no apparent trend of methane production. However, it has been concluded that the highest concentrations of methane production are within the relocated portions of the landfill. It has also been established that methane is not migrating west or east offsite. In addition, the presence of methane and methane production along the southern portion of the landfill is likely influenced by the presence of the Bradley Landfill, which is also a source of methane. The current concentrations of methane could create explosive conditions if low-lying areas or enclosed structure were present. However, because these types of site conditions are not present explosion potential due to build up of methane is currently not an issue. Should future site redevelopment be planned which includes the construction of enclosed structures, the potential of methane creating an explosive condition would be an issue of concern. Consequently, methods to recover methane in landfills should be evaluated during the performance of the FS.

GROUNDWATER CHEMISTRY

Vinyl chloride, cis-1,2-DCE, and TCE have been identified as signature chemicals that are unique to the Estes Landfill to identify groundwater impacted by the Site. VC and cis-1,2-DCE are the two VOCs with the greatest concentrations in groundwater samples collected from onsite wells and are present in lesser concentrations in groundwater samples from downgradient and cross-gradient wells. In addition, VC and TCE have the two lowest AWQSs of the VOC Compounds of Interest, which correlates to the higher toxicity value of these compounds. VC, cis-1,2-DCE, and TCE are used to identify the extent of groundwater contamination from the Site.

The groundwater plume from the Site is stable and not migrating. A review of over seven years of groundwater analytical data indicate that the western or downgradient lateral extent of the plume is defined by wells EW-1 and EW-12. Concentrations of VC and cis-1,2-DCE in groundwater samples collected from both of these wells have been very low to below detection, regardless of river flow conditions. To the south and southwest, the lateral extent fluctuates a few hundred feet in response to river flow. However, the southern lateral extent is generally defined by wells north of University Drive, in particular Wells BW-SD and EW-14. The northern/northwestern lateral extent is characterized by groundwater data from Wells EW-9, EW-11, EW-22, and newly installed Wells EW-23 and EW-24. Based on recent data from these wells, there appears to be a northwest migration component to the primary signature compounds from the Estes Landfill. June 1999 concentrations of VC at Wells EW-22 (2.7 µg/l) and EW-23 (12 µg/l), northwesternmost wells, were above the ADEQ AWQSs.

Based on inferred westerly to southwesterly groundwater flow in the area of the Estes Landfill, Wells EW-NE and EW-3 are upgradient of the inferred source of VOC contaminants identified at the Site. No VOCs have been reported in groundwater samples at these wells, which were initially sampled in September 1988 and June 1989, respectively. It can therefore be inferred that no VOC contaminants have migrated onto the Site from an upgradient source. Based on inferred westerly to southwesterly groundwater flow indicated since groundwater monitoring began at Estes Landfill, the Bradley Landfill is downgradient to cross-gradient of the Estes Landfill. Based on these inferred groundwater flow conditions, it is not likely that any potential VOCs in groundwater from the Bradley Landfill have migrated north onto the Estes Landfill boundary.

The vertical extent of groundwater contamination is generally limited to the alluvial hydrostratigraphic units F1, F2 and F3. Three wells have been completed in the bedrock and geologic coring was completed at a number of locations. Both VC and cis-1,2-DCE have been detected in groundwater samples collected from the unit F4 monitoring well EW-15, located near the source area. Only cis-1,2-DCE was detected in the June 1999 groundwater sample collected at Well EW-26, also located near the source area, but screened approximately 100 feet deeper than EW-15. VC and cis-1,2-DCE have not been detected, or have been detected at concentrations less than 1 ug/l, in groundwater samples collected from the downgradient F4 monitoring well EW-8. Given the hydrogeologic characteristics of F4 and the lack of groundwater contamination at the downgradient location, the vertical extent appears to be limited.

Contaminant concentrations in groundwater decline over time and with distance from the source area. Since the last major river flow event in 1993, concentrations have declined up to two orders of magnitude at some locations. It was noted that during large river flow events, groundwater concentrations of VC tend to spike near the source area. This concentration spike is immediately followed by a rapid decline. These spikes do not appear to affect the lateral extent of groundwater contamination over either the short or long term. From the source area to the western edge of the landfill, approximately 1,700 feet, groundwater concentrations generally decline by about two orders of magnitude. Groundwater concentrations of VC and DCE decline another order of magnitude to generally below detection in an additional 1,600 feet from the western edge of the Site.

The two primary mechanisms controlling the attenuation of VOCs at the Site are physical and biological. The main physical attenuation mechanisms are dissolution and advection. Dissolution occurs primarily in F2 beneath the source and results in the creation of highly contaminated groundwater. This highly contaminated groundwater slowly migrates vertically to the more permeable adjacent units F1 and F3, where it can migrate laterally via advective transport. During periods of river flow, rapid recharge causes hydraulic loading and upsets the established equilibrium. This effect contributes to the observed VC and DCE concentration spikes at source area wells during or immediately after a major river flow event.

An evaluation of concentration spikes over time indicates that the magnitude of the spikes is declining as a result of the reduction in contaminant mass in unit F2. In addition, after a spike event occurs, the concentrations rapidly decline to pre-spike levels or lower. The attenuation mechanism responsible for the rapid decline in concentrations appears to be primarily related to the presence of a unique set of environmental conditions that creates a sequential anaerobic/aerobic groundwater system. Strong evidence of the natural attenuation of TCE, cis-1,2-DCE, and VC through biodegradation is present at the Site.

Natural attenuation of TCE, cis-1,2-DCE, and to a limited extent, VC, is occurring at the Site. The presence of biologically-formed cis-1,2-DCE (daughter product of TCE) and VC (daughter product of the biodegradation of DCE) suggests that microbial reductive dechlorination is occurring at the Estes Landfill. In addition, supporting data have shown that appropriate geochemical conditions exist for reductive dechlorination to occur, especially near the source area.

However, daughter products of vinyl chloride, such as ethane and ethene, while detected at the site, do not occur in significant concentrations to suggest that vinyl chloride is being reductively dechlorinated, nor are the concentrations of chloride and carbon dioxide (ultimate end products in the mineralization of VC) significantly above background levels to indicate that VC mineralization is occuring. An alternative explanation for the lack of VC accumulation in the system may be other biodegradation mechanisms, such as direct oxidation or cometabolism with a primary organic substrate. At this time, insufficient evidence is available to conclusively determine the exact mechanism acting on VC to reduce concentrations over time.

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12.0 GLOSSARY

%	percent
F	degrees Fahrenheit
g/l	micrograms perliter
1,1,1-TCA	1,1,1-trichloroethane
1,1-DCE	1,1-dichloroethene
1,2-DCE	1,2-dichloroethene
Absorption.	The assimilation of gas, liquid, or solute into the internal structure of another substance.
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADOT	Arizona Department of Transportation
Adsorption.	The assimilation of gas, liquid, or solute onto the surface of another substance. In some cases, such as the assimilation of soil, both adsorption and absorption may occur. The term sorption is used when adsorption and absorption are not distinguished.
Adsorptive or Absorptive Capacity.	The capacity of soil and rock to remove dissolved chemicals from water.
Advection.	The process by which solutes are transported by the bulk motion of the flowing groundwater.
ADWR	Arizona Department of Water Resources
AG	Attorney General
Air Stripping.	A mass transfer process in which a substance in solution, usually water, is transferred to a gas, usually air.
Alkalinity.	Relating to the capacity of solutes in water and soluble salts in soil to neutralize acids. Quantitatively, alkalinity is expressed as an equivalent amount of calcium carbonate, even though several other soluble species contribute.
Alluvial.	Pertaining to or composed of alluvium or deposited by a stream or running water.
Alluvium.	A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.
Anion.	A negatively charged ion, for example, chloride or sulfate.
Annulus.	The space between the drill string or casing and the wall of the borehole or outer casing.
Aquifer Test.	A test in which measured quantities of water are withdrawn from or added to a well. The resulting changes in head in the aquifer both during and after the period of discharge or addition are measured to calculate the hydraulic properties of the aquifer.
Aquifer.	A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield economical quantities of water to wells and springs.
Aquitard.	A saturated, but poorly permeable bed, formation, or group of formations that does not yield water freely to a well or spring. However, an aquitard may transmit appreciable water to or from adjacent aquifers.
Artificial Recharge.	Recharge at a rate greater than natural, resulting from deliberate actions of man.
AWC	Arizona Water Commission
AWQS	Aquifer Water Quality Standards
Bank One	Bank One Arizona, N.A.
Basalt.	A general term for dark-colored iron-rich and magnesium-rich igneous rocks, commonly extrusive, but locally intrusive.
Bedrock.	A general term for the rock, usually solid, that underlies soil or other unconsolidated material.

Bentonite.	A colloidal clay, largely made up of the mineral sodium montmorillonite, a hydrated aluminum silicate. Bentonite is widely used as a drilling fluid additive.
bgs	below ground surface
BOD	biological oxygen demand
Braided Stream.	A stream that divides into or follows an interlacing or tangled network of several small branching and reuniting shallow channels separated from each other by branch islands or channel bars, resembling in plan the strands of a complex braid.
Caliche.	Soil or alluvium that has been cemented into a rock-like condition by chemical precipitates. The most common cementing material is calcium carbonate.
CAP	Central Arizona Project
Capillary Fringe.	The zone at the bottom of the vadose zone where groundwater is drawn upward by capillary force.
Cation Exchange.	Ion exchange process in which cations in solution are exchanged for other cations from an ion exchanger. Cation exchange occurs in groundwater under natural conditions and it is also used as a water treatment process.
Cation.	An ion having a positive charge, for example, calcium or sodium.
CCL_4	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
cfs	cubic feet per second
Chemicals of concern	
Chemicals of interest	
cis-1,2-DCE	cis-1,2-dichloroethene
City	The City of Phoenix
CLP	contract laboratory program
cm/sec	centimeters per second
COC	Chemicals of concern
COD	carbon oxygen demand
Coefficient of Storage.	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.
Colluvium-Alluvium.	Sediments consisting of mixtures of sand, gravel, silt, and clay which have been deposited by processes such as landslides (colluvium) or streams (alluvium).
Cone of Depression.	A depression in the groundwater table or potentiometric surface that has the shape of an inverted cone and develops around a well from which water is being withdrawn. It defines the area of influence of a well.
Confined Aquifer.	A formation in which the groundwater is isolated from the atmosphere at the point of discharge by impermeable geologic formations; confined ground water is generally subject to pressure greater than atmospheric.
Contamination.	The degradation of natural water quality as a result of man's activities. There is no implication of any specific limits, since the degree of permissible contamination depends upon the intended end use, or uses, of the water.
Continuous or Flood Flow	Those periods when flow in the river is continuous for more than a week, usually due to releases from upstream dams. These events typically result in significant water level rises in groundwater wells along the river as well as a shift in the gradient and direction of groundwater flow.Corrosion. The act or process of dissolving or wearing away metals.
Darcy's Law.	An empirical relation, describing the rate of laminar (viscous) flow of fluids through porous solids.
Density.	A property of matter measured as mass per unit volume usually expressed in pounds per gallon (lb/gal), pounds per cubic foot (lb/ft3), and kilograms per cubic meter (kg/m3).
Discharge Area.	An area in which groundwater is flowing toward the ground surface and may escape as a spring into a surface water body or may escape by evaporation and transpiration. Pumping wells are man-made discharge areas.
Dispersion.	The spreading and mixing of chemical constituents in groundwater caused by

	diffusion and mixing due to microscopic variations in velocities within and between pores.
Dissolution.	The process of dissolving; solvation.
DNAPL	dense non-aqueous phase liquids
DO	dissolved oxygen
Drainage Basin.	The land area from which surface runoff drains into a stream channel or system of channels, or to a lake, reservoir, or other body of water.
Drawdown.	The distance between the static water level and the surface of the cone of depression.
Drilling Fluid.	A water- or air-based fluid used in well drilling operations to remove cuttings from the hole, to clean and cool the bit, to reduce friction between the drill string and the sides of the hole, and to seal the borehole.
Effective Size.	The 90-percent-retained size of a sediment as determined from a grain-size analysis; therefore, 10 percent of the sediment is finer and 90 percent is coarser.
EPA	US Environmental Protection Agency
Evaporation.	The process by which fluids change from the liquid to the vapor state.
Exempt well.	A well having a pump with a maximum capacity of not more than thirty-five gallons per minute which is used to withdraw groundwater pursuant to ARS-45-454.
Extrusive Rocks.	Igneous rocks formed from magma that flows out on the Earth's surface. These rocks cool rapidly, producing a fine crystalline structure.
Fault.	A fracture or a zone of fractures along which there has been displacement of the rocks or soil relative to one another.
Field Capacity.	The amount of water held in the soil after the excess gravitational water has drained away and after the rate of downward movement of water has materially decreased.
Floodplain.	The surface or strip of relatively smooth land adjacent to a river channel, constructed by the present river and covered with water when the river overflows its banks. It is built of alluvium carried by the river during floods and deposited in the sluggish water beyond the influence of the swiftest current.
Flow Lines.	Lines indicating the direction followed by groundwater toward points of discharge. Flow lines are perpendicular to equipotential lines.
FS	Feasibility Study
ft/dy	feet per day
Gas Chromatography.	A process by which different gases can be separated from a mixture. The separation is accomplished by passing the gaseous mixture through a column containing liquid film. The different gases separate by way of successive sorption and desorption at different rates and leave the column in approximate order of decreasing boiling point.
gpm	gallons per minute
GQI	groundwater quality investigation
Graded.	An engineering term pertaining to a soil or an unconsolidated sediment consisting of particles of several or many sizes or having a uniform or equable distribution of particles from coarse to fine.
Gravel Pack.	Gravel that is placed in the annulus of the well between the borehole wall and the well screen to prevent formation material from entering the screen.
GRD	Granite Reef Diversion Dam
Groundwater Flow.	The movement of water through openings in soil and rock in the saturated zone in response to differences in hydraulic head, temperature, or chemical concentration.
Groundwater.	The subsurface water that occurs beneath the water table in soils and rocks that are saturated.
Grout.	A fluid mixture of Portland cement and water of a consistency that can be forced through a pipe and placed as required. Various additives, such as sand, bentonite, and hydrated lime, may be included in the mixture to meet certain

	requirements. Bentonite and water are sometimes used for grout. Neat cement grout is a mixture of water and Portland cement without additives.
Grouting.	The operation by which grout is placed between the casing and the sides of the well bore to a predetermined height above the bottom of the well. This secures the casing in place and excludes water and other fluids from the well bore.
GWC/PTS	groundwater containment/pilot treatment system
Hazard Quotient	Average daily chemical dose divided by the EPA reference (acceptable) dose.
HDR	Henningson, Durham & Richardson Engineers
Head Loss.	The part of head energy which is lost because of friction as water flows.
Head.	Energy contained in a water mass, produced by elevation, pressure, or velocity.
Heterogeneous.	Nonuniform in structure or composition throughout.
HI	Sum of hazard quotients. If only one chemical is considered, the hazard quotient equals the HI.
HLA	Harding Lawson Associates
Hydraulic Conductivity.	The rate of flow of groundwater under a unit hydraulic gradient at the prevailing temperature (ft/day). In the International System, the units are m3/day/m2/or m/day.
Hydraulic Gradient.	The rate of change in total head per unit of distance of flow in a given direction.
Hydrogeology.	The study of interrelationships between groundwater and geologic materials and processes.
Hydrostratigraphic Unit	A formation, part of a formation, or group of formations in which there are similar hydrologic characteristics allowing for grouping into aquifers or confining layers.
I-10	Interstate 10
IBW	Indian Bend Wash
Igneous Rocks.	Rocks that solidified from molten or partly molten material, that is, from a magma.
Infiltration.	The flow of water downward through the soil surface into the ground.
Interference.	The condition occurring when the area of influence of a water well comes into contact with or overlaps that of a neighboring well, as when two wells are pumping from the same aquifer or are located near each other.
Intrusive Rocks.	Those igneous rocks formed from magma injected beneath the Earth's surface. Generally these rocks have large crystals caused by slow cooling.
Ion.	An element or compound that has gained or lost an electron, so that it is no longer neutral electrically, but carries a charge.
Isotropic.	Refers to a medium whose properties are the same in all directions.
Laminar Flow.	Water flow in which the stream lines remain distinct and in which the flow direction at every point remains unchanged with time. It is characteristic of the movement of groundwater.
LAU	lower allluvial unit
Leachate.	The liquid that is derived from water which has percolated through waste materials and has dissolved the soluble components of the waste.
LUST	Leaking Underground Storage Tank
MAU	middle alluvial unit
MCFCD	Maricopa County Flood Control District
MCHD	Maricopa County Health Department
MCL	Maximum Contaminant Level
Metamorphic Rocks.	Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in the solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the Earth's crust.
mg/l	milligram per liter
mm	millimeters
Monitor Well.	A well which is used to measure groundwater levels and obtain groundwater samples.

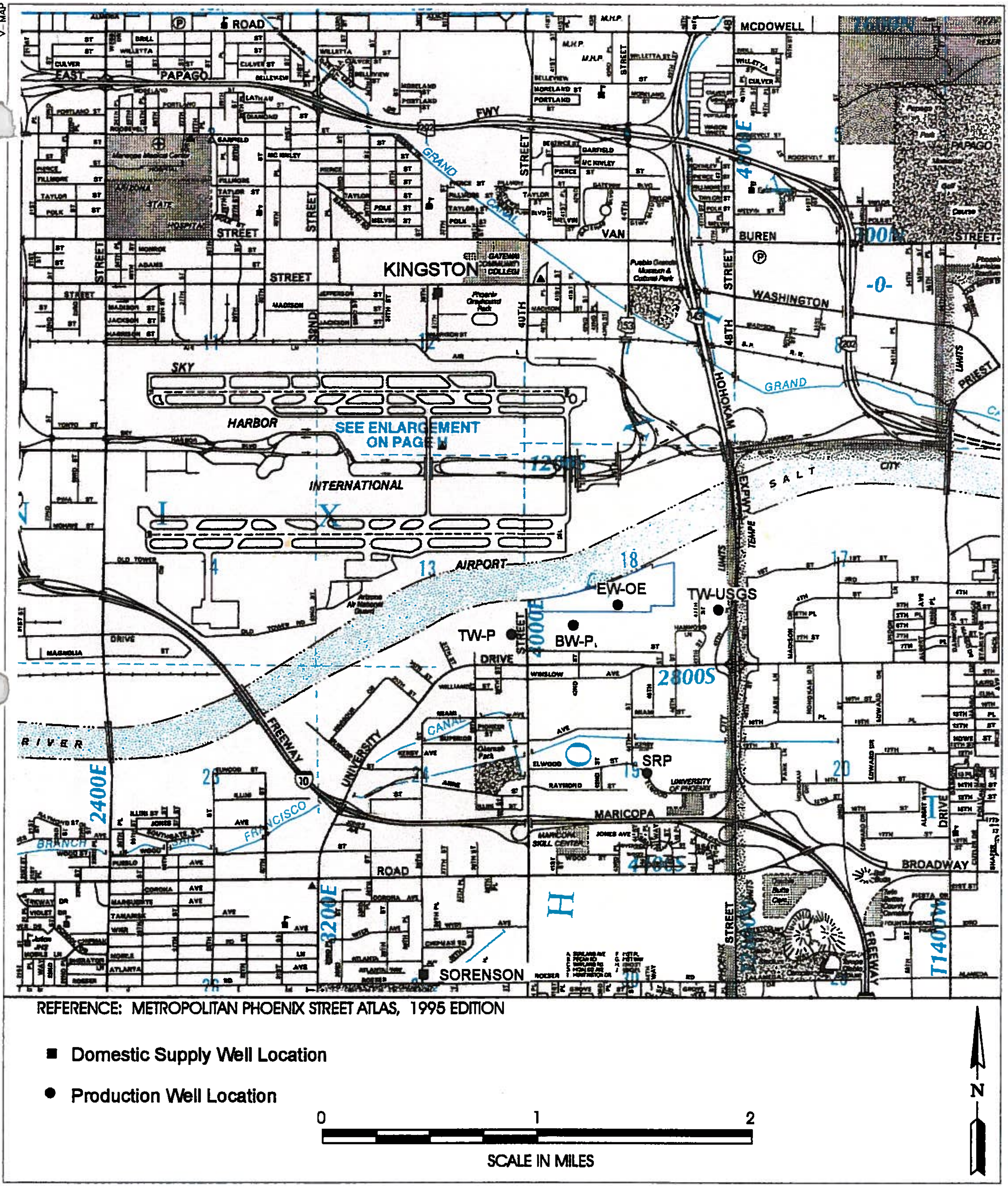
msl	mean sea level
NAPL	non-aqueous phase liquid
NCP	National Contingency Plan
No-Flow	No-flow river conditions are those that occur after a transitional period and are characteristic of those times when the river flow has no discernible impact on the regional or local groundwater system. During the period of time from when the landfill was constructed until present, this appears to be the most prevalent condition. This prevalence is expected to continue with the recent completion of the enlarged Roosevelt Dam and the subsequent increase storage potential of Roosevelt Lake.
Nongraded.	An engineering term pertaining to a soil or an unconsolidated sediment consisting of particles of essentially the same size or having a range of sizes with some intermediate size missing.
NPDES	National Pollution Discharge Elimination System
Observation Well.	A well drilled in a selected location for the purpose of observing parameters such as water levels and pressure changes.
Partial Penetration.	When the intake portion of the well is less than the full thickness of the aquifer.
PCB	polychlorinated biphenyls
Percolate.	The act of water seeping or filtering through the soil without a definite channel.
Permeability.	The property or capacity of a porous rock, sediment, or soil for transmitting a fluid; it is a measure of the relative ease of fluid flow under pressure gradients. Hydraulic conductivity is proportional to permeability. Permeability is measured in units of area.
pH.	A measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. (Originally stood for the words potential of hydrogen and is equal to the negative logarithm of the hydrogen ion concentration.)
Piezometer.	Device for measuring pressures in the groundwater from which water-level elevations can be calculated.
Porosity.	Related to the interstitial volume of bulk matter. It is the fraction of bulk volume not occupied by solid granular matter.
Potentiometric Surface.	An imaginary surface representing the total head of groundwater in a confined aquifer that is defined by the level to which water will rise in a well.
ppm	parts per million
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Parties
PRQWWP	Poor quality groundwater withdrawal permit
Pumping Test.	A test that is conducted to measure aquifer or well characteristics. Frequently used synonomously with aquifer test.
QA/QC	Quality Assurance/Quality Control
RA	risk assessment
Radius of Influence.	The radial distance from the center of a pumping well to the point where there is no lowering of the water table or potentiometric surface (the edge of the cone of depression).
RCRA	Resource Conservation & Recovery Act
RDA	remedial data acquisition
Recharge Area.	The portion of the land surface through which water seeps into the ground by infiltration or from another aquifer to recharge a particular aquifer.
Recharge.	The addition of water to the zone of saturation; also, the amount of water added.
Relative Permeability.	Measure of the ease with which one liquid (e.g. oil) can move through soil or rock in the presence of another liquid (e.g. water) in variable proportions.
Residual Drawdown.	The difference between the original static water level and the depth to water at a given instant during the recovery period after the pump has been shut off in a pumping well.
RI	Remedial Investigation

RME	Reasonable Maximum Exposure
Runoff.	That part of precipitation flowing to surface streams.
Safe Yield.	The amount of water which can be withdrawn from a groundwater basin on an annual basis without producing excessive drawdowns or other undesirable results. Cannot exceed mean annual recharge.
Sandstone.	A sedimentary rock composed of abundant rounded or angular fragments of sand which may be set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material.
SAP	Sampling and Analysis Plan
SCM	site conceptual model
Sedimentary Rocks.	Rocks resulting from the consolidation of loose sediment that has accumulated in layers.
Semi-Volatile Organic Compound.	Any organic compound that cannot be effectively purged from a water solution by an inert gas. In particular, any chemical analyzed by EPA Methods No. 625 and No. 8270 are defined as semi-volatile.
SH&B	Sergent, Hauskins & Beckwith
Slurry.	A thin mixture of liquid, especially water, and any of several finely divided substances, such as cement or clay particles.
Specific Capacity.	The rate of discharge of a water well per unit of drawdown, commonly expressed in gpm/ft or m3/day/m. It varies with duration of discharge.
Specific Gravity.	The weight of a particular volume of any substance compared to the weight of an equal volume of water at a reference temperature.
Specific Retention.	The ratio of the volume of water that a given body of rock or soil will hold against the pull of gravity to the volume of the body itself. It is usually expressed as a percentage.
Specific Storage	The amount of water released from or taken into storage per unit volume of porous medium per unit change of head.
Specific Yield.	The ratio of the volume of water that a given mass of saturated rock or soil will yield by gravity to the volume of that mass. This ratio is stated as a percentage.
SRP	Salt River Project
SRV	Salt River Valley
Static Water Level.	The level of water in a well that is not being affected by withdrawal of groundwater.
Storage Coefficient.	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. By definition, it is a dimensionless term. It is equal to the product of specific storage and aquifer thickness.
Stratigraphy.	The study of rock strata, especially of their distribution, deposition, and age.
SVOC	semi-volatile organic compounds
TC	Technical Committee
TCE	tricholoroethene
TD	total depth
the river	The Salt River
the Site	The Estes Landfill
the source area	the liquid waste disposal pit
TOC	total organic carbon
Tortuosity.	Sinuosity of the actual flow path in porous medium; it is the ratio of the length of the flow path divided by the length of the sample.
Total Dissolved Solids (TDS).	A term that expresses the quantity of dissolved material in a sample of water, either the residue on evaporation, dried at 3560F (1800C), or, for many waters that contain more than about 1,000 mg/l, the sum of the dissolved chemical constituents.
trans-1,2-DCE	trans-1,2-dichloroethene
Transmissivity.	The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Transmissivity values are given in gallons per day

	through a vertical section of an aquifer one foot wide and extending the full saturated height of an aquifer under a hydraulic gradient of one in the English Engineering system (gpd/ft); in the International System, transmissivity is given in cubic meters per day through a vertical section of an aquifer one meter wide and extending the full saturated height of an aquifer under a hydraulic gradient of one (m2/d).
Transpiration.	The process by which water absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface.
Trolls	transducer-type data loggers
Turbulent Flow.	Fluid flow in which the flow lines are confused and heterogeneously mixed. It is typical of flow in surface-water bodies.
UAU	upper alluvial unit
Unconfined Aquifer.	An aquifer where the water table is exposed to the atmosphere through openings in the overlying materials.
Unsaturated Zone.	An underground area containing water in the gas phase under atmospheric pressure, water temporarily or permanently under less than atmospheric pressure, and air or other gases.
USDC	US Department of Commerce
USGS	US Geological Survey
UV	Ultraviolet
UV/Perox	Ultraviolet Peroxidation
Vadose Zone.	The zone containing water under pressure less than that of the atmosphere, including soil water, intermediate vadose water, and capillary water. This zone is limited above by the land surface and below by the surface of the zone of saturation, that is, the water table.
VC	vinyl chloride
Viscosity.	The property of a substance to offer internal resistance to flow. Specifically, the ratio of the shear stress to the rate of shear strain.
VOC	volatile organic compounds
Volatile Organic Compound (VOC).	Any compound that can be purged from a water solution with an inert gas. The compounds than can by analyzed by EPA Method 624 are considered to be VOCs. As a useful guide, any organic liquid compound with a vapor pressure of the order of or greater than the vapor pressure of water may be considered to be a VOC.
Water Table.	The surface between the vadose zone and the groundwater; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.
Weathering.	The in situ physical disintegration and chemical decomposition of rock materials at or near the Earth s surface.
Well Development.	Process by which obstructions such as silt and fine sand are removed from the surrounding aquifer prior to pumping. The use of brushes, compressed air, and water surging cleans the well screen and surrounding aquifer and allows water to enter the well more readily.
Well Screen.	A filtering device that allows water to enter a water well.
Well Yield.	The volume of water discharged from a well in gallons per minute or cubic meters per day.
WQARF	Arizona Water Quality Assurance Fund
WSRV	Western Salt River Valley

LIST OF FIGURES

V_MAP



REFERENCE: METROPOLITAN PHOENIX STREET ATLAS, 1995 EDITION

■ Domestic Supply Well Location

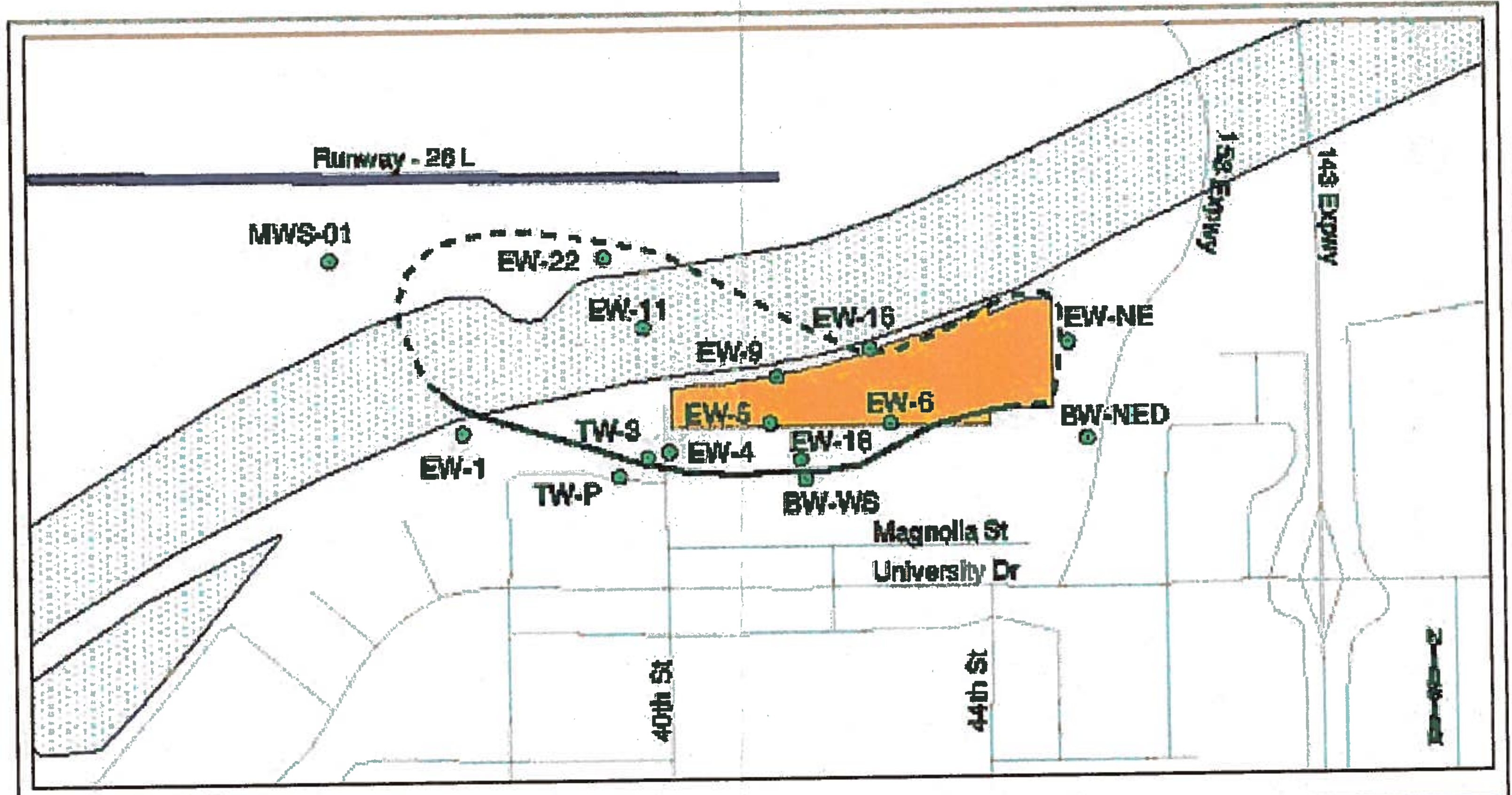
● Production Well Location

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Vicinity Map
Estes Landfill RI
Phoenix, Arizona

Figure
1.1

Drawn	Project Number	Approved	Date	Revised Date
Daniel L. Kudlicki			11/96	7/22/99



EXPLANATION

—	Estimated site boundary - Western boundary represents area of Vinyl Chloride contamination in groundwater that exceeds the Aquifer Water Quality Standard of 2.0 micrograms per liter. The eastern boundary represents soil contamination in the landfill.
- -	Dashed line indicates inferred site boundary
—	Roads
▬	Sky Harbor Airport Runway
🟧	Estes Landfill
☐	Salt River - ephemeral
EW-22 ●	Well sample location and indentifier

500 0 500 1000 Feet

ESTES LANDFILL
WQARF SITE

SITE BOUNDARY MAP

MAY 1999

PHOENIX, ARIZONA

PREP: KJZ
FILE: 070213-00
REV: PCW/WR
/kjz/estes/ps-raster/el.jpg

Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

ADEQ Estes Landfill
WQARF Site Boundry

FIGURE
1.2

DRAWN	PROJECT NUMBER	APPROVED	DATE	DATE REVISED
Daniel L. Kudlicki			7/7/99	7/99

ESTES001

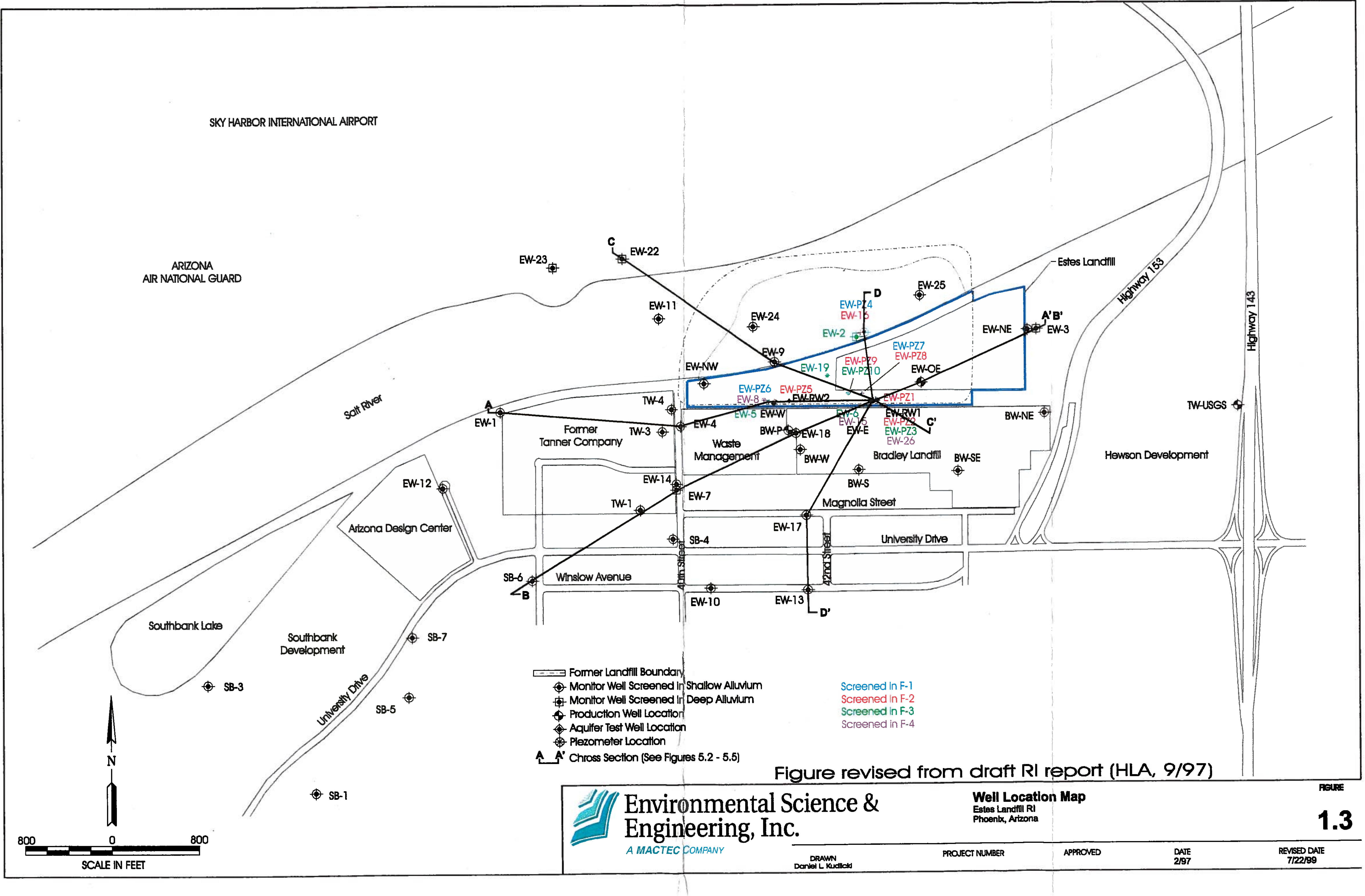


Figure revised from draft RI report (HLA, 9/97)

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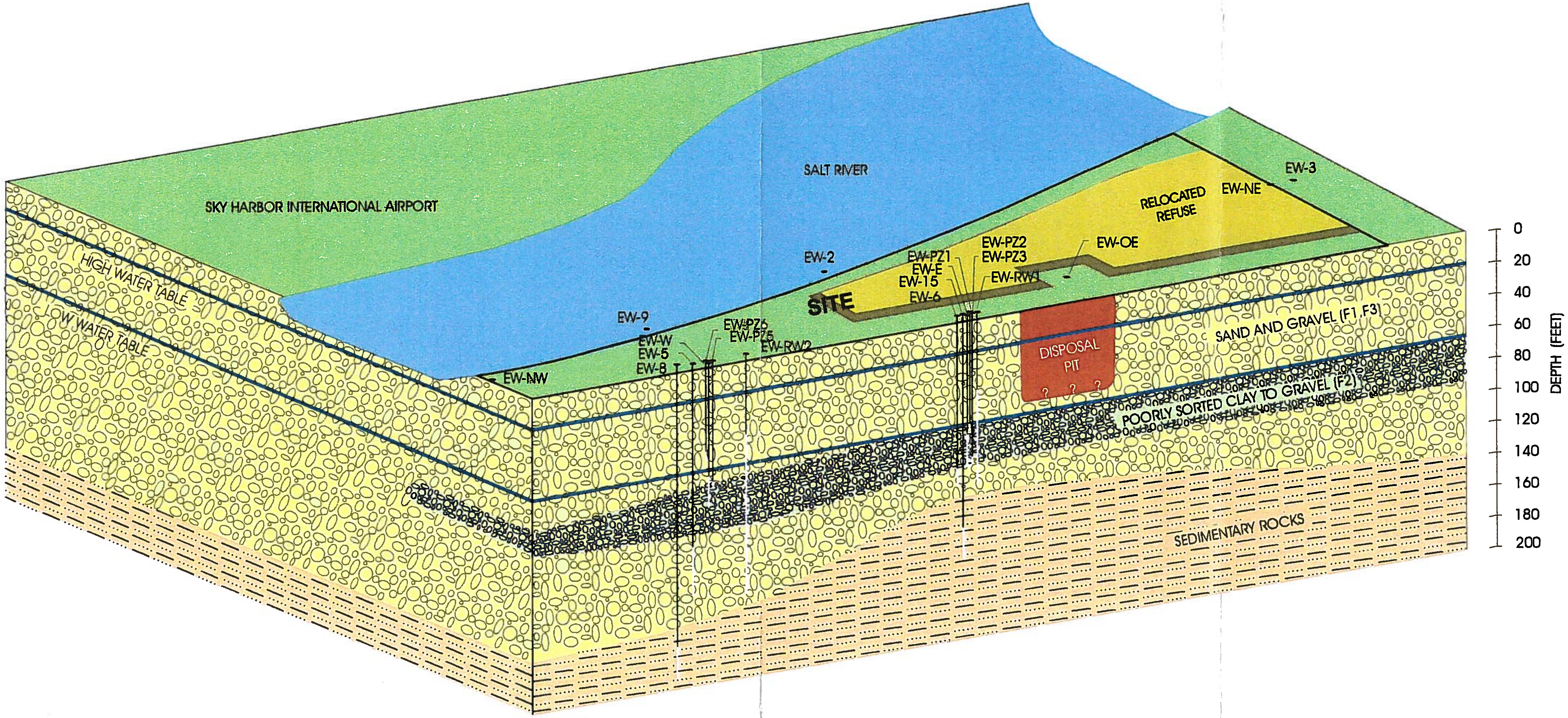
A MACTEC COMPANY

Well Location Map
Estes Landfill RI
Phoenix, Arizona

FIGURE
1.3

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			2/97	7/22/99

3D-XSCT1



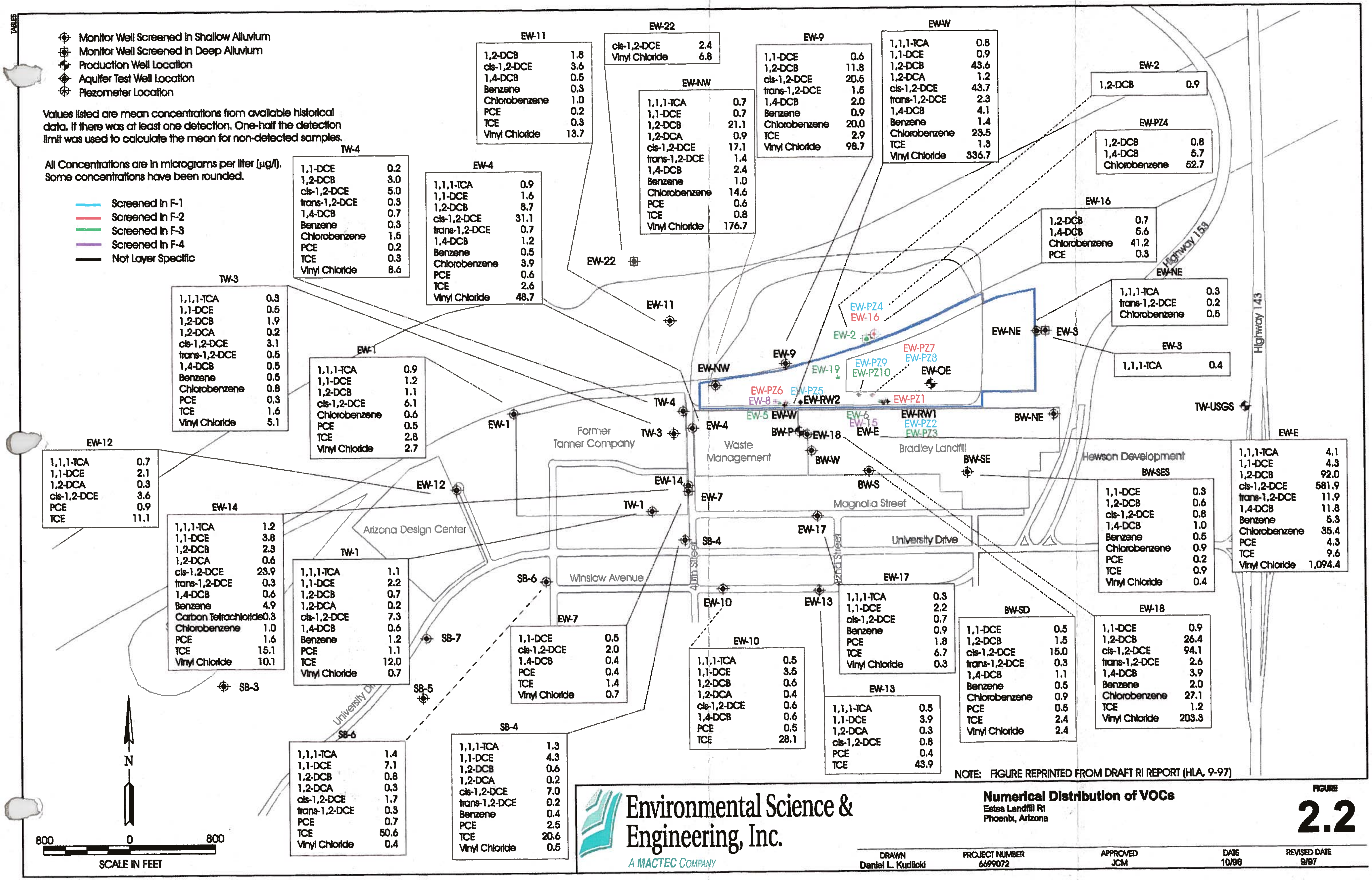
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Hydrostratigraphic Block Diagram
Estes Landfill RI
Phoenix, Arizona

FIGURE
2.1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



⊕ Monitor Well Screened in Shallow Alluvium
⊕ Monitor Well Screened in Deep Alluvium
⊕ Production Well Location
◈ Aquifer Test Well Location
⊕ Piezometer Location

Values listed are mean concentrations from available historical data. If there was at least one detection. One-half the detection limit was used to calculate the mean for non-detected samples.

All Concentrations are in micrograms per liter (µg/l). Some concentrations have been rounded.

▬ Screened in F-1
▬ Screened in F-2
▬ Screened in F-3
▬ Screened in F-4
▬ Not Layer Specific

TW-4

1,1-DCE	0.2
1,2-DCB	3.0
cis-1,2-DCE	5.0
trans-1,2-DCE	0.3
1,4-DCB	0.7
Benzene	0.3
Chlorobenzene	1.5
PCE	0.2
TCE	0.3
Vinyl Chloride	8.6

EW-11

1,2-DCB	1.8
cis-1,2-DCE	3.6
1,4-DCB	0.5
Benzene	0.3
Chlorobenzene	1.0
PCE	0.2
TCE	0.3
Vinyl Chloride	13.7

EW-22

cis-1,2-DCE	2.4
Vinyl Chloride	6.8

EW-NW

1,1,1-TCA	0.7
1,1-DCE	0.7
1,2-DCB	21.1
1,2-DCA	0.9
cis-1,2-DCE	17.1
trans-1,2-DCE	1.4
1,4-DCB	2.4
Benzene	1.0
Chlorobenzene	14.6
PCE	0.6
TCE	0.8
Vinyl Chloride	176.7

EW-4

1,1,1-TCA	0.9
1,1-DCE	1.6
1,2-DCB	8.7
cis-1,2-DCE	31.1
trans-1,2-DCE	0.7
1,4-DCB	1.2
Benzene	0.5
Chlorobenzene	3.9
PCE	0.6
TCE	2.6
Vinyl Chloride	48.7

EW-9

1,1-DCE	0.6
1,2-DCB	11.8
cis-1,2-DCE	20.5
trans-1,2-DCE	1.5
1,4-DCB	2.0
Benzene	0.9
Chlorobenzene	20.0
TCE	2.9
Vinyl Chloride	98.7

EW-W

1,1,1-TCA	0.8
1,1-DCE	0.9
1,2-DCB	43.6
1,2-DCA	1.2
cis-1,2-DCE	43.7
trans-1,2-DCE	2.3
1,4-DCB	4.1
Benzene	1.4
Chlorobenzene	23.5
TCE	1.3
Vinyl Chloride	336.7

EW-2

1,2-DCB	0.9

EW-PZ4

1,2-DCB	0.8
1,4-DCB	5.7
Chlorobenzene	52.7

EW-16

1,2-DCB	0.7
1,4-DCB	5.6
Chlorobenzene	41.2
PCE	0.3

EW-NE

1,1,1-TCA	0.3
trans-1,2-DCE	0.2
Chlorobenzene	0.5

EW-3

1,1,1-TCA	0.4

TW-3

1,1,1-TCA	0.3
1,1-DCE	0.5
1,2-DCB	1.9
1,2-DCA	0.2
cis-1,2-DCE	3.1
trans-1,2-DCE	0.5
1,4-DCB	0.5
Benzene	0.5
Chlorobenzene	0.8
PCE	0.3
TCE	1.6
Vinyl Chloride	5.1

EW-1

1,1,1-TCA	0.9
1,1-DCE	1.2
1,2-DCB	1.1
cis-1,2-DCE	6.1
Chlorobenzene	0.6
PCE	0.5
TCE	2.8
Vinyl Chloride	2.7

EW-12

1,1,1-TCA	0.7
1,1-DCE	2.1
1,2-DCA	0.3
cis-1,2-DCE	3.6
PCE	0.9
TCE	11.1

EW-14

1,1,1-TCA	1.2
1,1-DCE	3.8
1,2-DCB	2.3
1,2-DCA	0.6
cis-1,2-DCE	23.9
trans-1,2-DCE	0.3
1,4-DCB	0.6
Benzene	4.9
Carbon Tetrachloride	0.3
Chlorobenzene	1.0
PCE	1.6
TCE	15.1
Vinyl Chloride	10.1

TW-1

1,1,1-TCA	1.1
1,1-DCE	2.2
1,2-DCB	0.7
1,2-DCA	0.2
cis-1,2-DCE	7.3
1,4-DCB	0.6
Benzene	1.2
PCE	1.1
TCE	12.0
Vinyl Chloride	0.7

EW-E

1,1,1-TCA	4.1
1,1-DCE	4.3
1,2-DCB	92.0
cis-1,2-DCE	581.9
trans-1,2-DCE	11.9
1,4-DCB	11.8
Benzene	5.3
Chlorobenzene	35.4
PCE	4.3
TCE	9.6
Vinyl Chloride	1,094.4

BW-SES

1,1-DCE	0.3
1,2-DCB	0.6
cis-1,2-DCE	0.8
1,4-DCB	1.0
Benzene	0.5
Chlorobenzene	0.9
PCE	0.2
TCE	0.9
Vinyl Chloride	0.4

EW-7

1,1-DCE	0.5
cis-1,2-DCE	2.0
1,4-DCB	0.4
PCE	0.4
TCE	1.4
Vinyl Chloride	0.7

EW-17

1,1,1-TCA	0.3
1,1-DCE	2.2
cis-1,2-DCE	0.7
Benzene	0.9
PCE	1.8
TCE	6.7
Vinyl Chloride	0.3

EW-10

1,1,1-TCA	0.5
1,1-DCE	3.5
1,2-DCB	0.6
1,2-DCA	0.4
cis-1,2-DCE	0.6
1,4-DCB	0.6
PCE	0.5
TCE	28.1

EW-13

1,1,1-TCA	0.5
1,1-DCE	3.9
1,2-DCA	0.3
cis-1,2-DCE	0.8
PCE	0.4
TCE	43.9

BW-SD

1,1-DCE	0.5
1,2-DCB	1.5
cis-1,2-DCE	15.0
trans-1,2-DCE	0.3
1,4-DCB	1.1
Benzene	0.5
Chlorobenzene	0.9
PCE	0.5
TCE	2.4
Vinyl Chloride	2.4

EW-18

1,1-DCE	0.9
1,2-DCB	26.4
cis-1,2-DCE	94.1
trans-1,2-DCE	2.6
1,4-DCB	3.9
Benzene	2.0
Chlorobenzene	27.1
TCE	1.2
Vinyl Chloride	203.3

SB-6

1,1,1-TCA	1.4
1,1-DCE	7.1
1,2-DCB	0.8
1,2-DCA	0.3
cis-1,2-DCE	1.7
trans-1,2-DCE	0.3
PCE	0.7
TCE	50.6
Vinyl Chloride	0.4

SB-4

1,1,1-TCA	1.3
1,1-DCE	4.3
1,2-DCB	0.6
1,2-DCA	0.2
cis-1,2-DCE	7.0
trans-1,2-DCE	0.2
Benzene	0.4
PCE	2.5
TCE	20.6
Vinyl Chloride	0.5

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Numerical Distribution of VOCs
Estes Landfill RI
Phoenix, Arizona

FIGURE
2.2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki	6699072	JCM	10/96	9/97

AERIAL

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

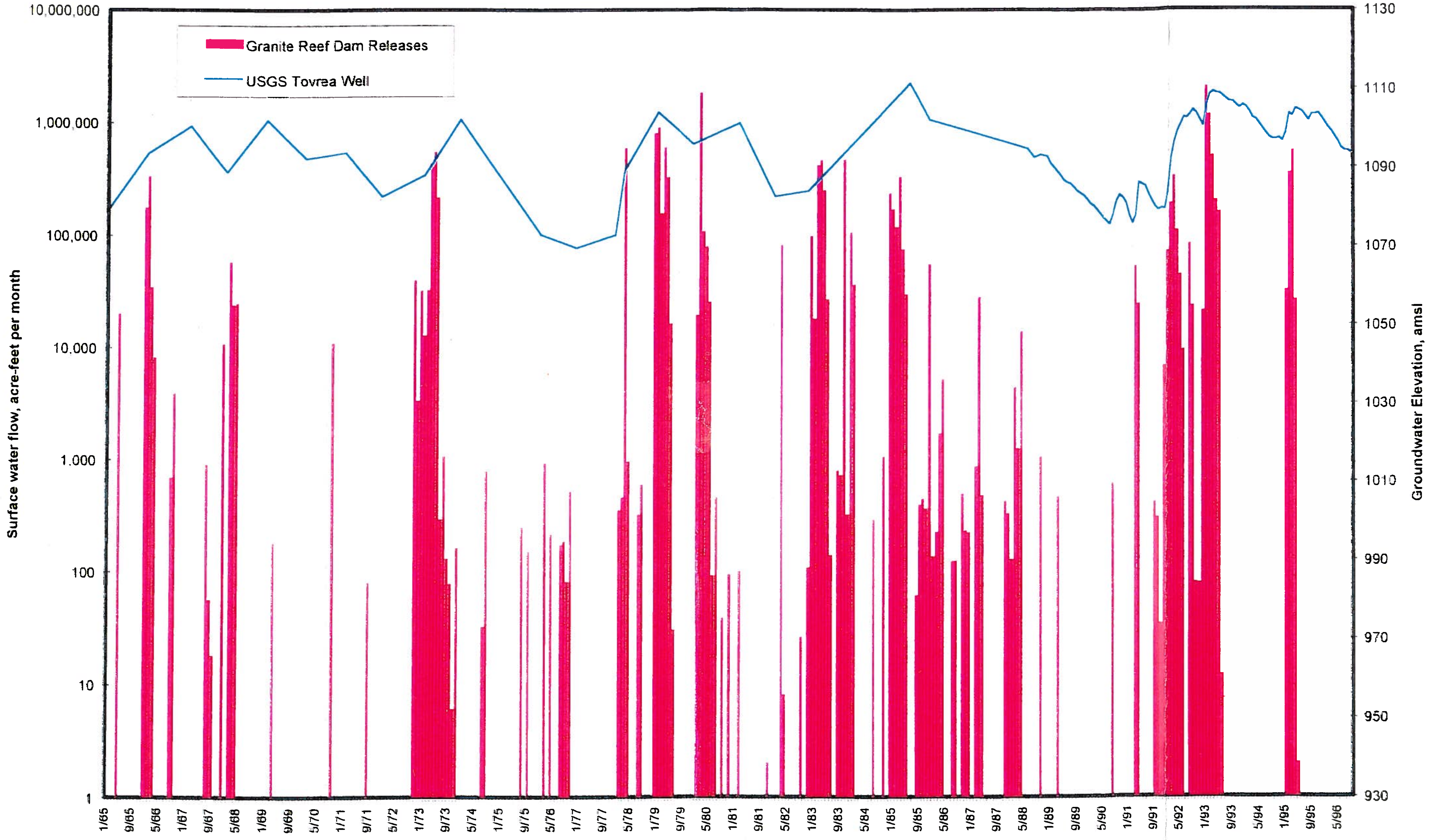
● Storm Drain

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Aerial Photograph: October 1996
Estes Landfill RI
Phoenix, Arizona

FIGURE
3.1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



NOTE: Line Graph is water levels for USGS Tovrea Well.

Bar Graphs are releases from Granite Reef Dam in total acre-feet per month.

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

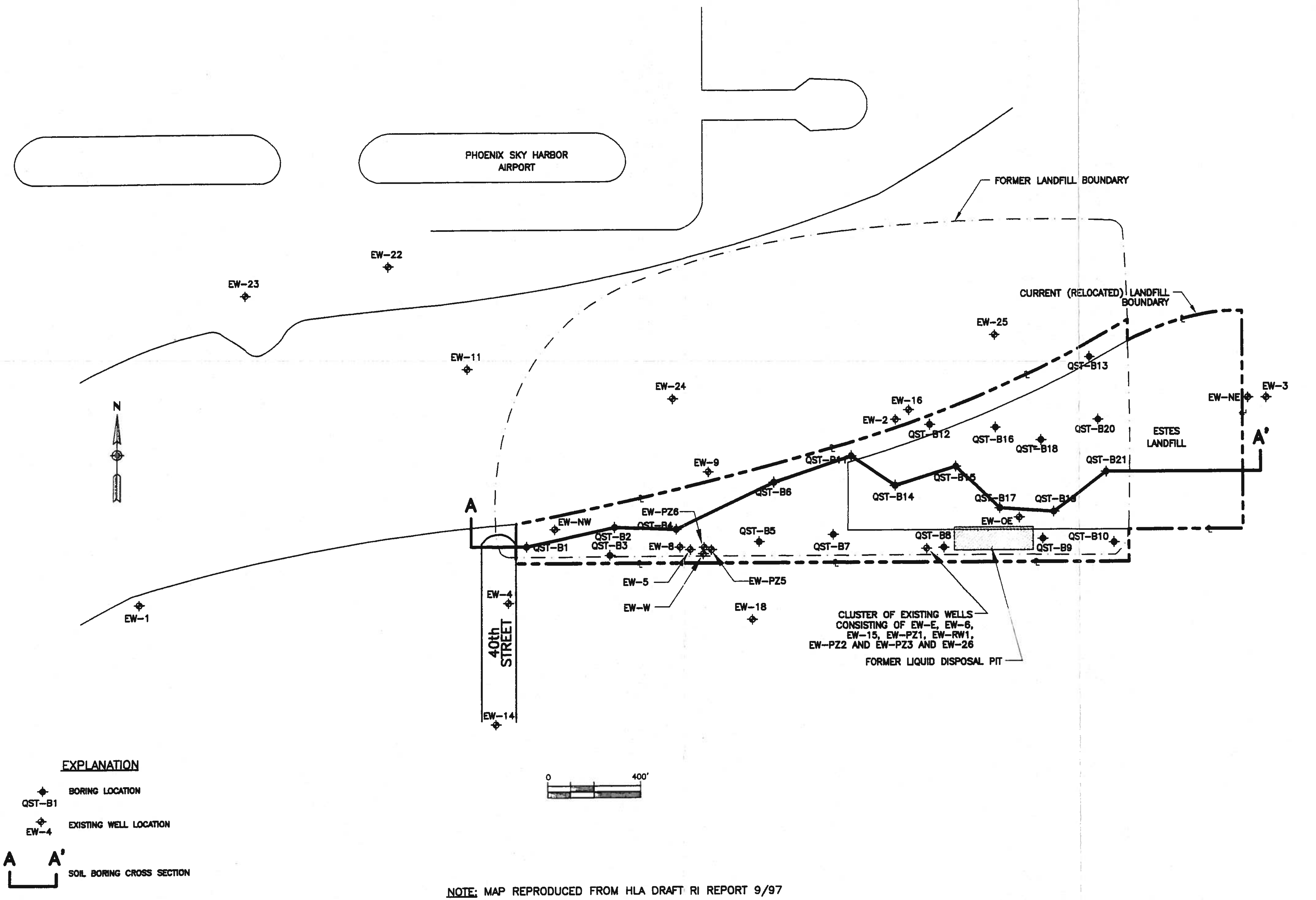
CADD FILE: ACAD\FILES\ESTES\3.2.dwg

DATE 7-7-99
SCALE NTS
DRAWN BY: RBC
FIGURE **3.2**
PROJECT No. 6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

TOVREA WATER LEVELS vs. GRANITE REEF SPILL

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97

CADD FILE: C:\ACAD\FILES\ESTES\STPLAN1.dwg

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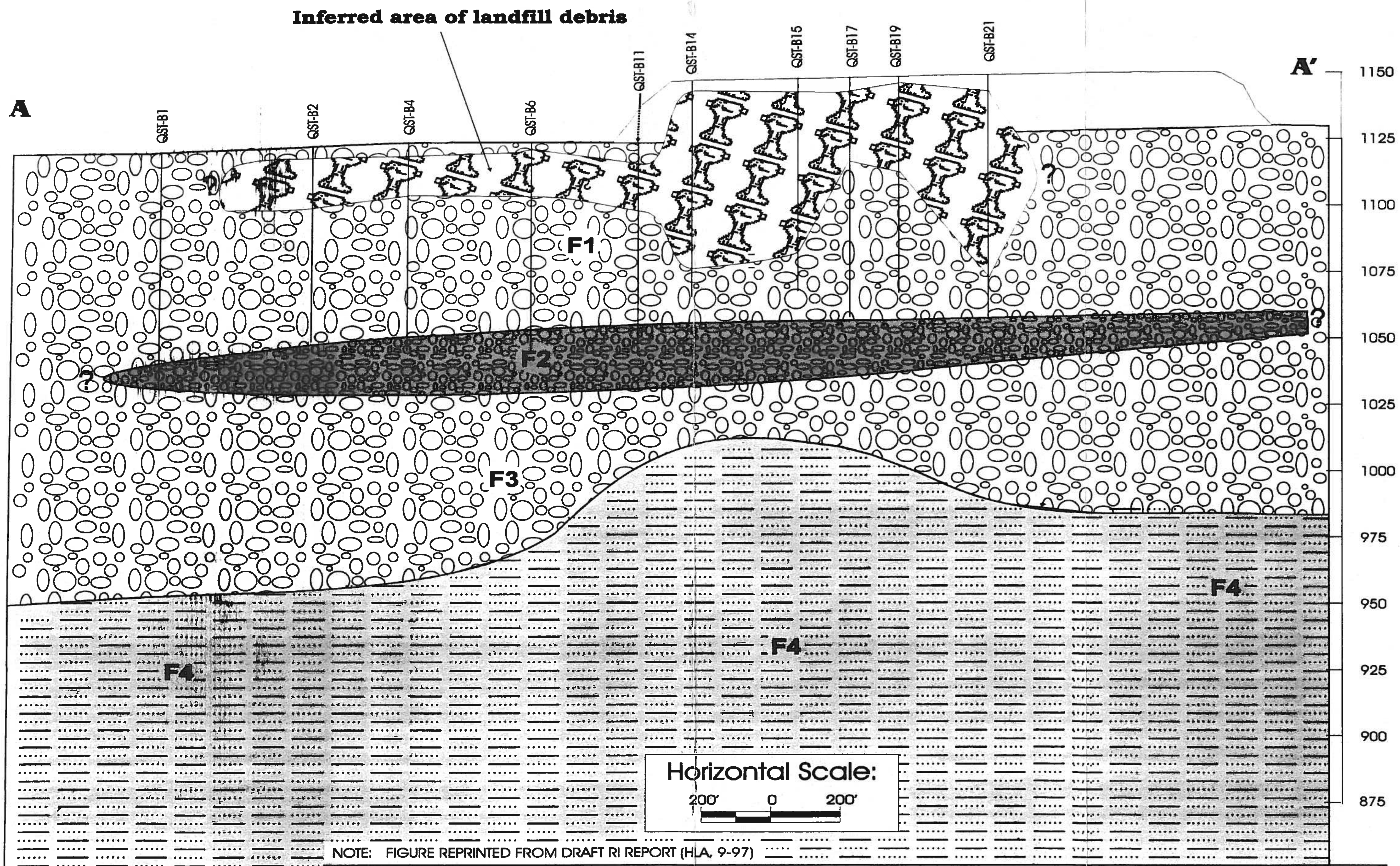
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

SITE PLAN
SOIL BORING AND GROUNDWATER MONITORING WELL LOCATIONS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE	7-8-99	SCALE	1"=400'
DRAWN BY:	RBC	FIGURE	4.1
PROJECT No.	6699030		



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

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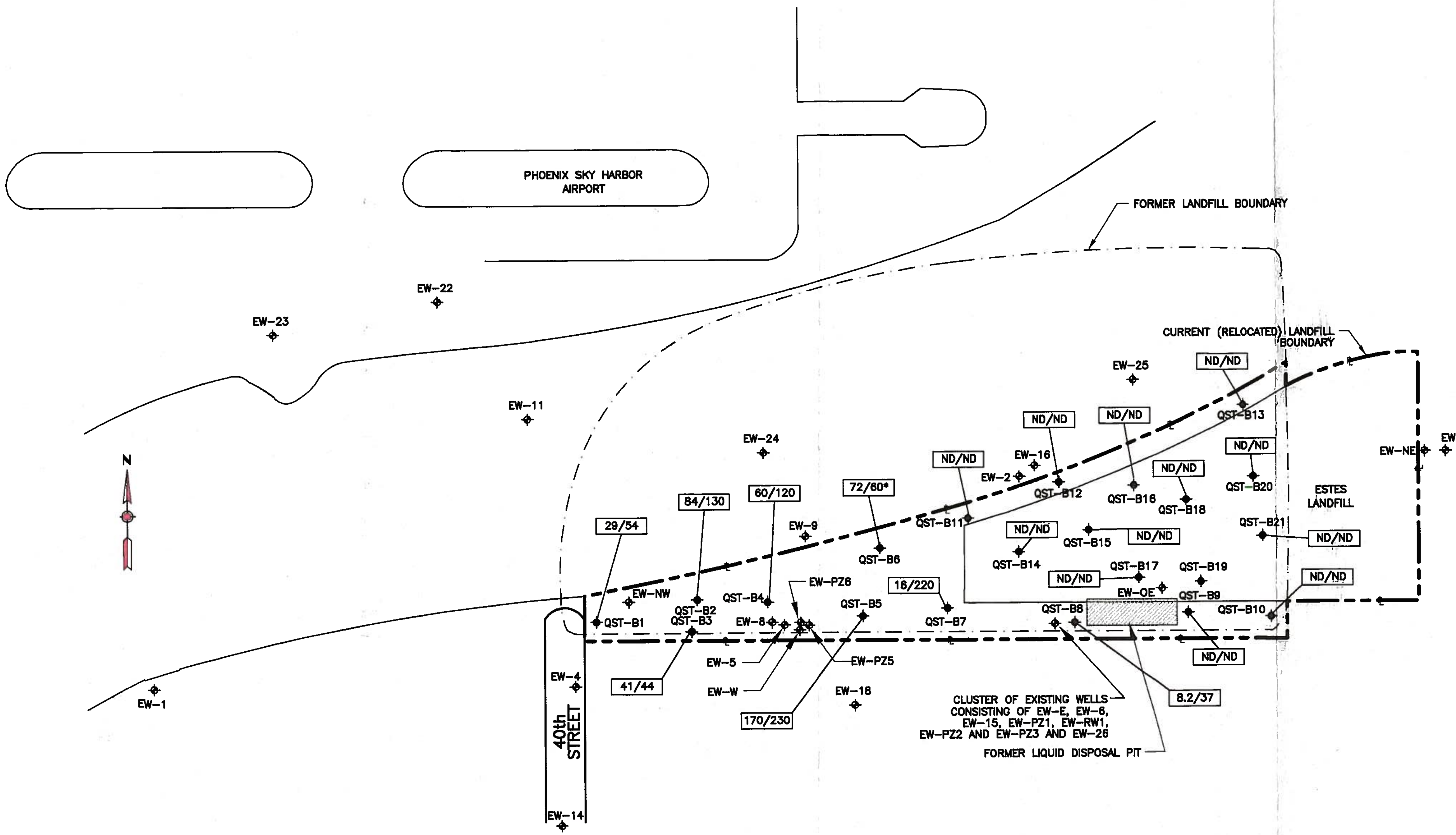
A MACTEC COMPANY

West - East Profile of Landfill Debris
Estes Landfill RI
Phoenix, Arizona

FIGURE
4.2

DRAWN by	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/16/99



EXPLANATION

✦ BORING LOCATION
QST-B1

✦ EXISTING WELL LOCATION
EW-4

29/54 GROUNDWATER "GRAB" SAMPLE CONCENTRATIONS FOR CIS-1,2-DCE/ VINYL CHLORIDE IN MICROGRAMS/LITER

ND – NOT DETECTED
* TCE REPORTED @ B6 @ 2.8 ug/l

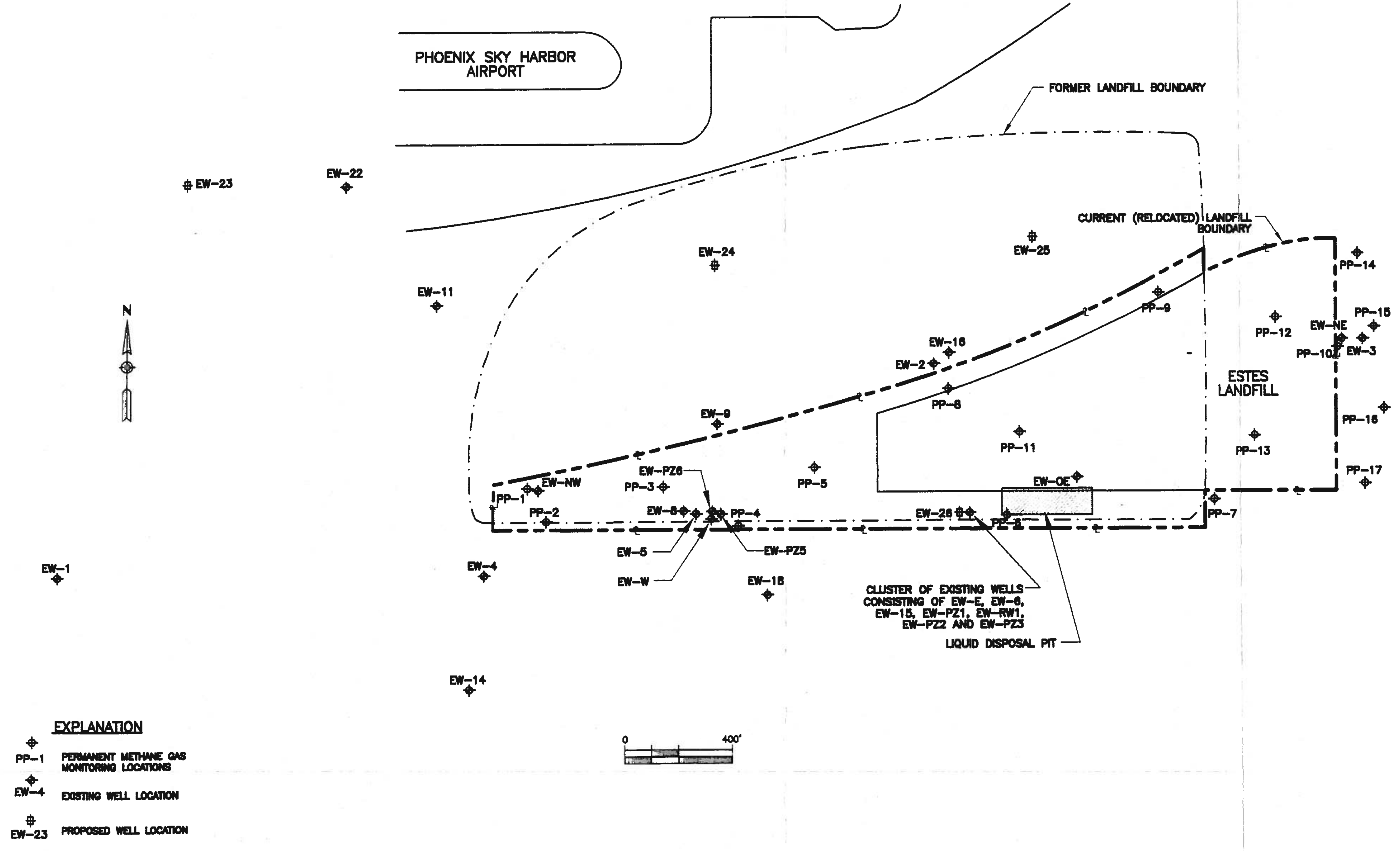
NOTE: MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97

DATE 7-13-99
DRAWN BY: RBC
PROJECT No. 6699030
SCALE 1"=400'
FIGURE 4.3

ESTES LANDFILL RI
PHOENIX
ARIZONA

SITE PLAN
SOIL BORING LOCATION &
GROUNDWATER CONCENTRATIONS (5/99)

Environmental Science &
Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: MAP TAKEN FROM HARDING LAWSON AND ASSOCIATEES

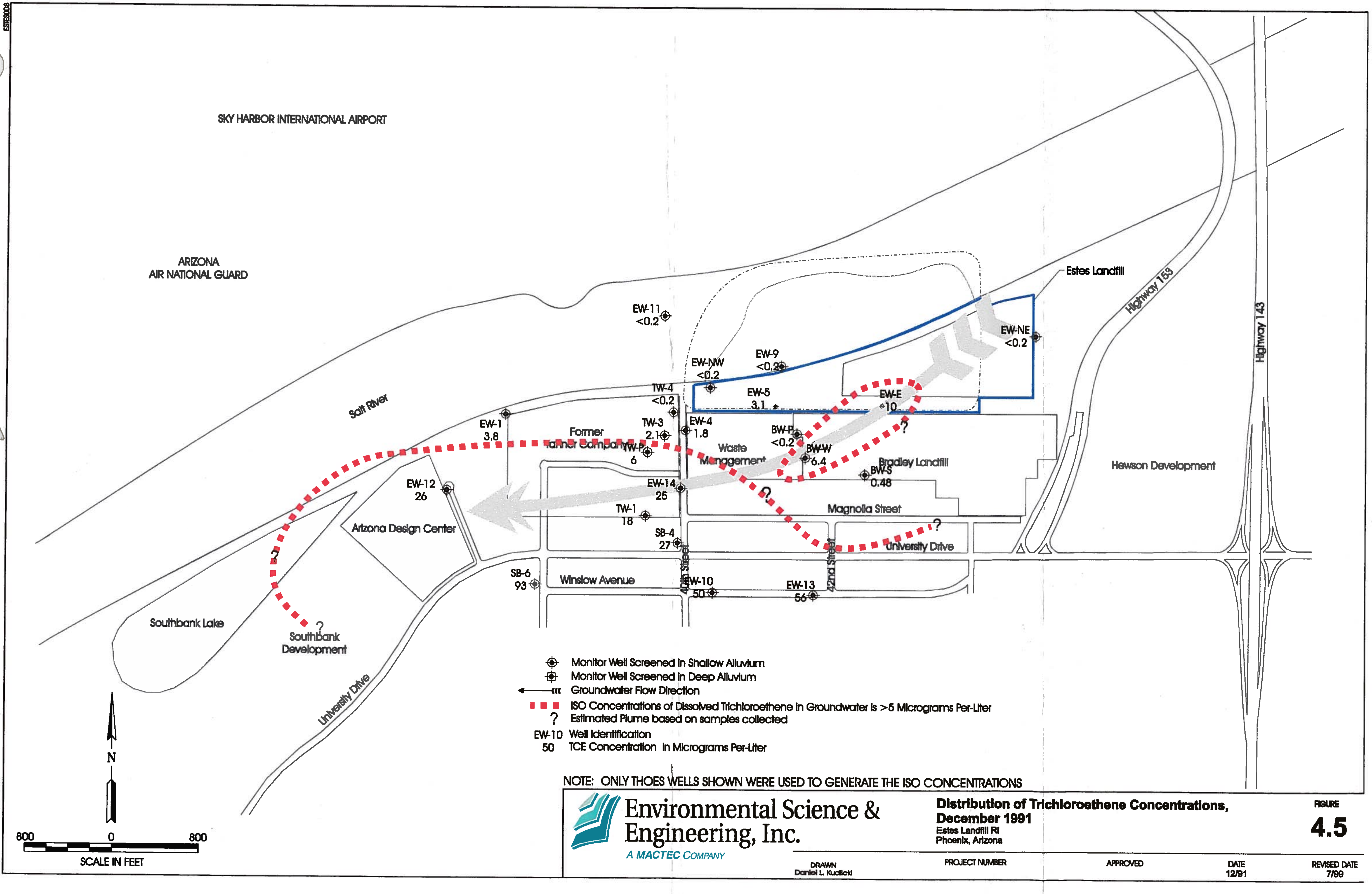
CADD FILE: C:\ACAD\FILES\ESTES\STPLAN2.dwg

Environmental Science & Engineering, Inc.
A MACTEC Company 426 N. 44th St. # 110 Phoenix, AZ 85008

SITE PLAN
METHANE MONITORING
PROBE LOCATIONS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 3-30-99
DRAWN BY: RBC
PROJECT No. 6699030
SCALE 1"=400'
FIGURE 4.4



NOTE: ONLY THOES WELLS SHOWN WERE USED TO GENERATE THE ISO CONCENTRATIONS

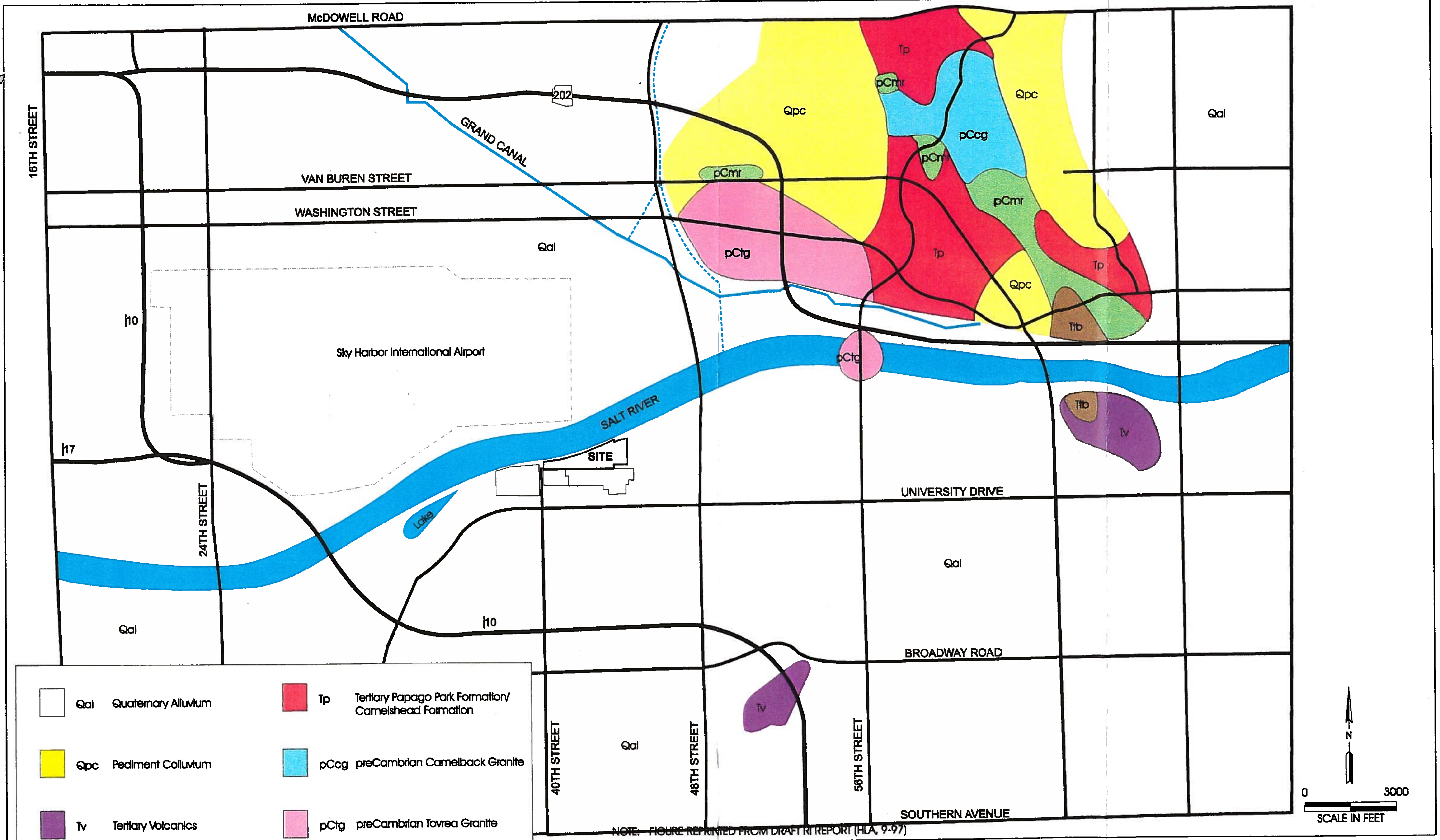
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of Trichloroethene Concentrations, December 1991
Estes Landfill RI
Phoenix, Arizona

FIGURE
4.5

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			12/91	7/99

RGEOLOGY



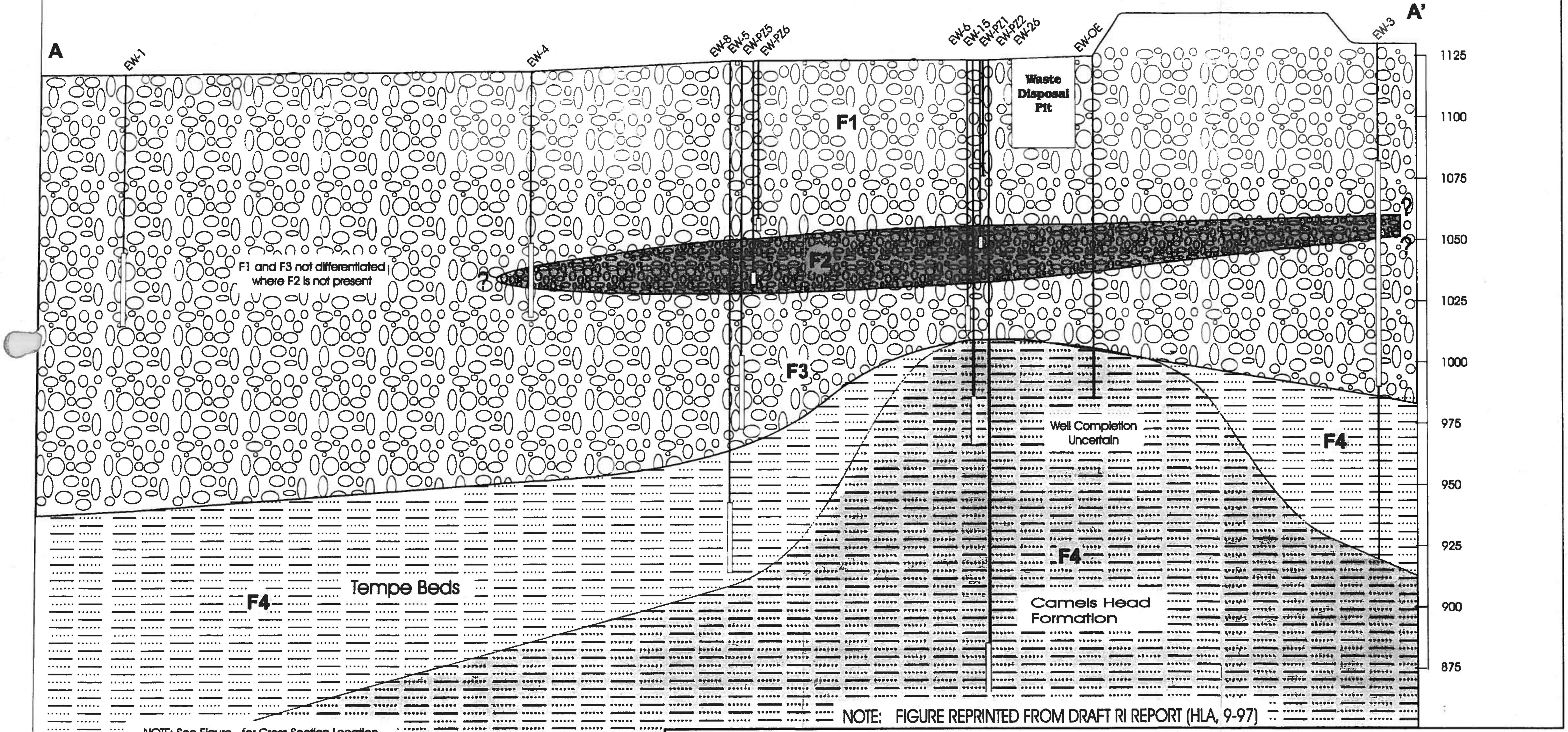
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

Regional Geology
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			6/96	7/99



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

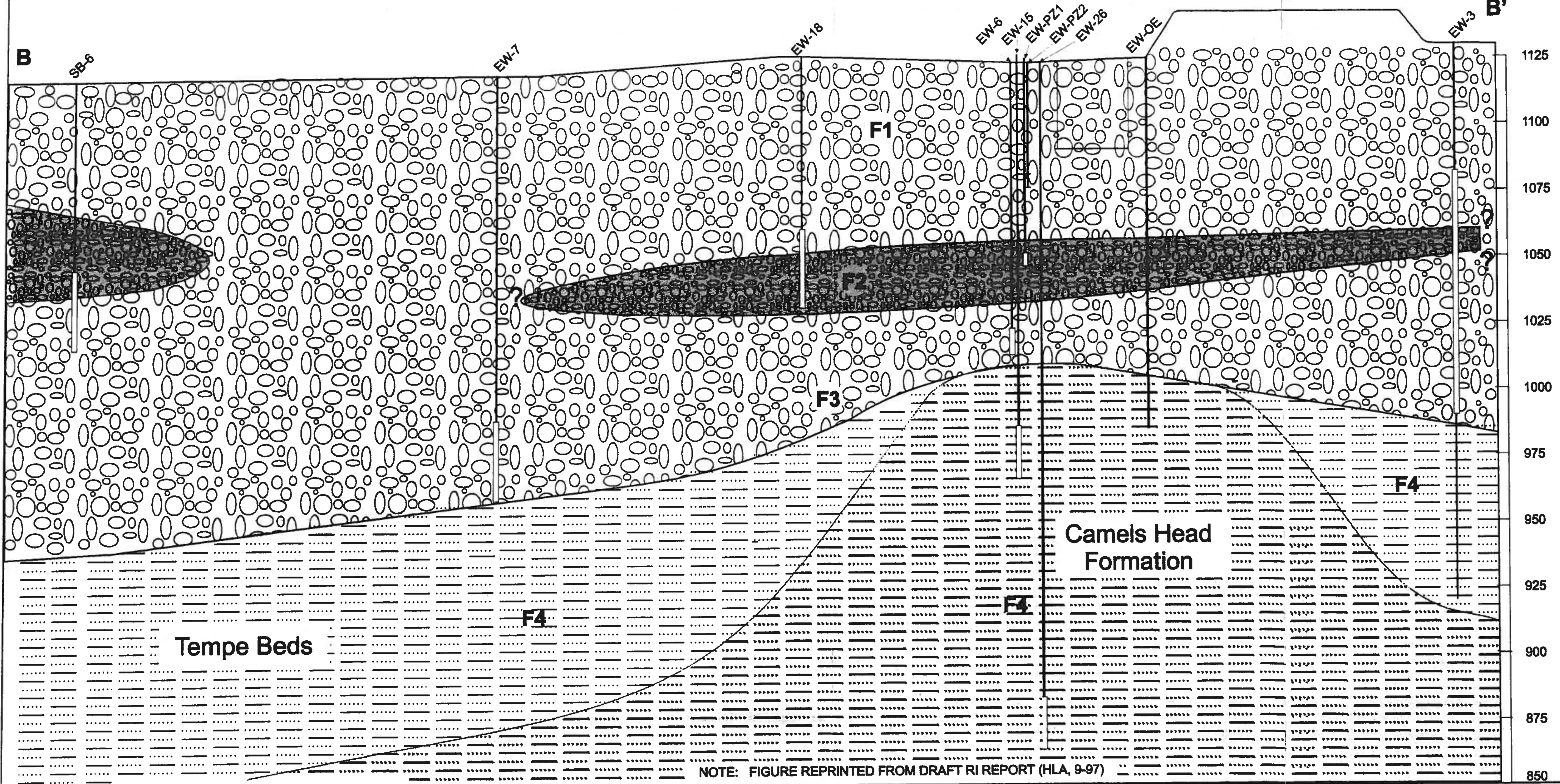
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

West - East Cross-Section (A-A')
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			7/7/99	7/20/99

X-SW-NE



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

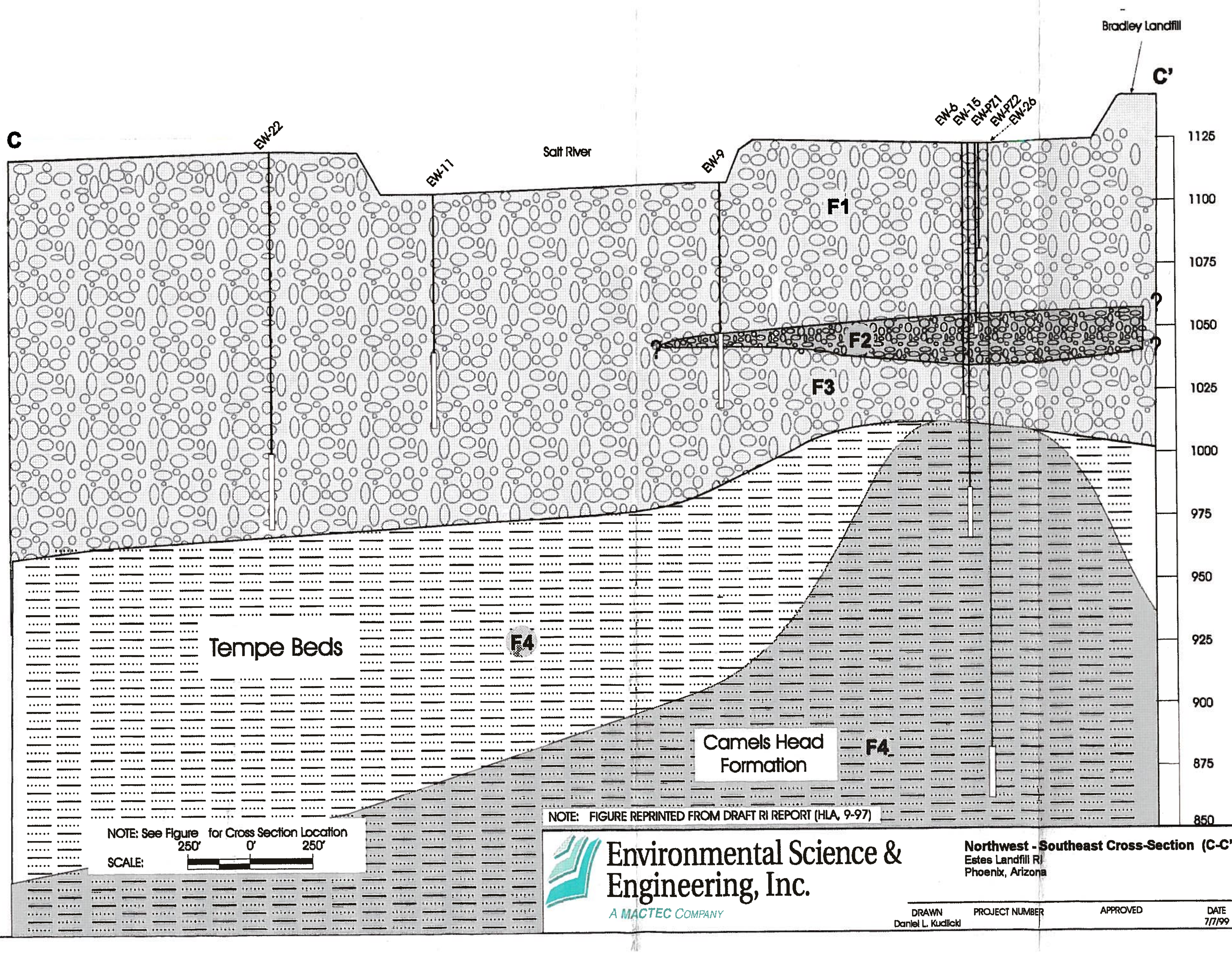
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Southwest - Northeast Cross-Section (B-B')
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.3

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99

SE-NW



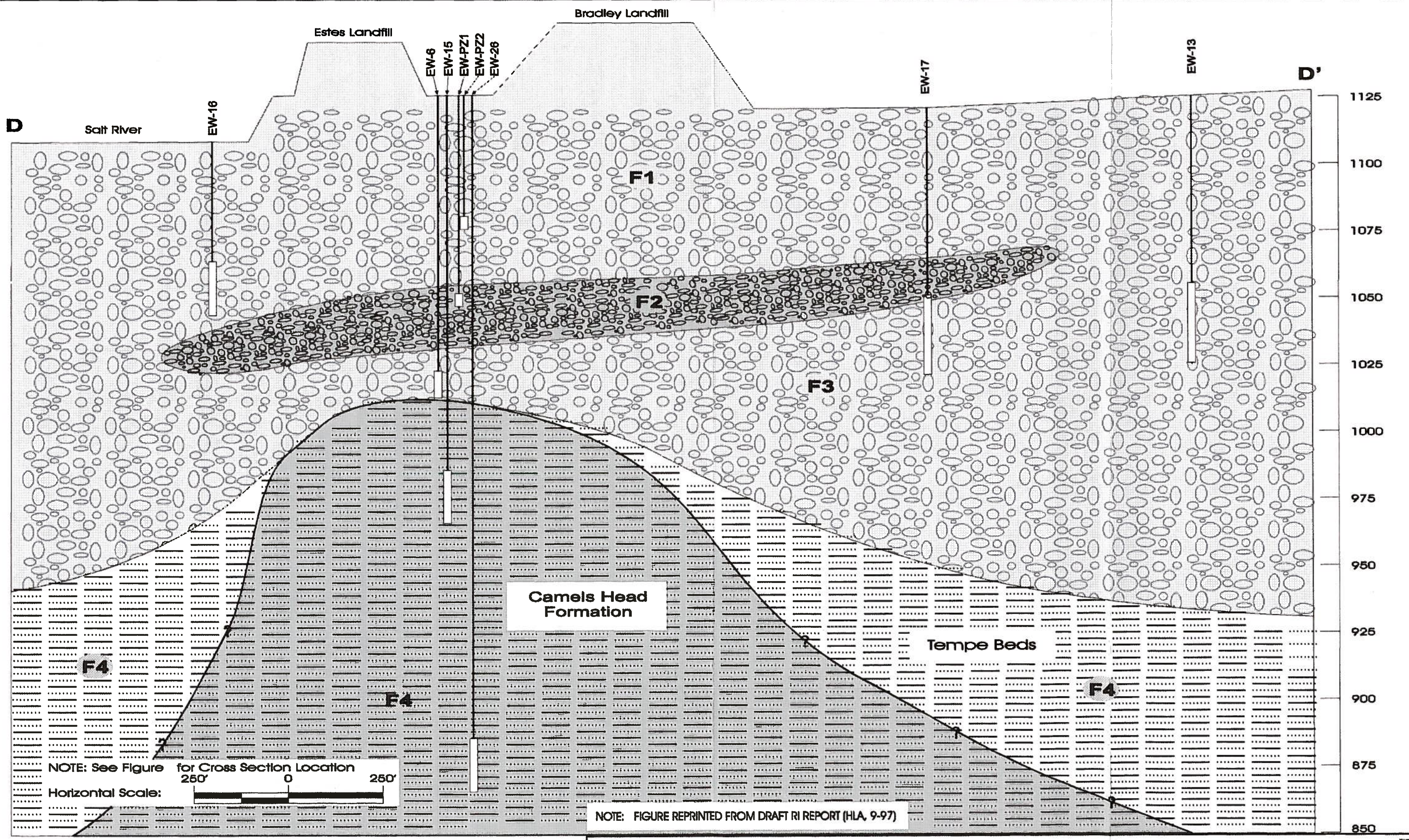
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Northwest - Southeast Cross-Section (C-C')
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.4

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			7/7/99	7/20/99



NOTE: See Figure for Cross Section Location

Horizontal Scale:

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

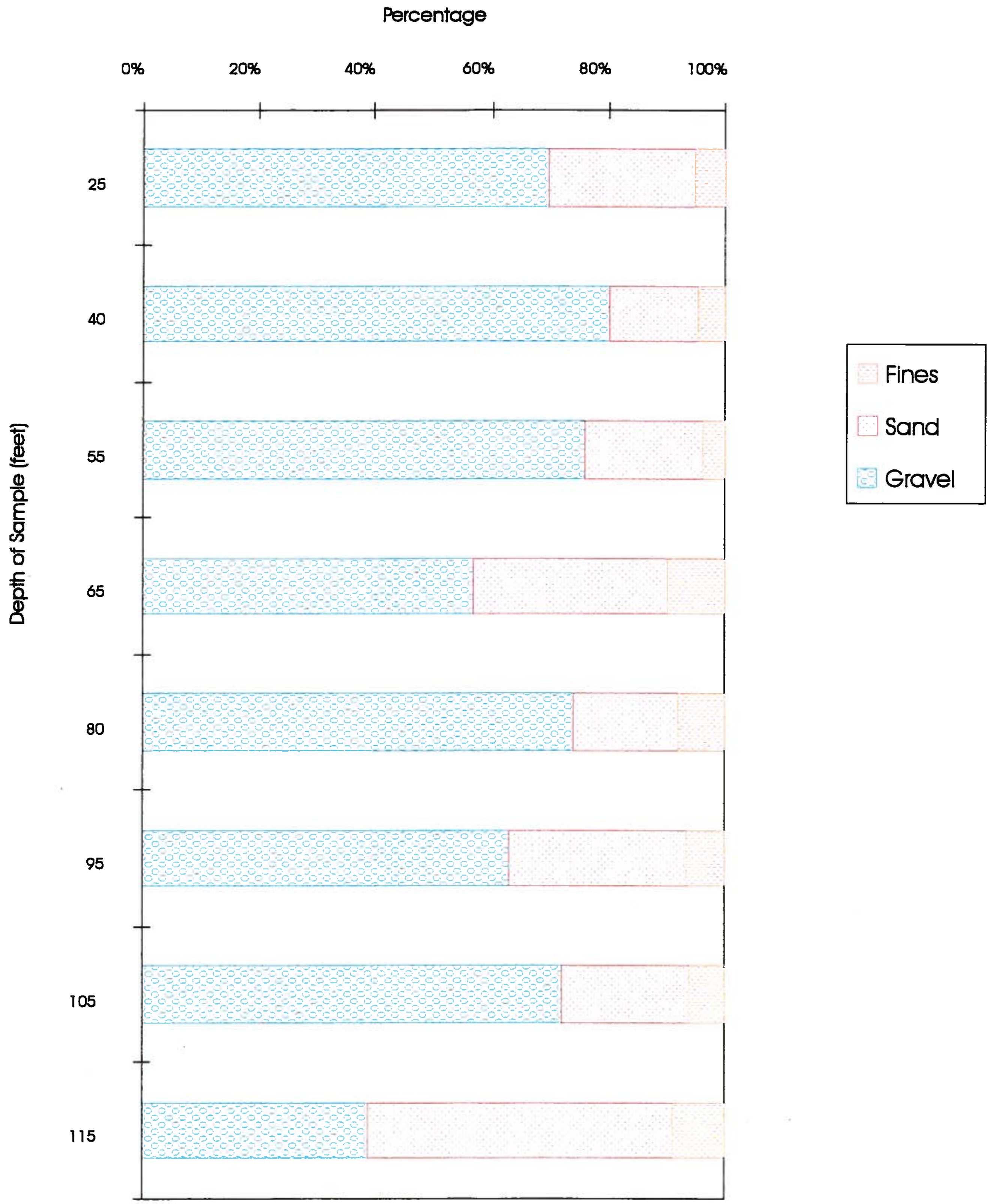
Environmental Science & Engineering, Inc.

A MACTEC COMPANY

North - South Cross-Section (D-D')
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.5

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/98	7/99



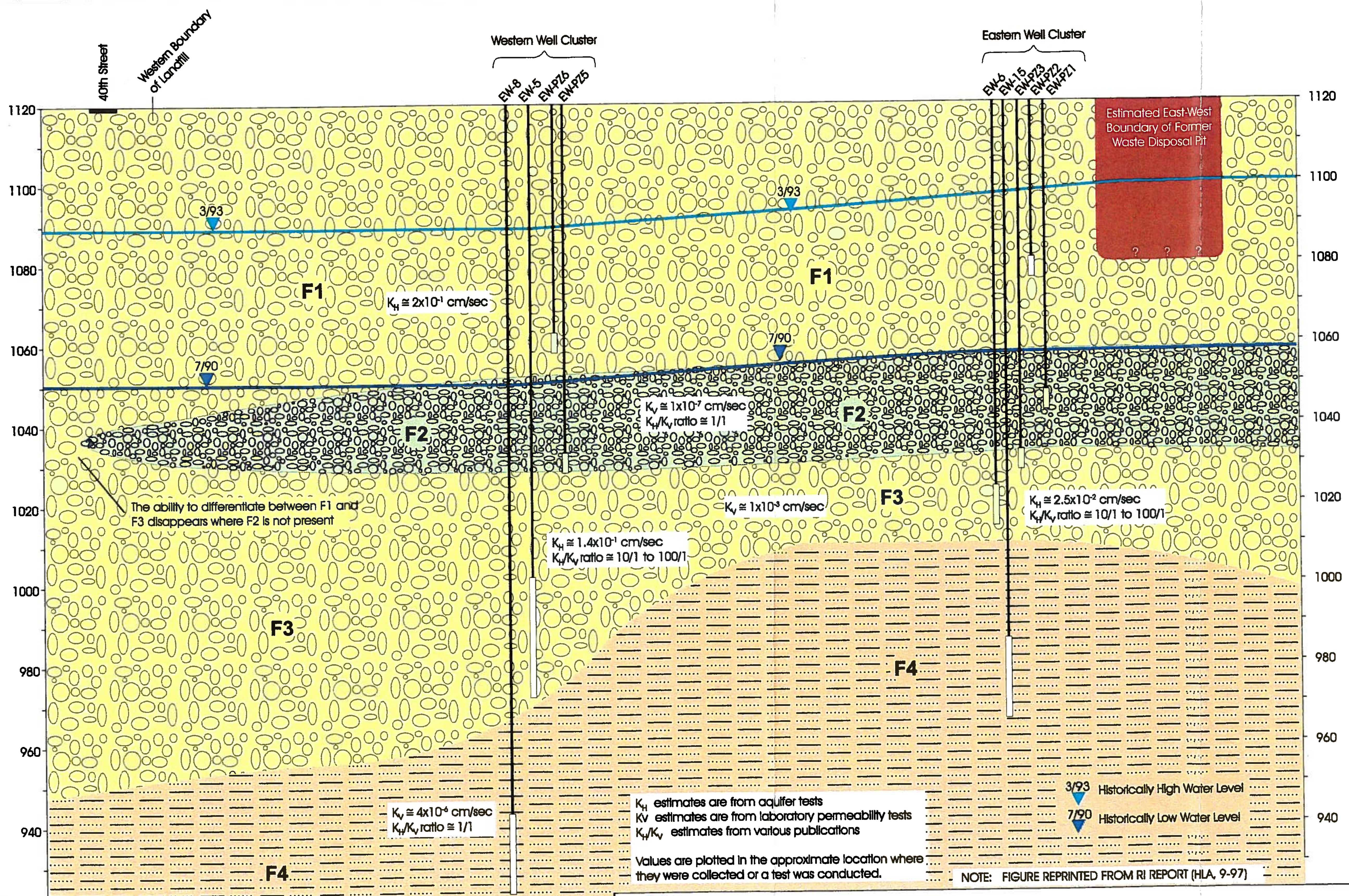
Environmental Science & Engineering, Inc.
A MACTEC Company

Particle Size Distribution for EW-15
Estes Landfill RI
Phoenix Arizona

Figure
5.6

Drawn	Project Number	Approved	Date	Revised Date
Daniel L. Kudlicki				7/99

XSECT003



K_H estimates are from aquifer tests
Kv estimates are from laboratory permeability tests
K_H/K_V estimates from various publications

Values are plotted in the approximate location where they were collected or a test was conducted.

NOTE: FIGURE REPRINTED FROM RI REPORT (HLA, 9-97)

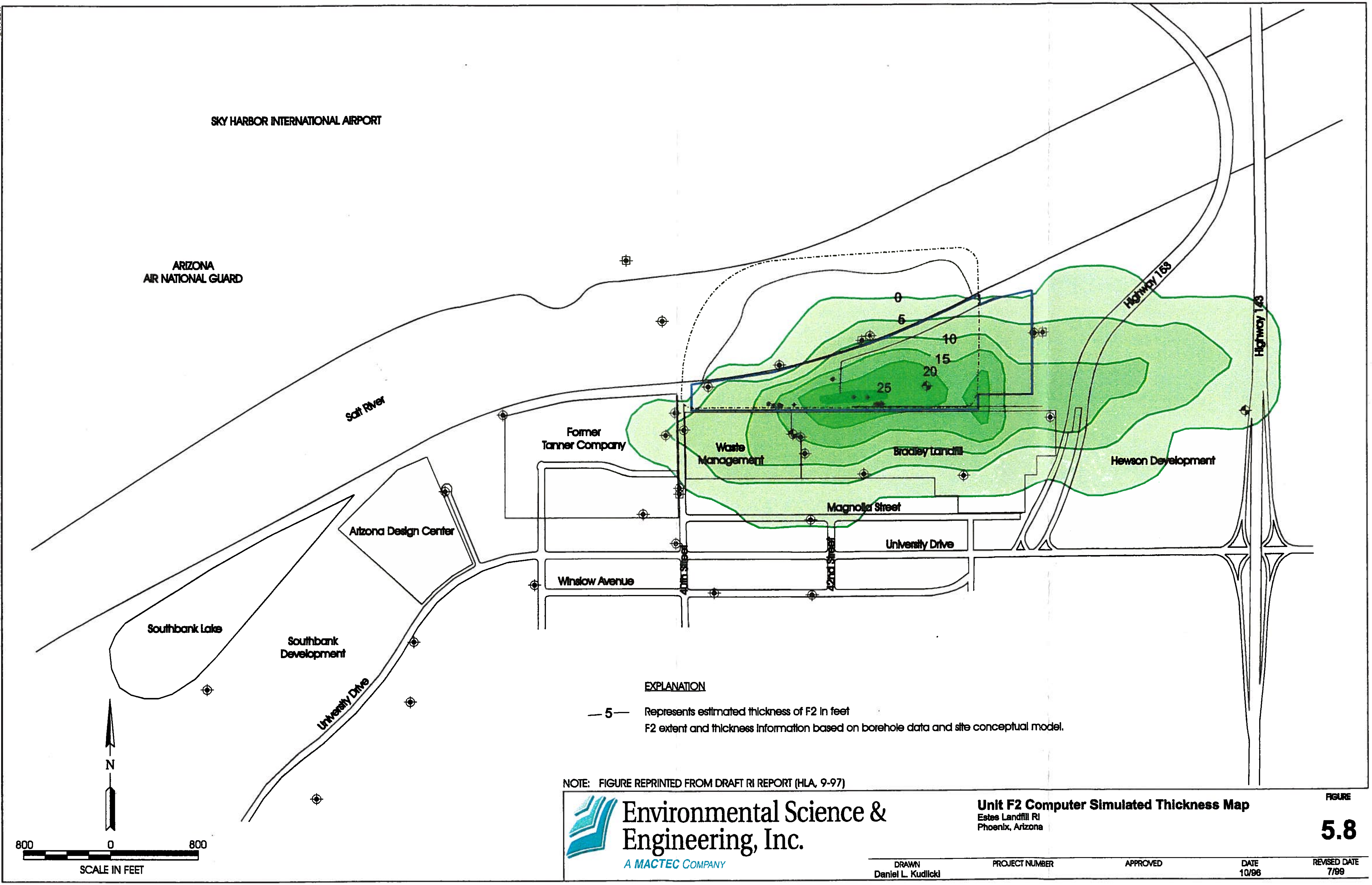
HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=25'

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Profile Of Estimated Hydraulic Conductivities
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.7

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



EXPLANATION

— 5 — Represents estimated thickness of F2 in feet

F2 extent and thickness information based on borehole data and site conceptual model.

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

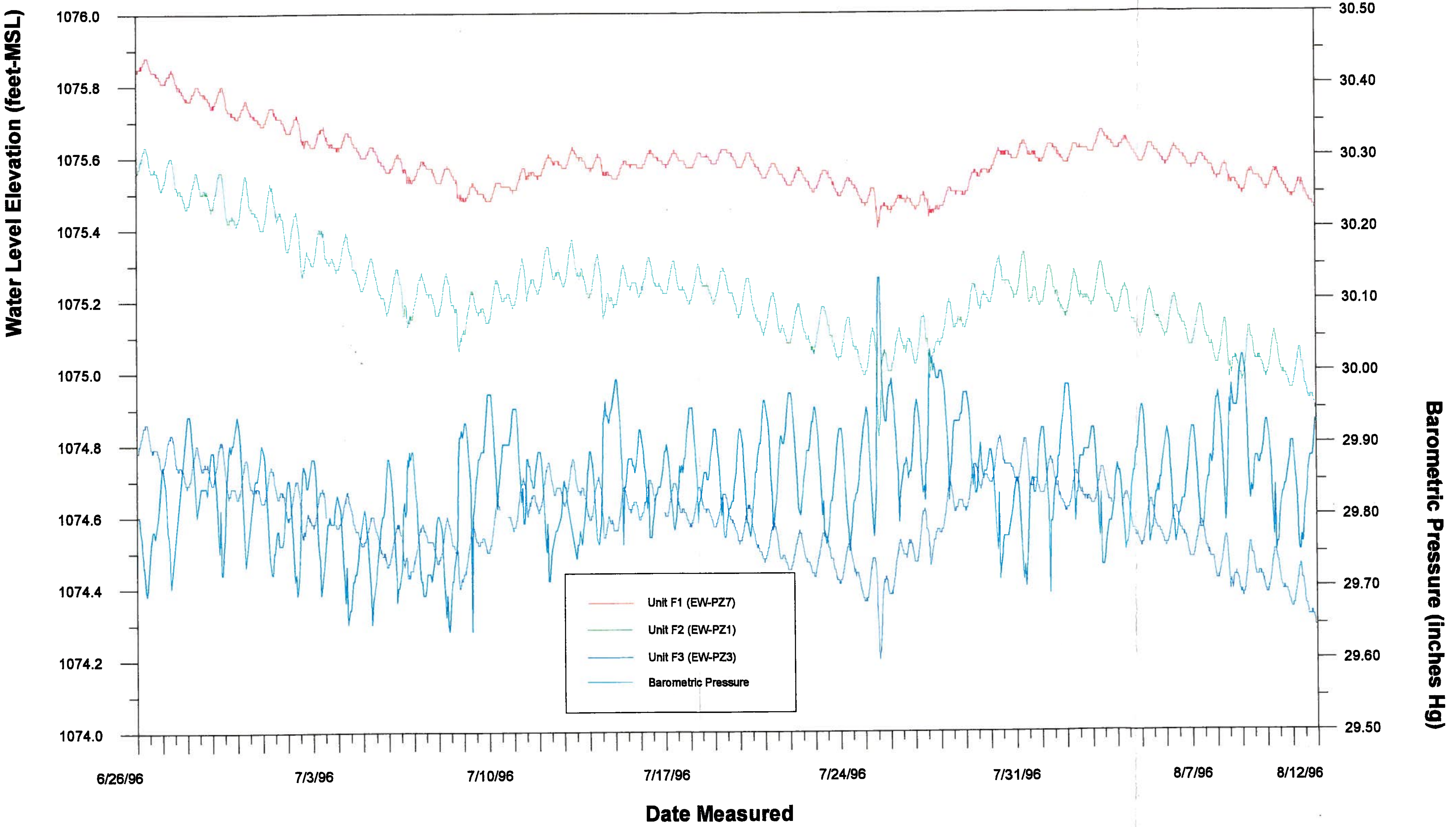
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Unit F2 Computer Simulated Thickness Map
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.8

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			10/96	7/99

HYDSTR04



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

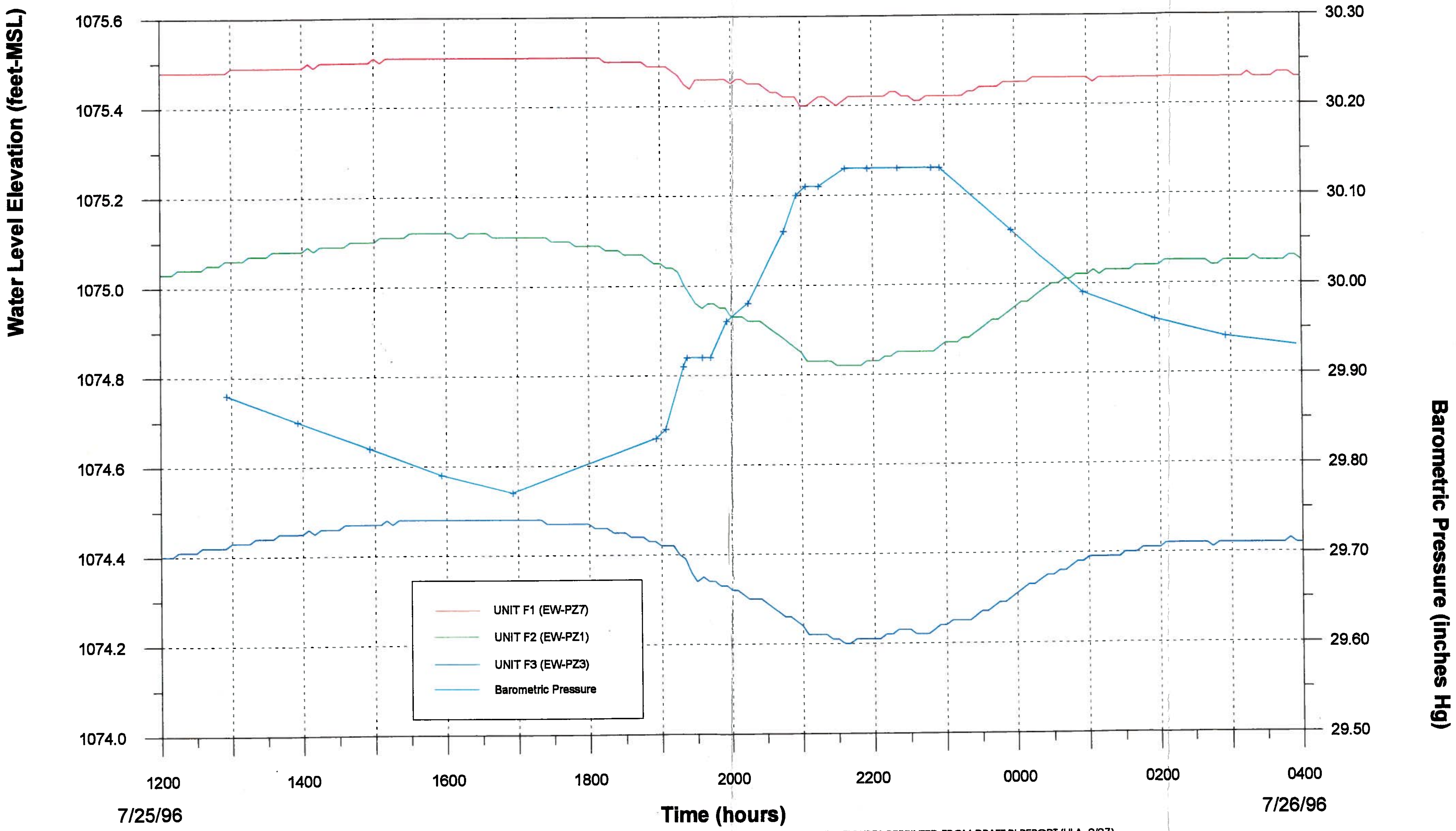
Environmental Science & Engineering, Inc.
A MACTEC Company

Unit Specific Hydraulic Head Data
Showing Confining Aquifer Conditions
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.9

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99

HYDSTR04a



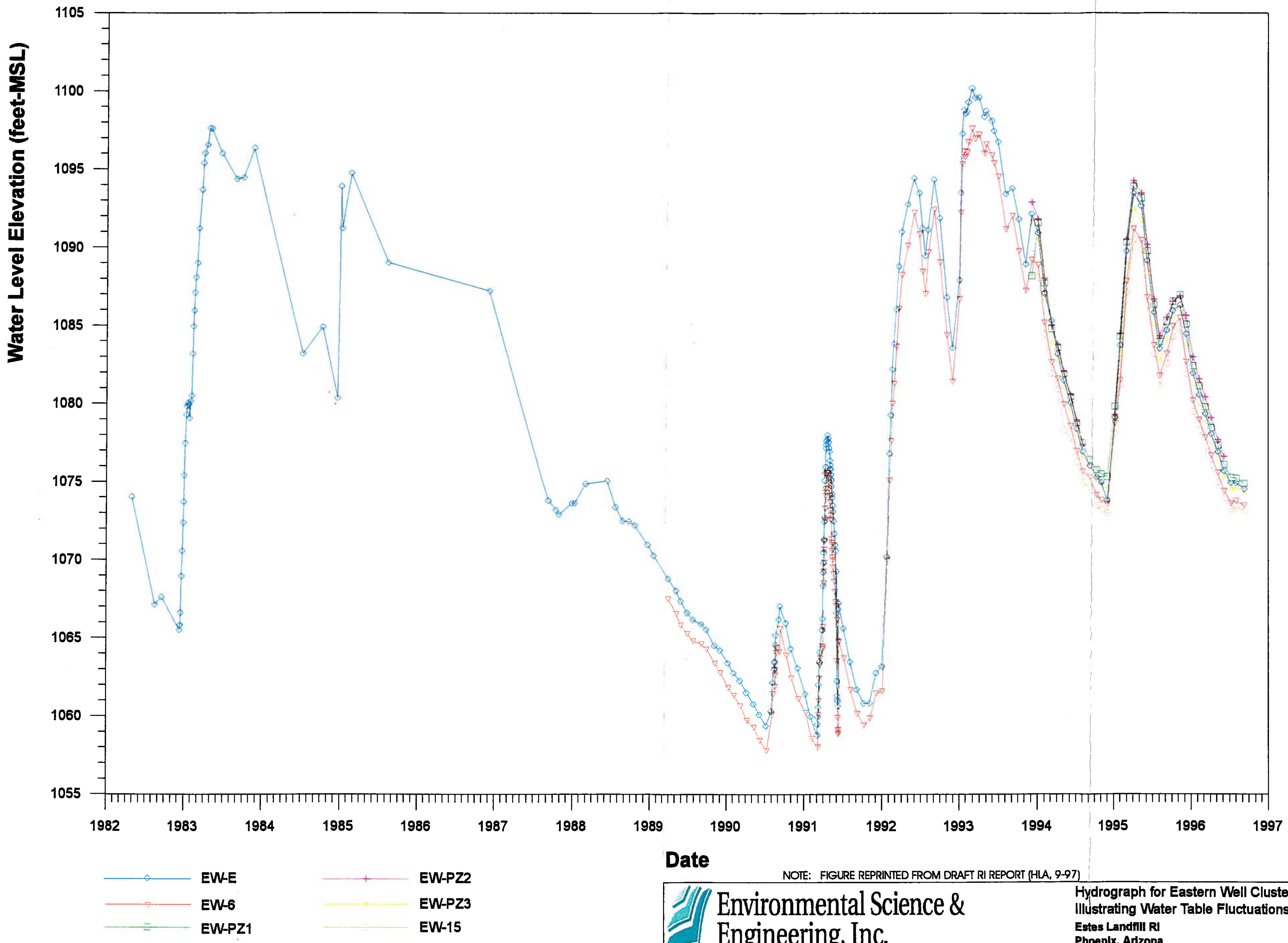
NOTE: FIGURES REPRINTED FROM DRAFT RI REPORT (HLA, 9/97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Unit Specific Hydraulic Head Data
Showing Confining Aquifer Conditions
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.10

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



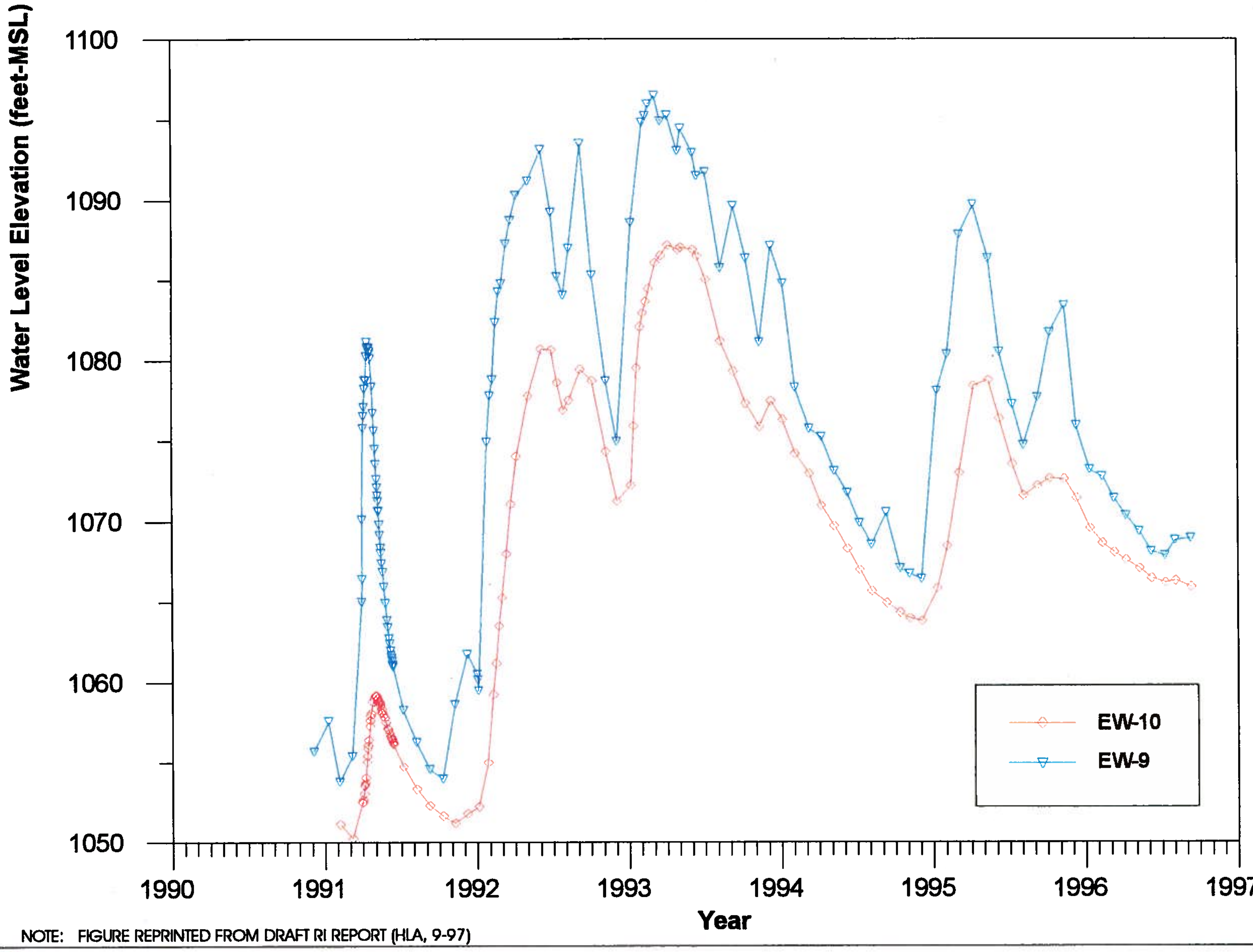
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Hydrograph for Eastern Well Cluster Illustrating Water Table Fluctuations
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.11

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

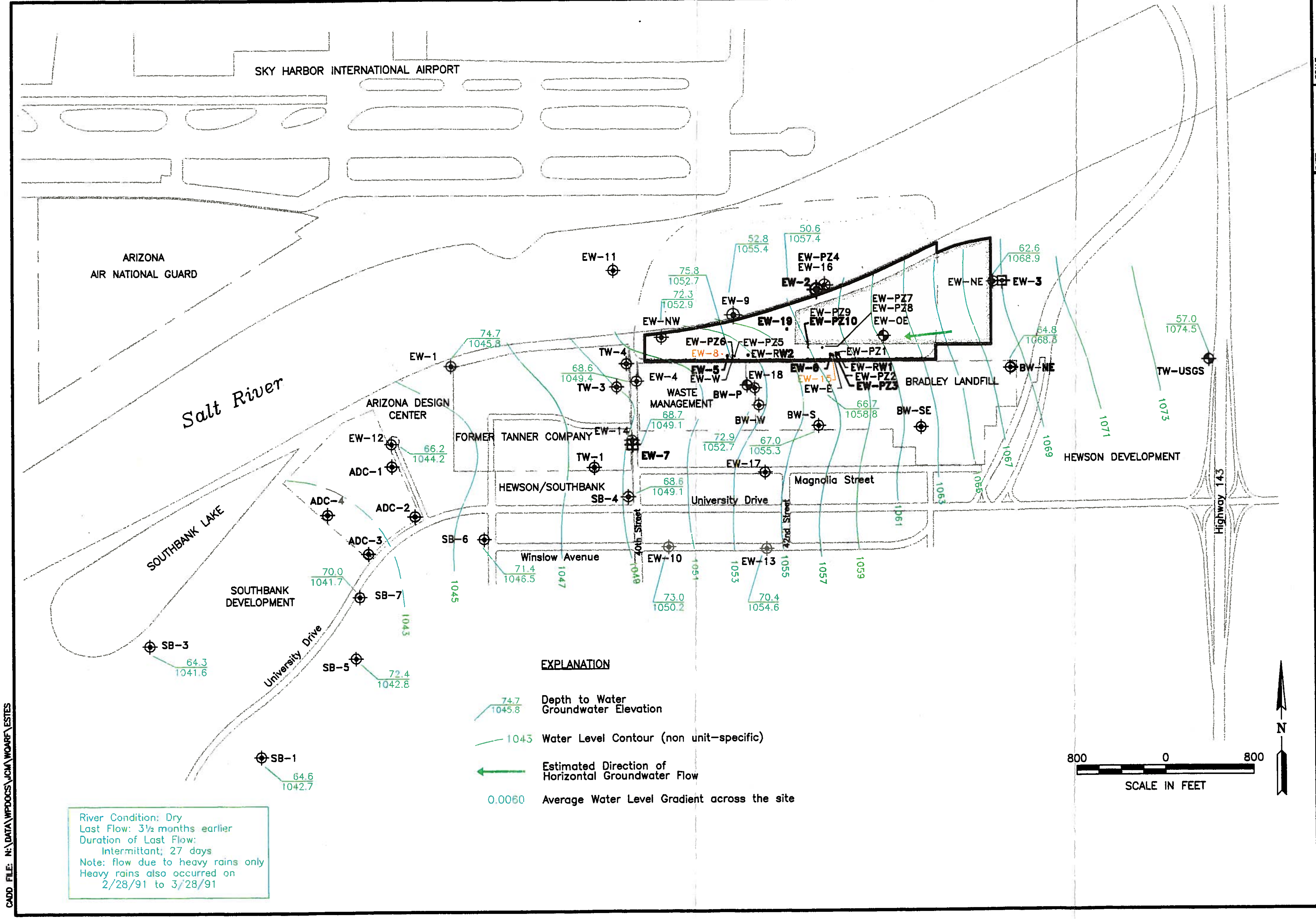
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Hydrograph of EW-9 and EW-10
Illustrating Different Responses to Recharge
Estes Landfill RI
Phoenix, Arizona

FIGURE

5.12

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



EXPLANATION

74.7 / 1045.8	Depth to Water Groundwater Elevation
1043	Water Level Contour (non unit-specific)
←	Estimated Direction of Horizontal Groundwater Flow
0.0060	Average Water Level Gradient across the site

River Condition: Dry
Last Flow: 3½ months earlier
Duration of Last Flow:
Intermittant; 27 days
Note: flow due to heavy rains only
Heavy rains also occurred on
2/28/91 to 3/28/91

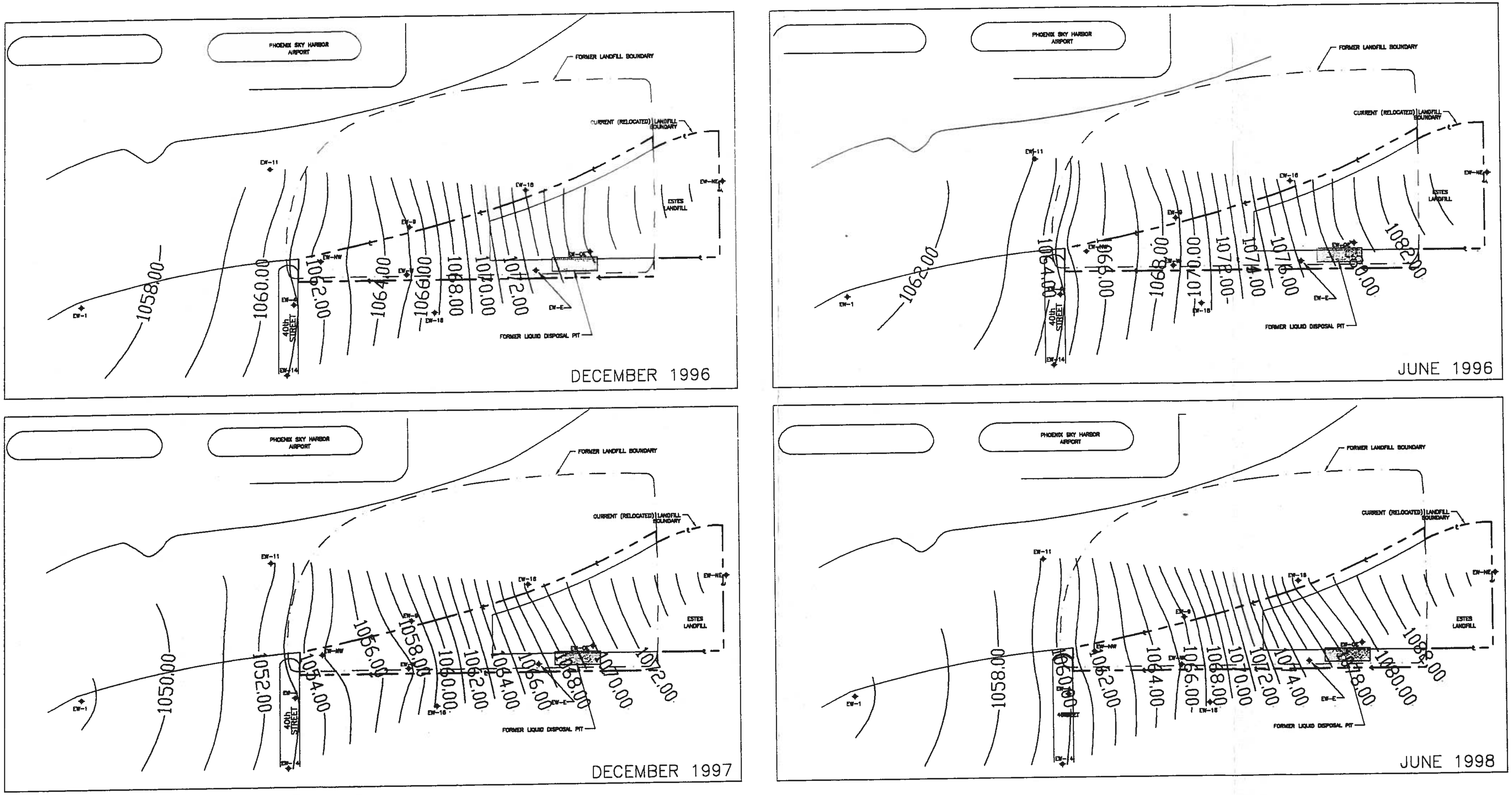
CADD FILE: N:\DATA\WPDOCS\JCM\WQARF\ESTES

ESTES LANDFILL RI
PHOENIX
ARIZONA

GENERALIZED WATER LEVEL CONTOURS SHOWING WESTERLY FLOW MARCH, 1991

DATE 7-21-99
DRAWN BY: DBS
PROJECT No. 6699030
SCALE 1"=800'
FIGURE 5.13

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008



NOTES: MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97

ONLY THOSE WELLS USED TO PRODUCE POTENTIOMETRIC SURFACE MAPS ARE SHOWN.

CONTOUR INTERVAL EQUALS ONE FOOT.

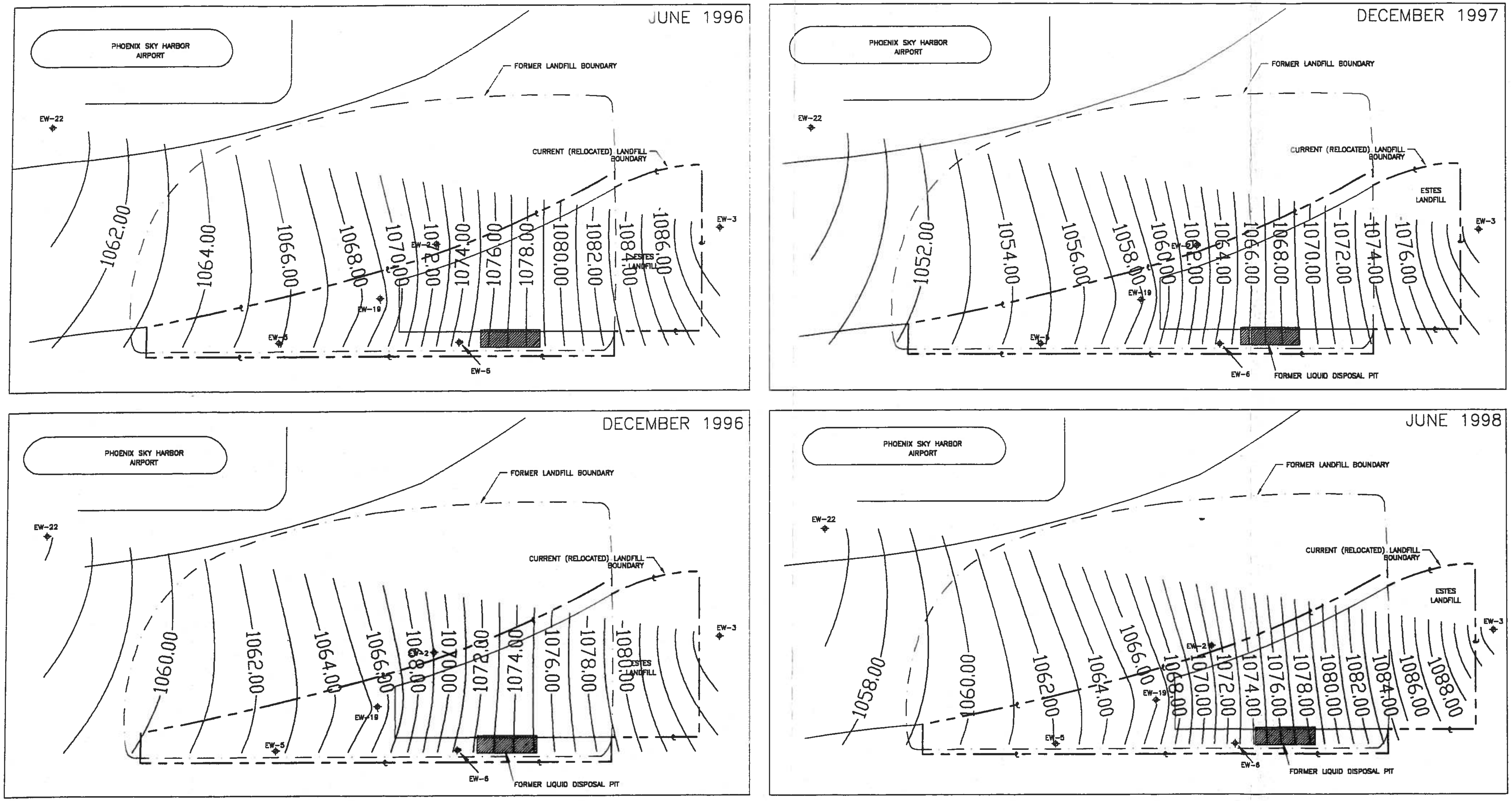
CADD FILE: N:\DATA\WPDOCS\JCM\WQARF\ESTES\ACAD\F1BASE.dwg

DATE 7-21-99
SCALE NTS
DRAWN BY: RBC
PROJECT No. 6699030
FIGURE 5.14a

ESTES LANDFILL RI
PHOENIX
ARIZONA

UNIT F1 POTENTIOMETRIC SURFACE
JUNE 1996, DECEMBER 1996
DECEMBER 1997 AND JUNE 1998

Environmental Science &
Engineering, Inc.
A MACTEC Company
426 N. 44th St., # 110
Phoenix, AZ 85008



NOTES: BASE MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97.
GROUNDWATER CONTOUR INTERVAL IS ONE FOOT.
ONLY THOSE WELLS USED TO PRODUCE POTENTIOMETRIC SURFACE MAPS ARE SHOWN.

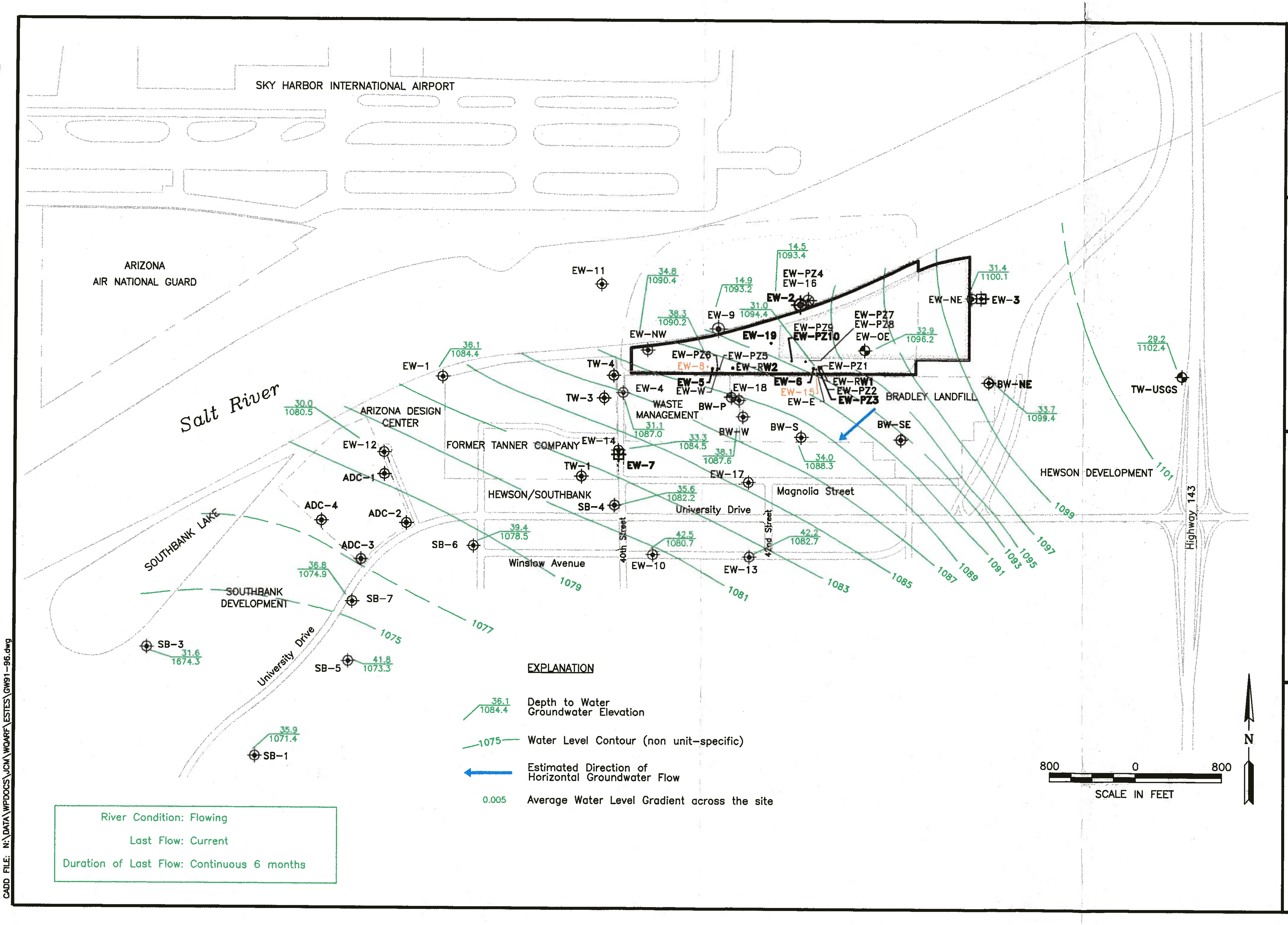
DATE 7-21-99
DRAWN BY: RBC
PROJECT No. 6699030
SCALE NTS
FIGURE **5.14b**

ESTES LANDFILL RI
PHOENIX
ARIZONA

UNIT F3 POTENTIOMETRIC SURFACE JUNE 1996, DECEMBER 1996 DECEMBER 1997 AND JUNE 1998

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

CADD FILE: N:\DATA\WPDOCS\JCM\WQARF\ESTES\ACAD\STPLANF3.dwg



EXPLANATION

36.1 / 1084.4	Depth to Water Groundwater Elevation
1075	Water Level Contour (non unit-specific)
←	Estimated Direction of Horizontal Groundwater Flow
0.005	Average Water Level Gradient across the site

River Condition: Flowing

Last Flow: Current

Duration of Last Flow: Continuous 6 months

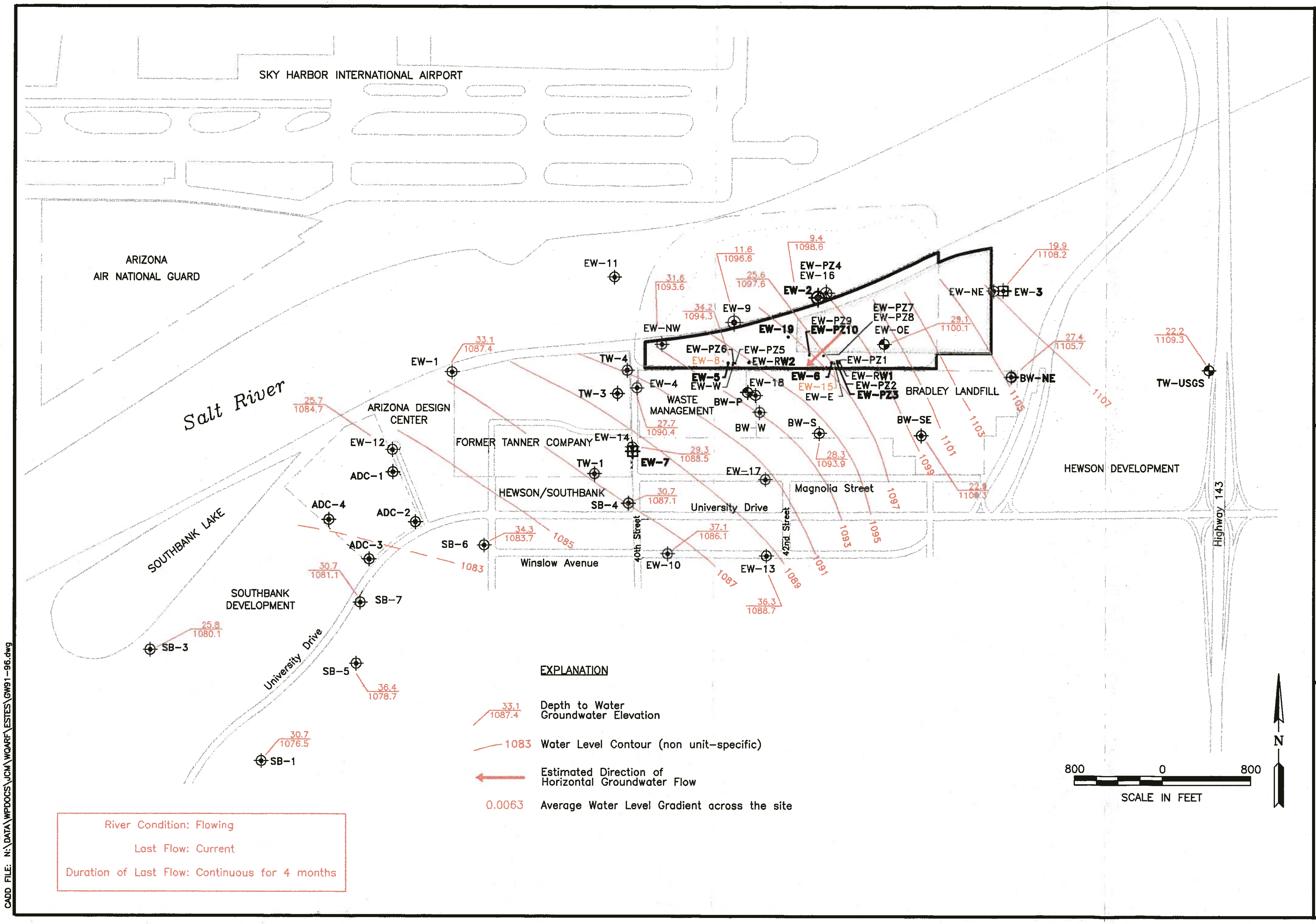
CADD FILE: N:\DATA\WPDOCS\JCM\WQARF\ESTES\GW91-96.dwg

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008

GENERALIZED WATER LEVEL CONTOURS SHOWING SOUTH WESTERLY FLOW
JUNE, 1992

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7-21-99
DRAWN BY: DBS
PROJECT No. 6699030
SCALE 1"=800'
FIGURE 5.15



CADD FILE: N:\DATA\WPDOCS\JCM\WOARF\ESTES\GW91-96.dwg

SCALE 1"=800'

FIGURE 5.16

DATE 7-21-99

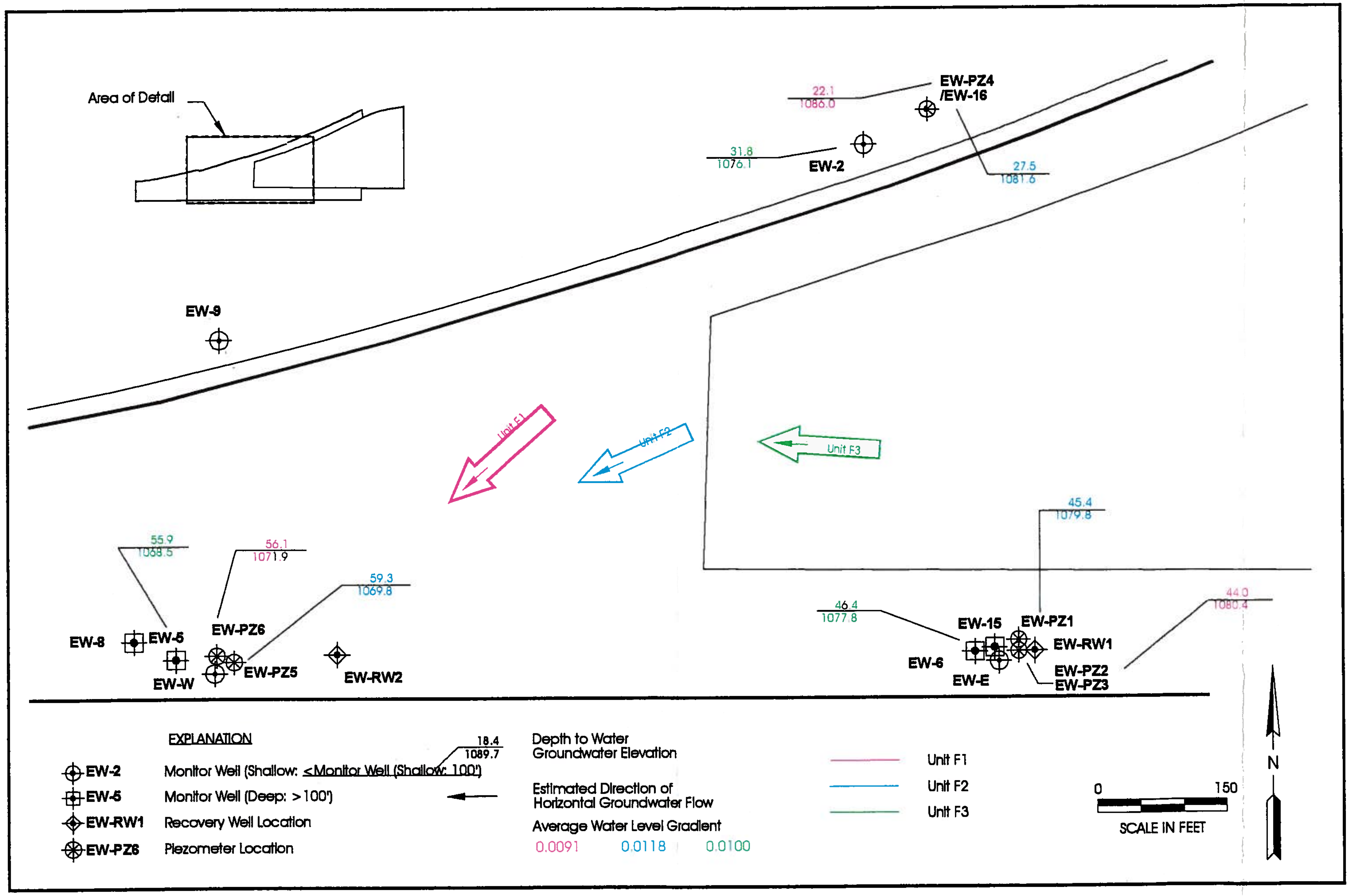
DRAWN BY: DBS

PROJECT No. 6699030

ESTES LANDFILL RI
PHOENIX
ARIZONA

GENERALIZED WATER LEVEL CONTOURS & SHOWING SOUTH WESTERLY FLOW MARCH, 1993

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008



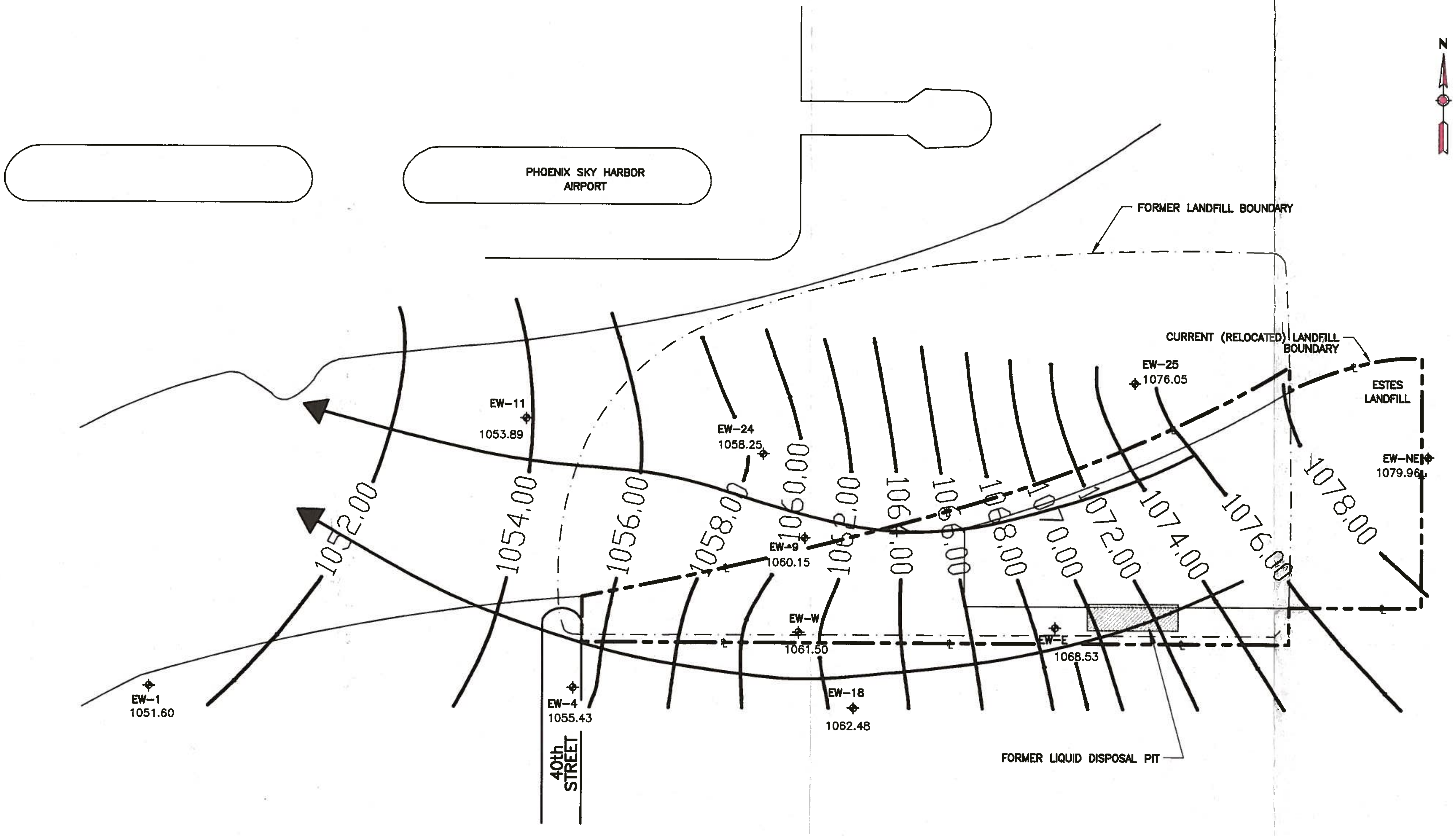
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

UNIT SPECIFIC WATER LEVELS, MARCH 8, 1996
ESTES LANDFILL RI
PHOENIX, ARIZONA

FIGURE
5.17

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			7/7/99	7/99



EXPLANATION

⊕ EW-1 1051.60 — EXISTING WELL LOCATION WITH JUNE 1999 GROUNDWATER ELEVATION

← GROUNDWATER FLOW PATH

0 400'

NOTES: BASE MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97.
ONLY THOSE WELLS SHOWN WERE USED TO GENERATE POTENTIOMETRIC SURFACE.
GROUNDWATER CONTOUR INTERVAL = 2 FEET.

CADD FILE: N:\DATA\WPDOCS\JCM\WQARF\ESTES\ACAD\699FLOW.dwg

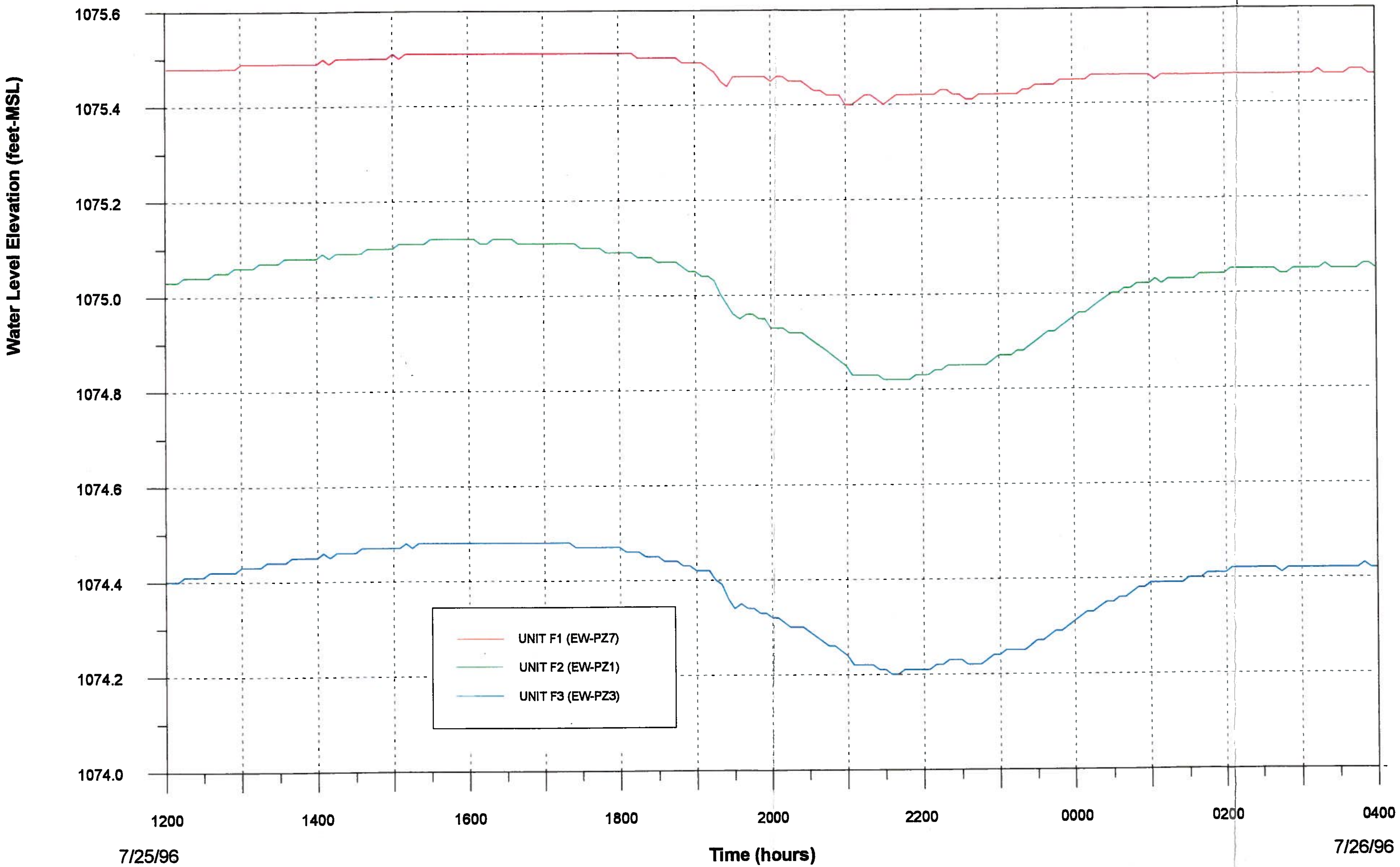
DATE	7-21-99
SCALE	1"=400'
DRAWN BY:	RBC
FIGURE	5.18
PROJECT No.	6699030

ESTES LANDFILL RI
PHOENIX
ARIZONA

UNIT F1 POTENTIOMETRIC SURFACE
JUNE 1999

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008

HYDSTR04B



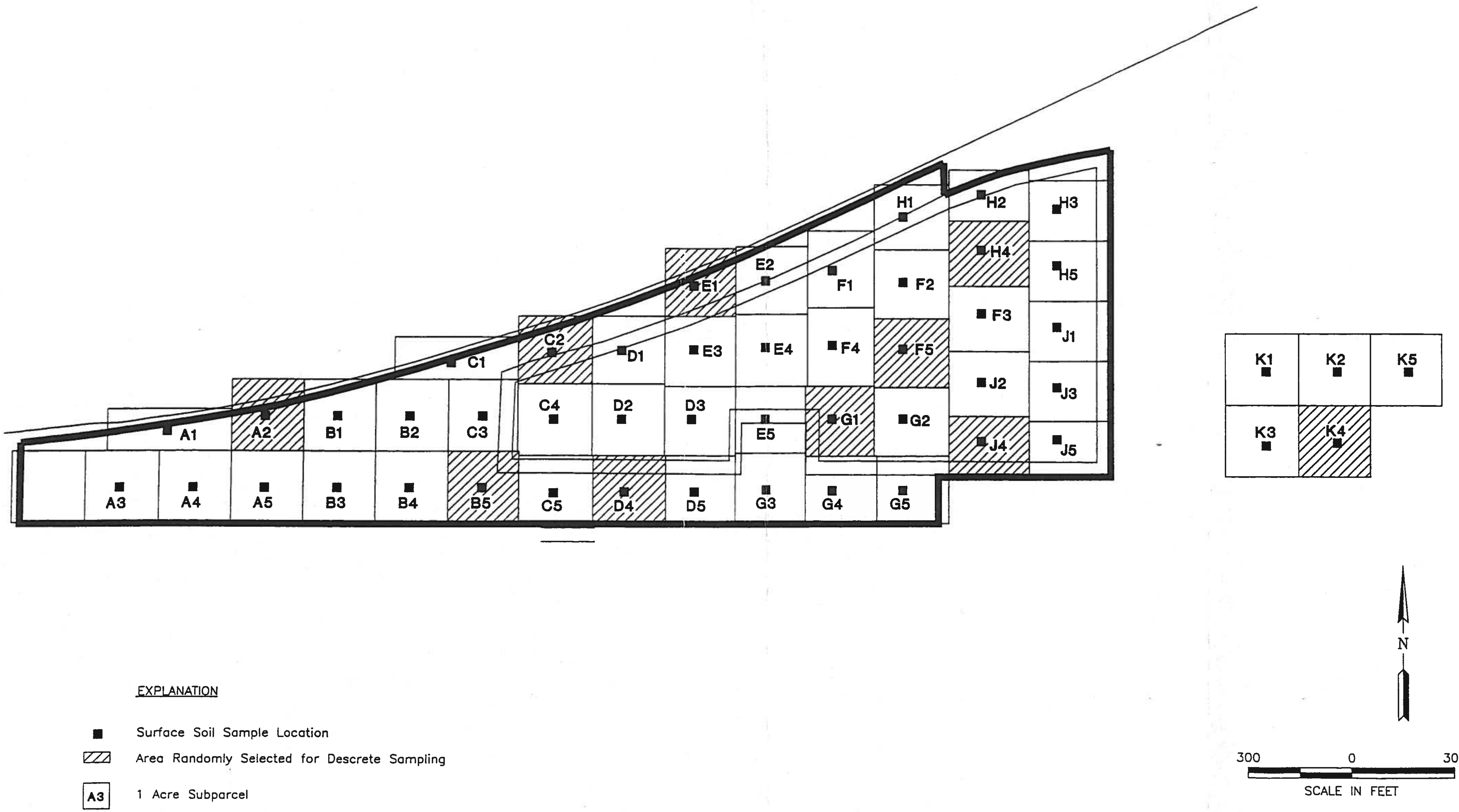
NOTE: FIGURES REPRINTED FROM DRAFT RI REPORT (HLA, 9/97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Unit Specific Water Levels
Illustrating Downward Vertical Gradient
Estes Landfill RI
Phoenix, Arizona

FIGURE
5.19

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



EXPLANATION

■ Surface Soil Sample Location

▨ Area Randomly Selected for Descrete Sampling

A3 1 Acre Subparcel

⌐ Area of Relocated Refuse

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

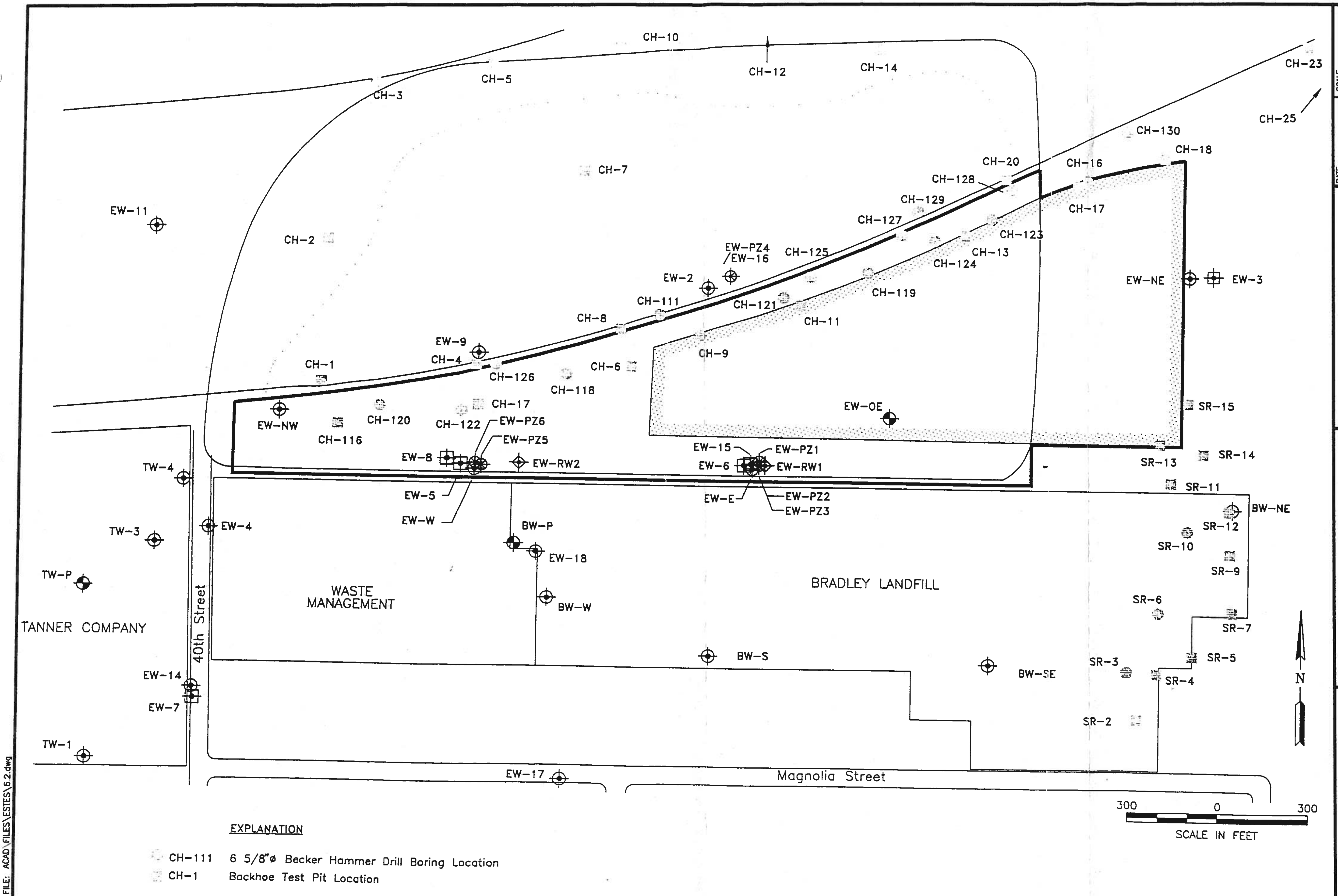
CADD FILE: ACAD-FILES\ESTES\6.1.dwg

DATE 7-11-99
SCALE 1"=300'
DRAWN BY: RBC
FIGURE 6.1
PROJECT No. 6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

SURFACE SOIL SAMPLE LOCATIONS
AUGUST, 1994

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

CADD FILE: ACAD\FILES\ESTES\6.2.dwg

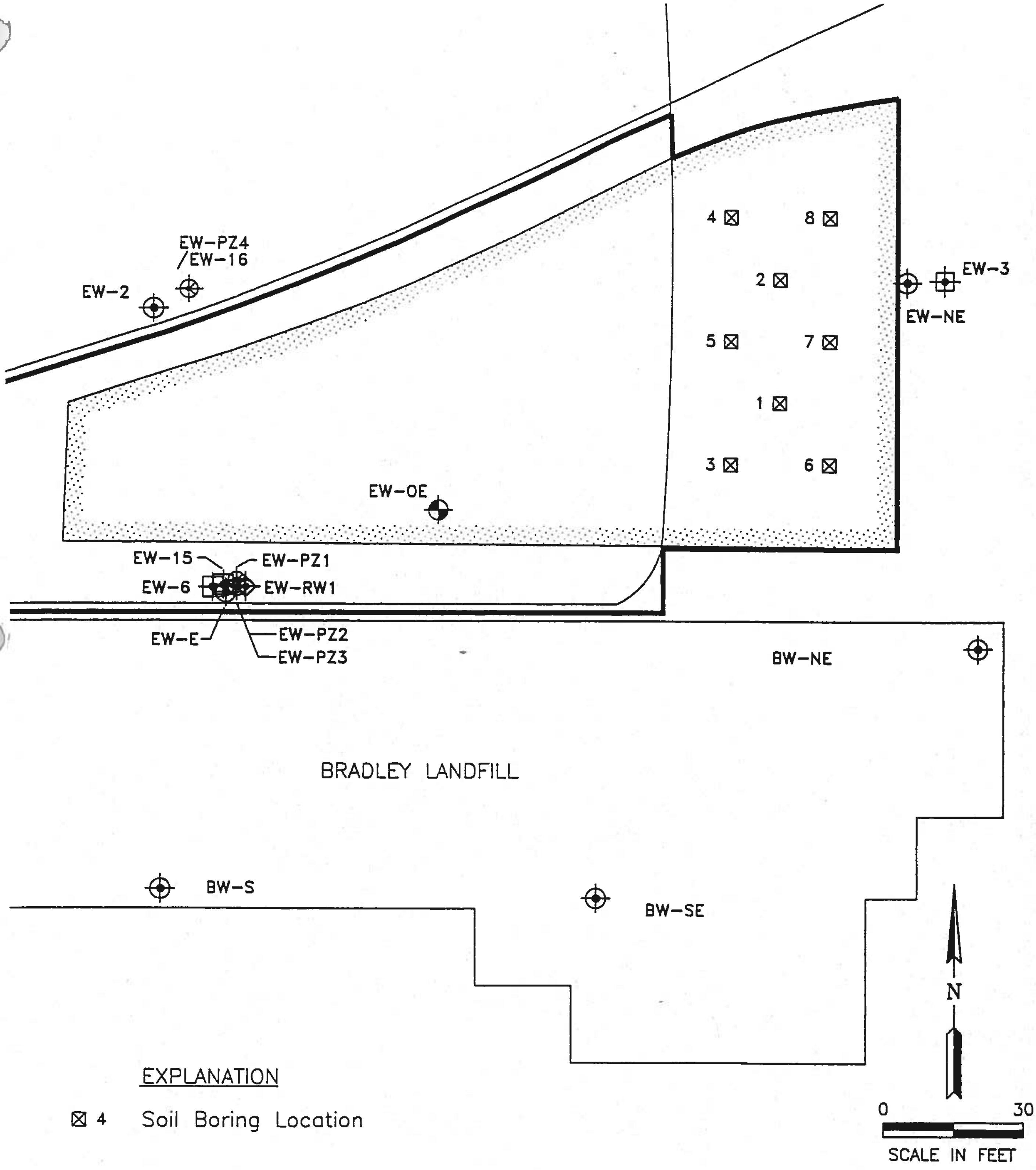
ESTES LANDFILL RI
PHOENIX
ARIZONA

SOIL BORING & TEST PIT
LOCATIONS SH&B STATE
ROUTE 153 DATA

Environmental Science &
Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

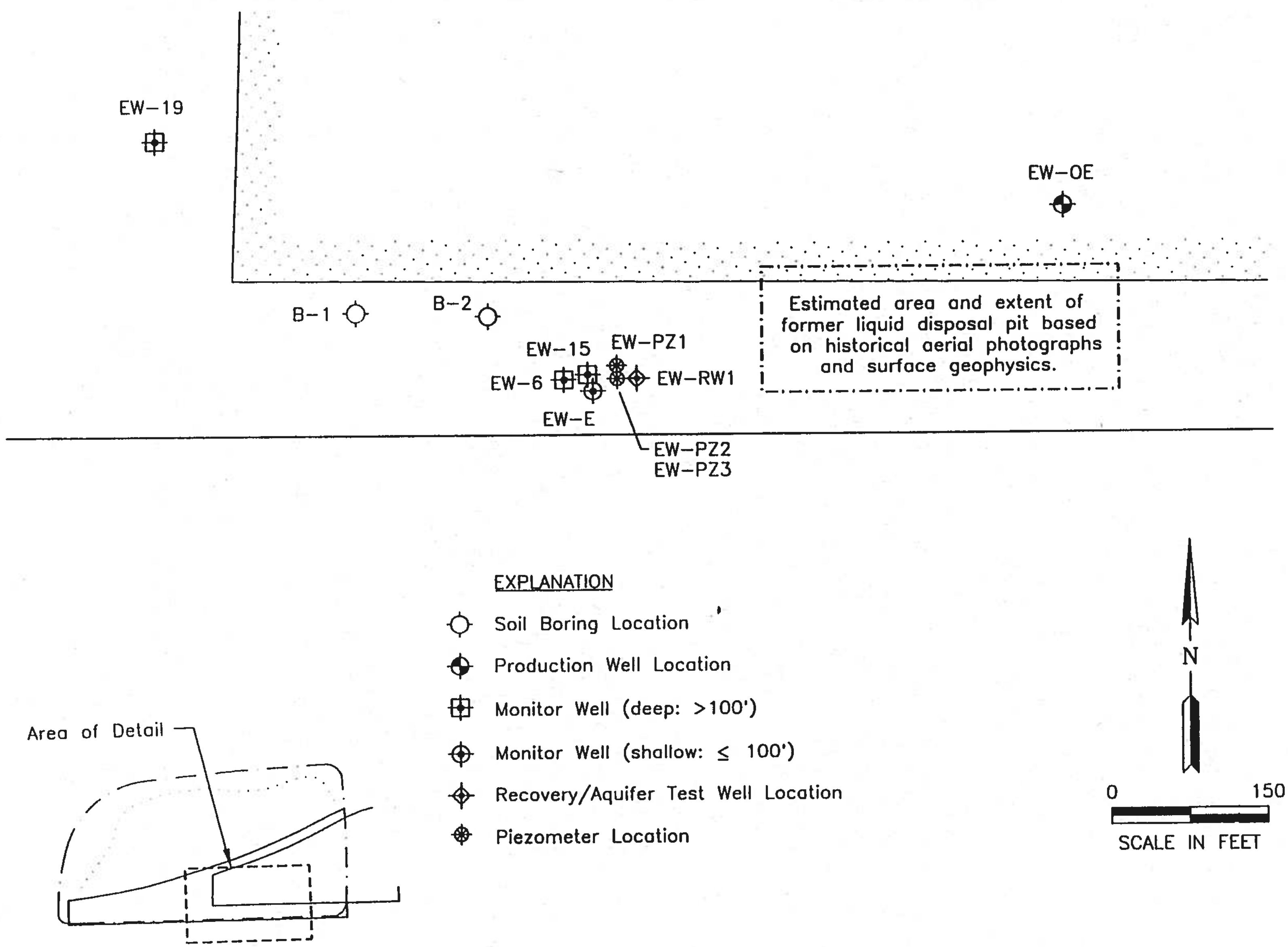
DATE 7-11-99
DRAWN BY: RBC
PROJECT No. 6699033
SCALE 1"=300'
FIGURE 6.2

CADD FILE: ACAD\FILES\ESTES\6.3.dwg



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc. A MACTEC Company 428 N. 44th St. # 110 Phoenix, AZ 85008	HARGIS & ASSOCIATES SOIL BORING LOCATIONS	ESTES LANDFILL RI PHOENIX ARIZONA	DATE 7-7-99 DRAWN BY: RBC PROJECT No. 6699033	SCALE 1"=30' FIGURE 6.3



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

LOCATION MAP FOR SOIL BORINGS B-1 & B-2

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7-7-99
DRAWN BY: RBC
PROJECT No. 5698033
SCALE 1"=150'
FIGURE **6.4**

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

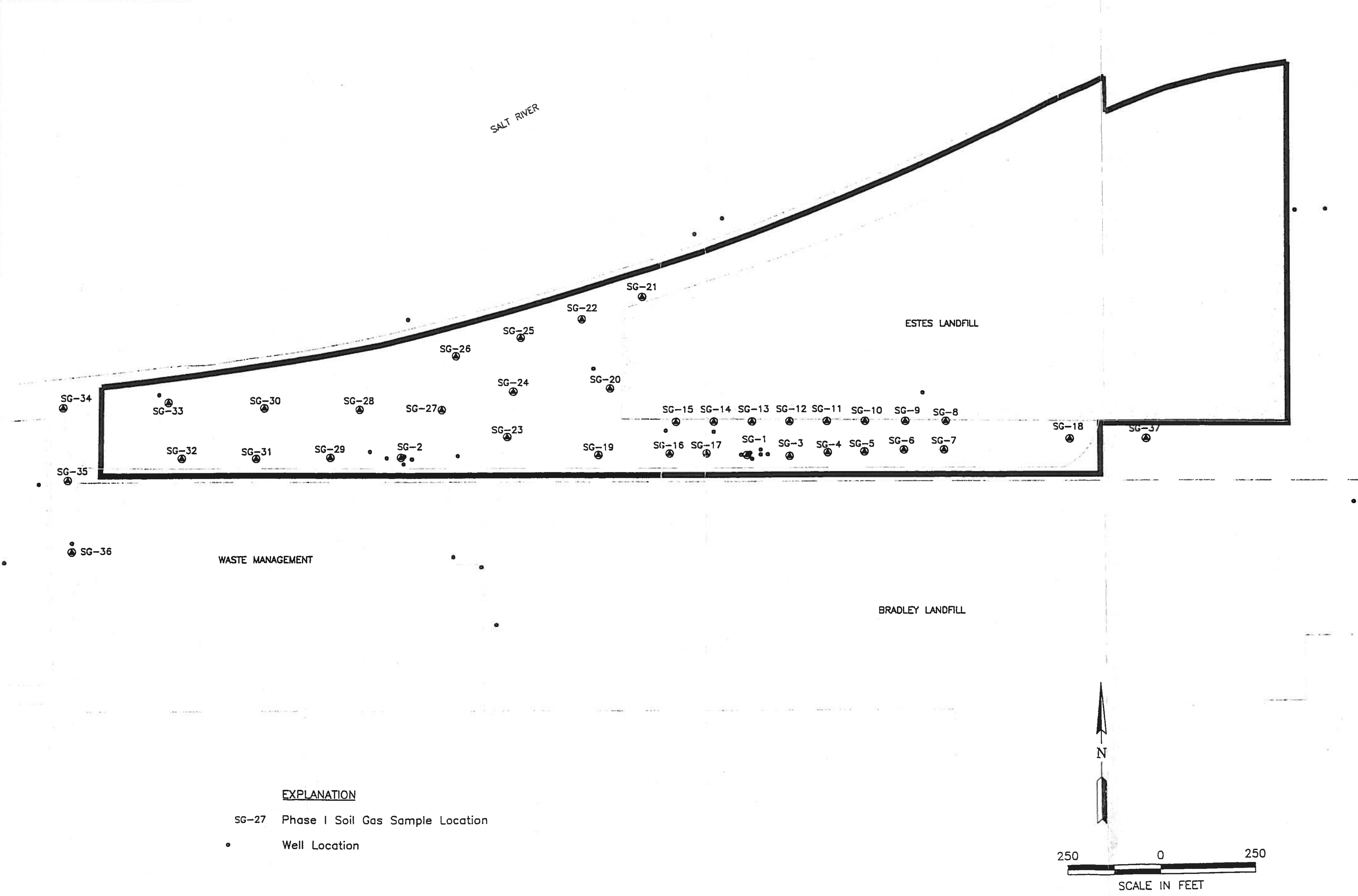
CADD FILE: ACAD\FILES\ESTES\6.4.dwg

PHASE I SOIL GAS SAMPLE LOCATIONS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE	7-11-99
DRAWN BY:	RBC
PROJECT No.	6699033
SCALE	1"=250'
FIGURE	6.5

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



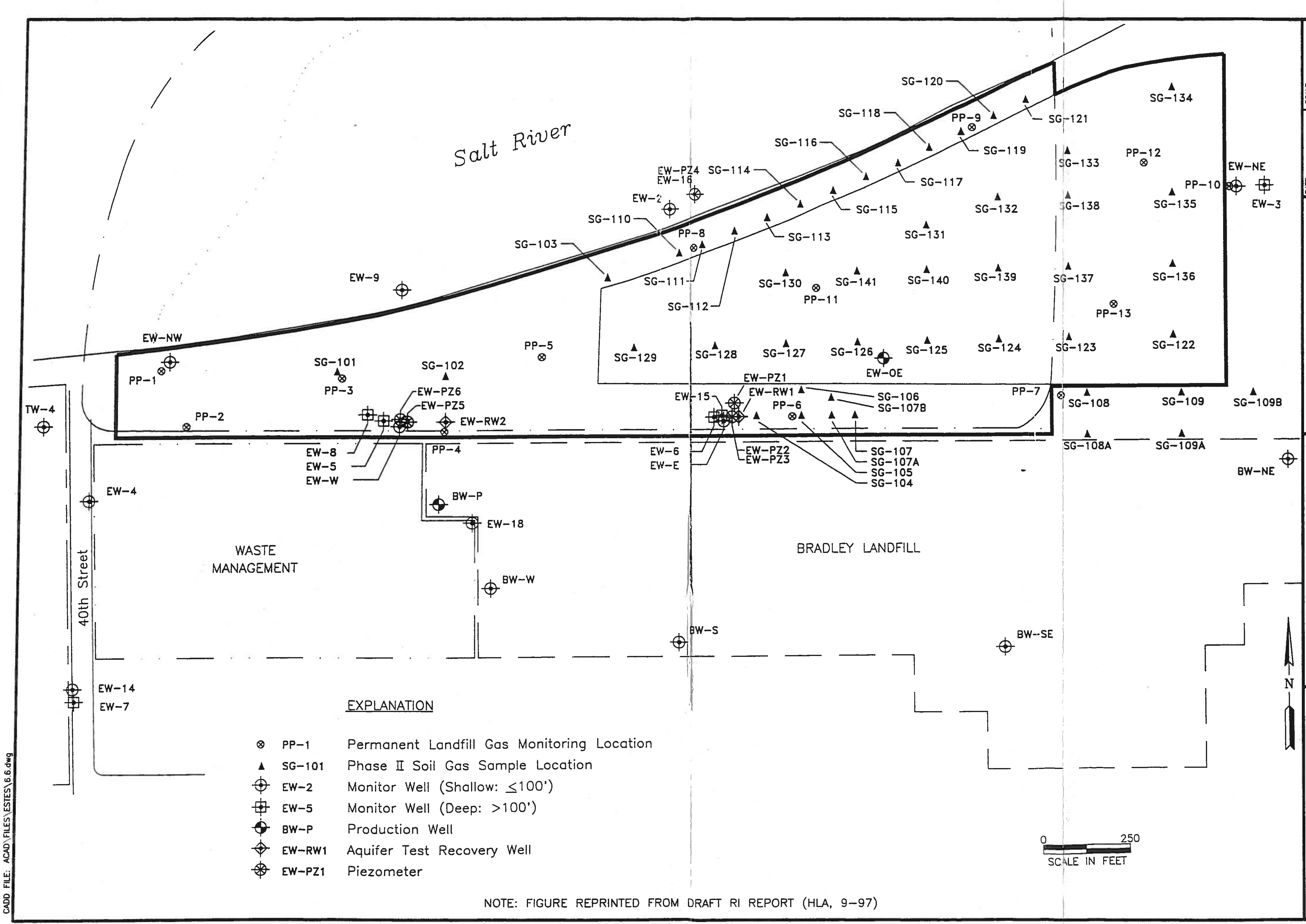
EXPLANATION

SG-27 Phase I Soil Gas Sample Location

● Well Location

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

CADD FILE: ACAD\FILES\ESTES\6.5.dwg



EXPLANATION

⊗	PP-1	Permanent Landfill Gas Monitoring Location
▲	SG-101	Phase II Soil Gas Sample Location
⊕	EW-2	Monitor Well (Shallow: ≤100')
⊞	EW-5	Monitor Well (Deep: >100')
◓	BW-P	Production Well
✧	EW-RW1	Aquifer Test Recovery Well
⊛	EW-PZ1	Piezometer

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

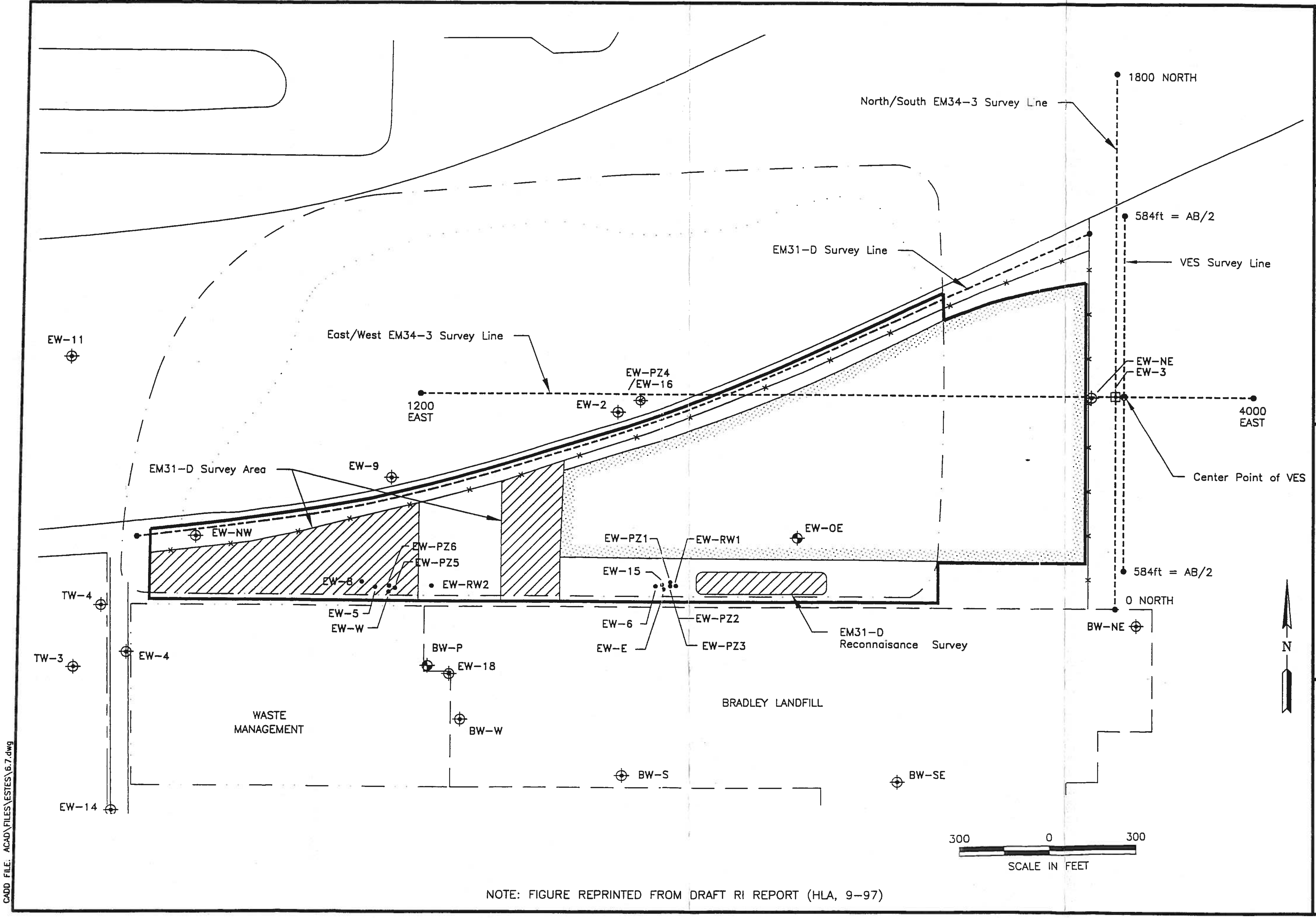
CADD FILE: ACAD\FILES\ESTES\6.6.dwg

ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE II SOIL GAS
SAMPLE LOCATIONS

DATE 7-11-99
SCALE 1"=250'
DRAWN BY: RBC
PROJECT No. 6699033
FIGURE 6.6

Environmental Science &
Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

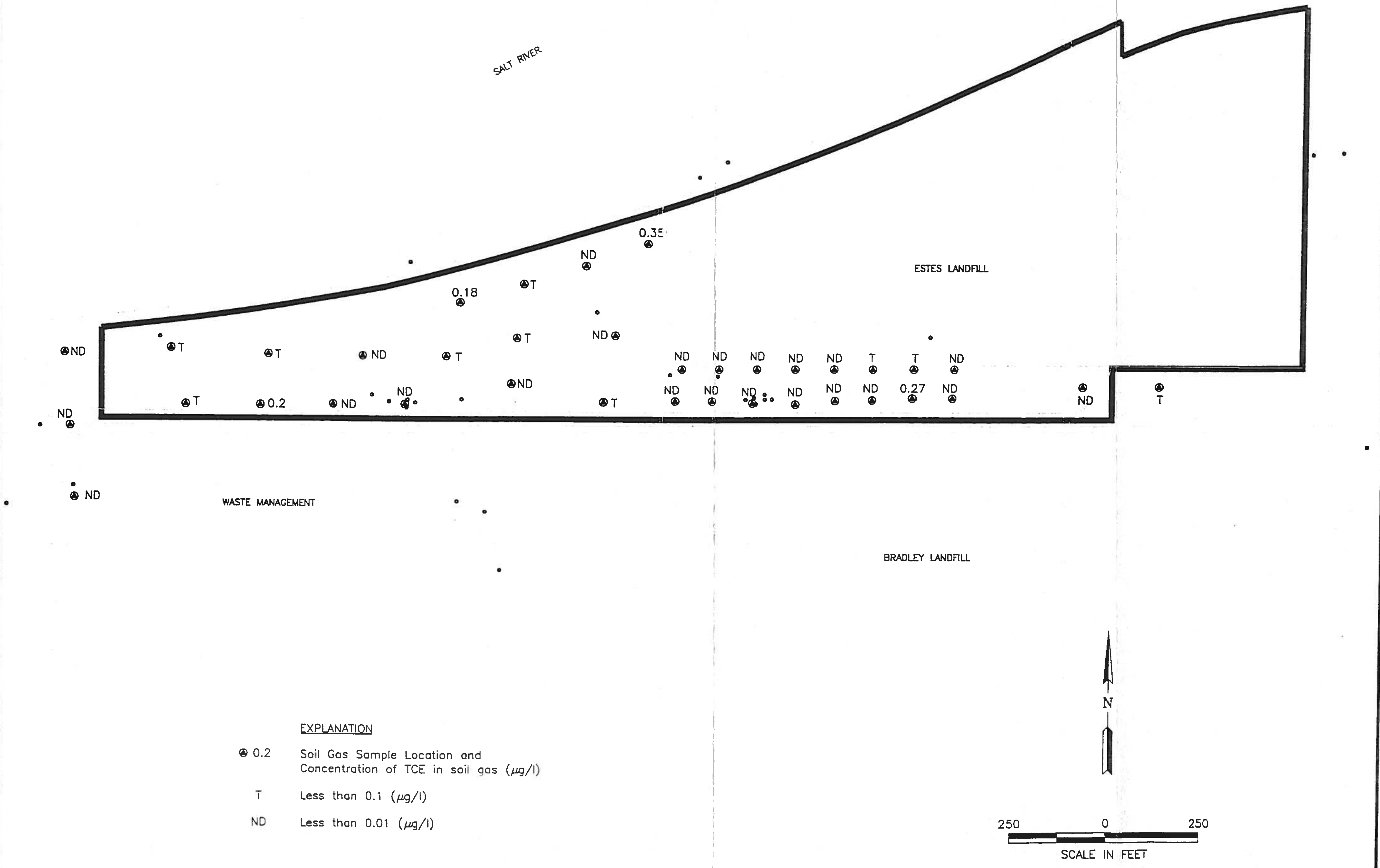
CADD FILE: ACAD\FILES\ESTES\6.7.dwg

DATE 7-11-99
SCALE 1"=300'
FIGURE 6.7
DRAWN BY: RBC
PROJECT No. 6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

GEOPHYSICAL SURVEY LOCATIONS

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



EXPLANATION

⊗ 0.2 Soil Gas Sample Location and Concentration of TCE in soil gas (µg/l)

T Less than 0.1 (µg/l)

ND Less than 0.01 (µg/l)

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

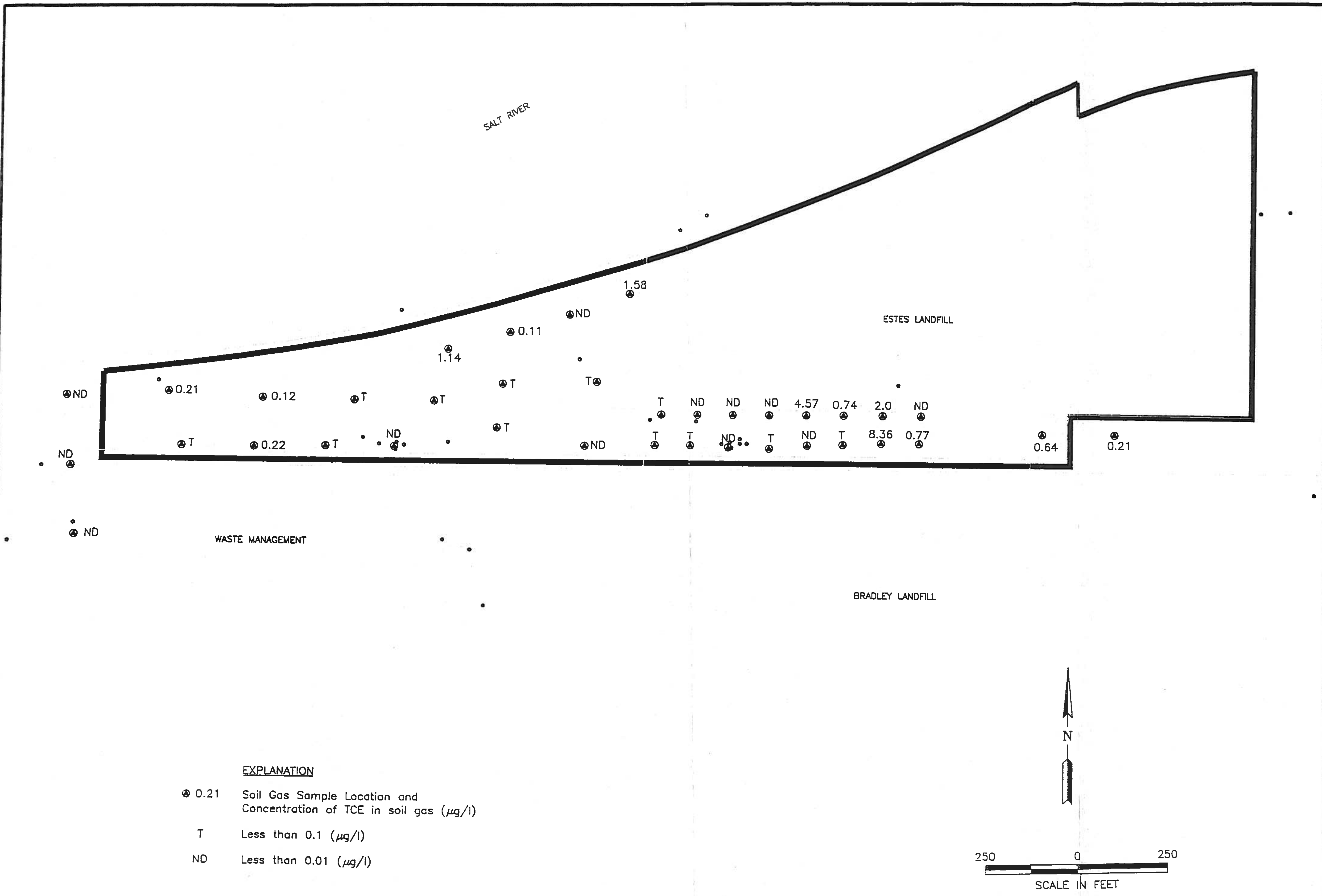
CADD FILE: ACAD\FILES\ESTES\6.8.dwg

DATE 7-11-99
SCALE 1"=250'
DRAWN BY: RBC
FIGURE **6.8**
PROJECT No. 669903

ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE I TCE CONCENTRATIONS IN SOIL GAS

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



EXPLANATION

⊛ 0.21	Soil Gas Sample Location and Concentration of TCE in soil gas (μg/l)
T	Less than 0.1 (μg/l)
ND	Less than 0.01 (μg/l)

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

CADD FILE: ACAD\ES\ESTES\6.9.dwg

DATE 7-11-99
DRAWN BY: RBC
PROJECT No. 6699033
SCALE 1"=250'
FIGURE 6.9

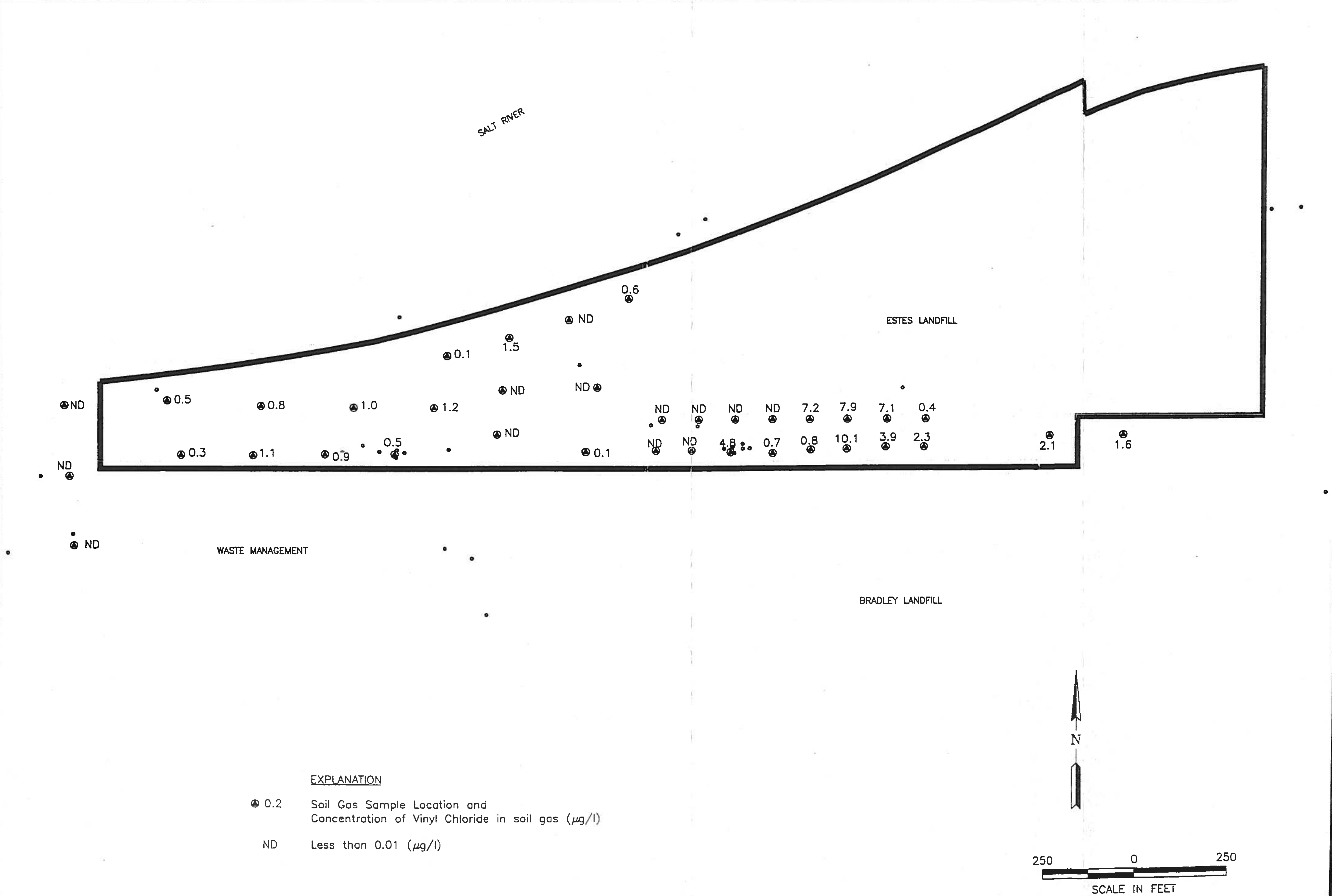
ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE I cis-1,2-DCE
CONCENTRATIONS IN SOIL GAS

Environmental Science &
Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008

PHASE I VINYL CHLORIDE CONCENTRATIONS IN SOIL GAS

ESTES LANDFILL RI
PHOENIX
ARIZONA



EXPLANATION

⊛ 0.2 Soil Gas Sample Location and Concentration of Vinyl Chloride in soil gas (μg/l)

ND Less than 0.01 (μg/l)

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

CADD FILE: ACAD\FILES\ESTES\6.10.dwg

DATE	7-11-99
DRAWN BY:	RBC
PROJECT No.	6699033
SCALE	1"=250'
FIGURE	6.10

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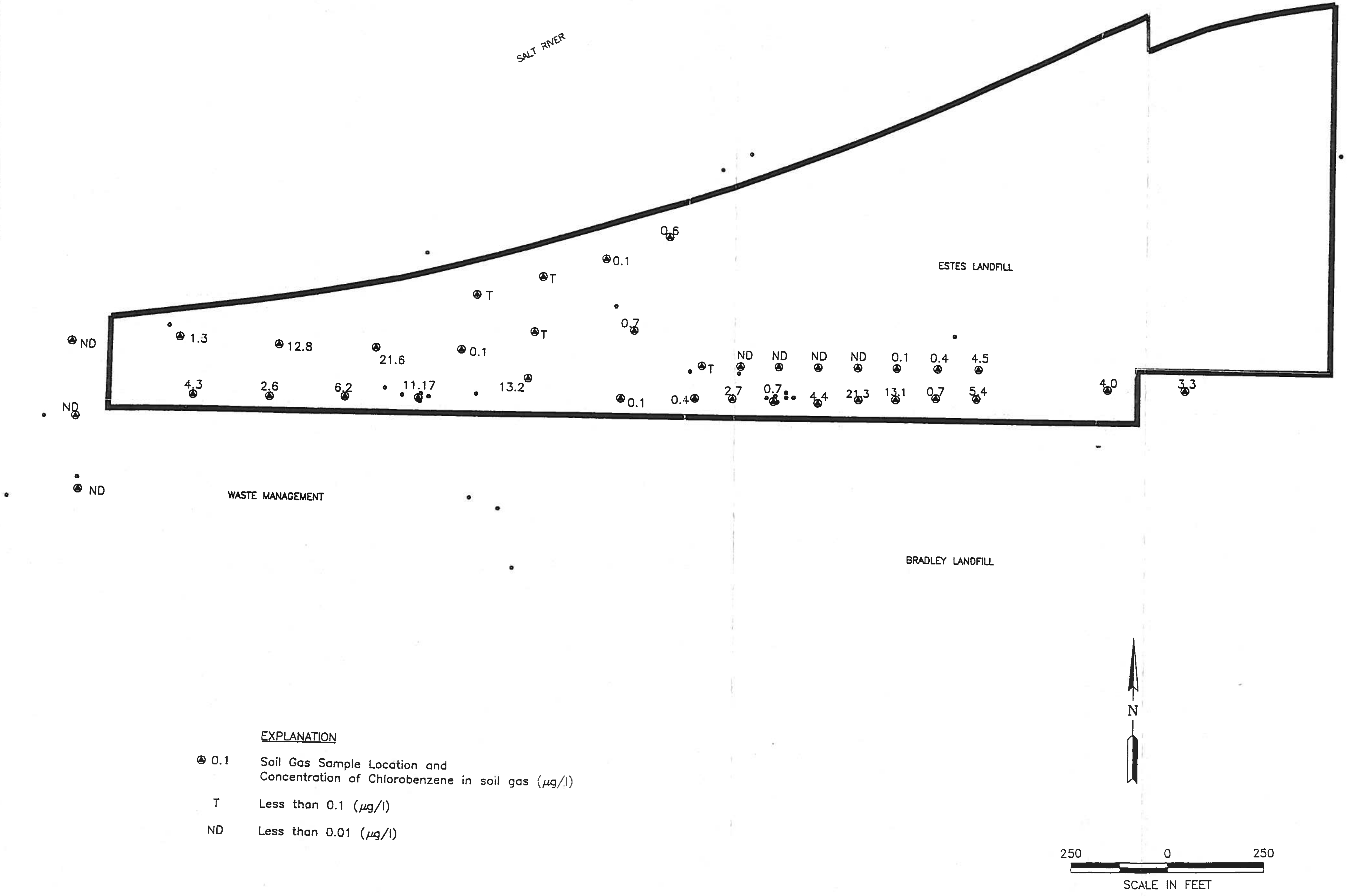
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



EXPLANATION

● 0.1	Soil Gas Sample Location and Concentration of Chlorobenzene in soil gas (μg/l)
T	Less than 0.1 (μg/l)
ND	Less than 0.01 (μg/l)

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

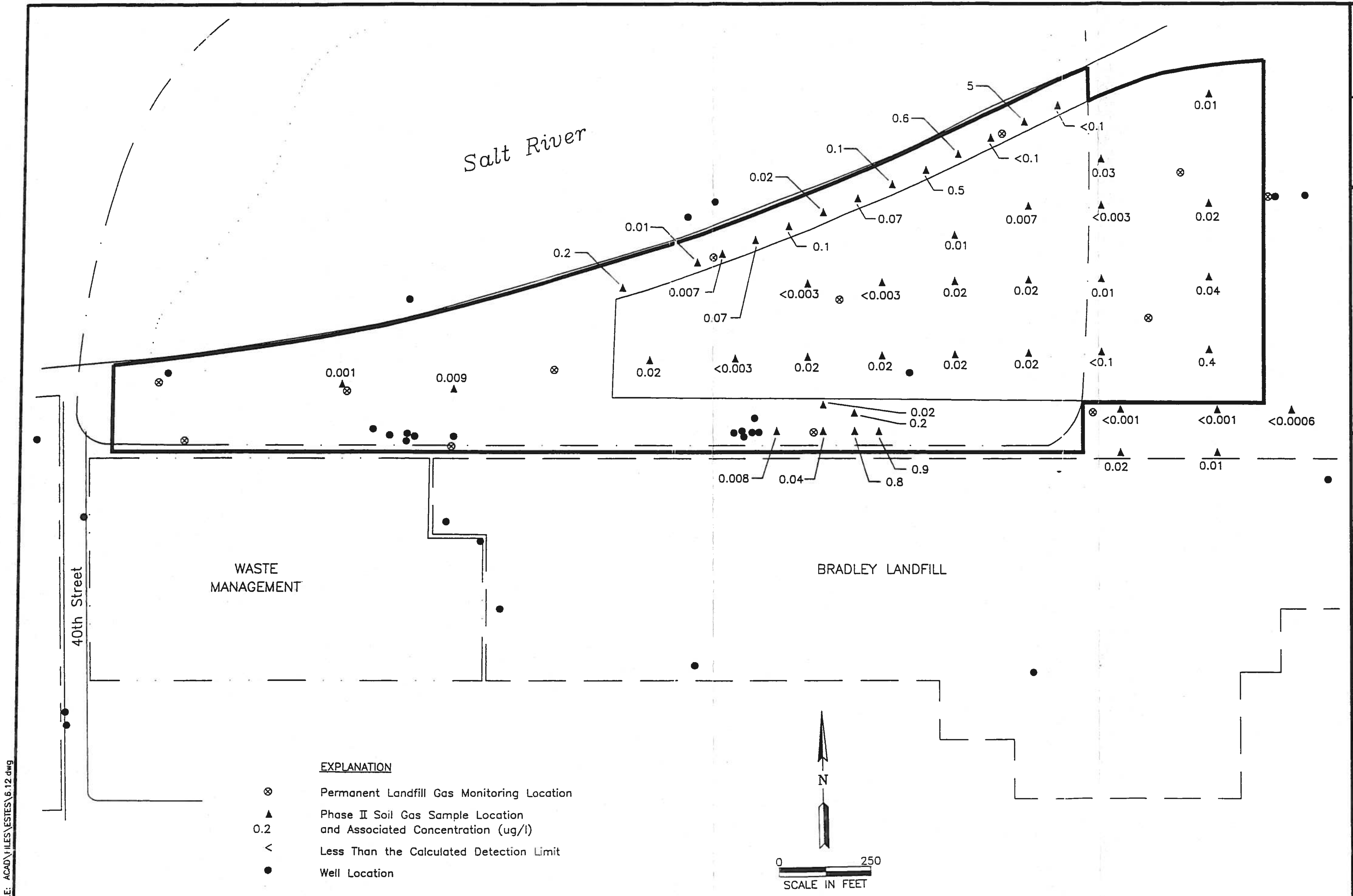
CADD FILE: ACAD\FILES\ESTES\6 11.dwg

PHASE I CHLOROBENZENE CONCENTRATIONS IN SOIL GAS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7-11-99
SCALE 1"=250'
DRAWN BY: RBC
FIGURE 6.11
PROJECT No. 6699033

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008



EXPLANATION

⊗	Permanent Landfill Gas Monitoring Location
▲ 0.2	Phase II Soil Gas Sample Location and Associated Concentration (ug/l)
<	Less Than the Calculated Detection Limit
●	Well Location

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

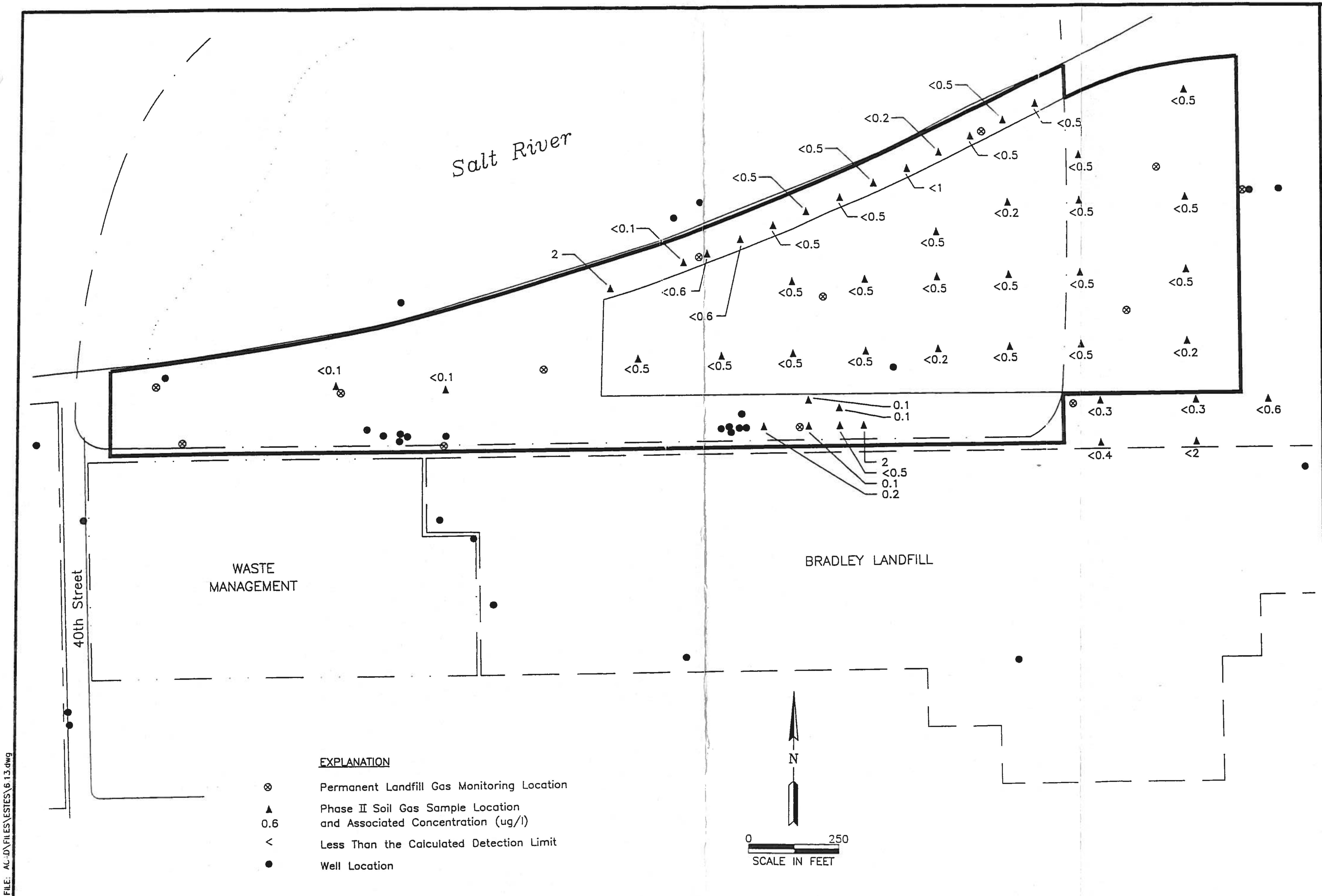
CADD FILE: ACAD\FILES\ESTES\6.12.dwg

DATE 7-11-99
SCALE 1"=250'
DRAWN BY: RBC
FIGURE 6.12
PROJECT No. 6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE II TCE
CONCENTRATIONS IN SOIL GAS

Environmental Science &
Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9–97)

CADD FILE: AC-D\FILES\ESTES\6.13.dwg

DATE	7-11-99
SCALE	1"=250'
DRAWN BY:	RBC
FIGURE	6.13
PROJECT No.	6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE II TOTAL 1,2–DCE CONCENTRATIONS IN SOIL GAS

Environmental Science & Engineering, Inc.
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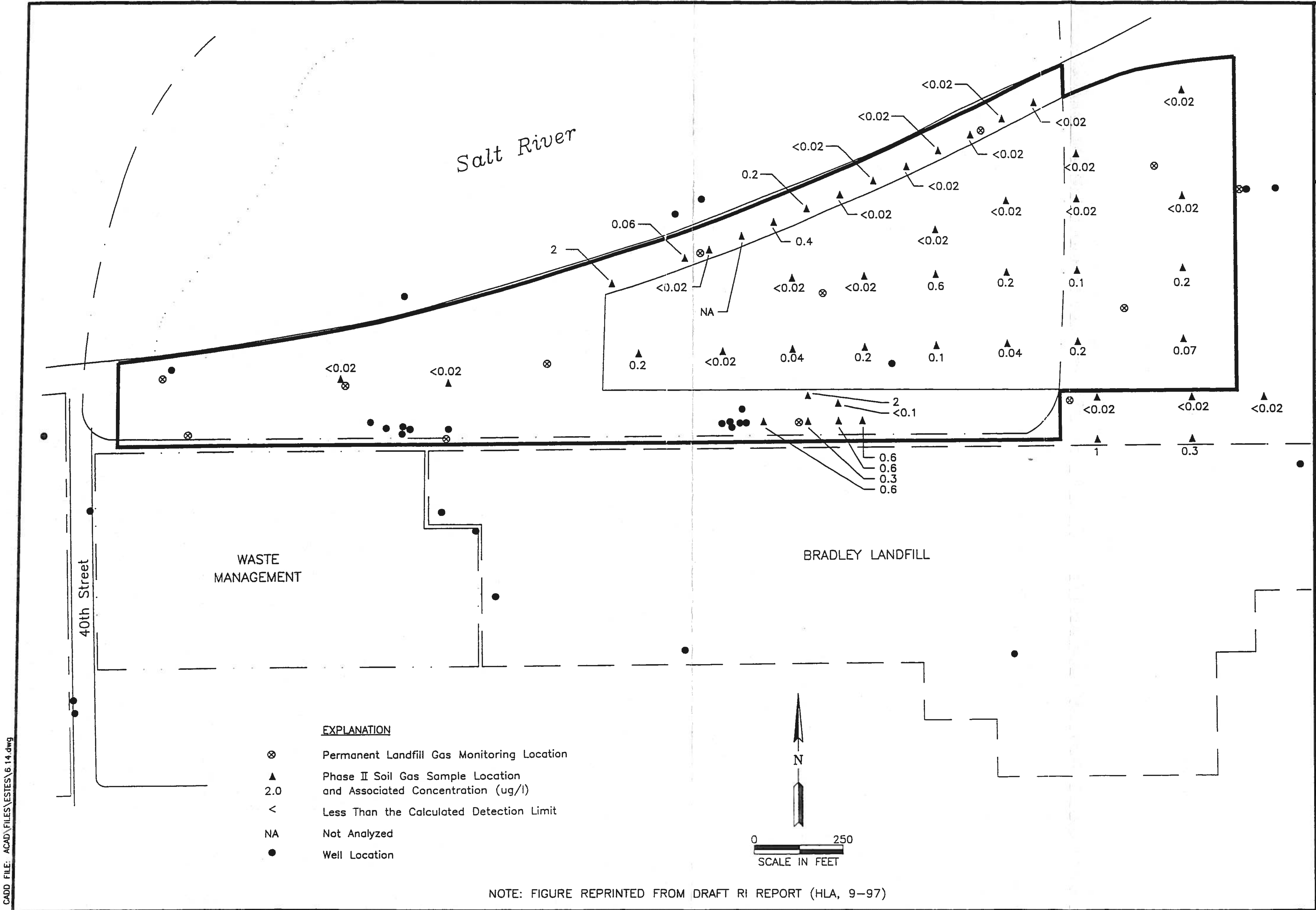
426 N. 44th St. # 110
Phoenix, AZ 85008



EXPLANATION

⊗ Permanent Landfill Gas Monitoring Location

▲ 2.0 Phase II Soil Gas Sample Location and Associated Concentration (ug/l)

< Less Than the Calculated Detection Limit

NA Not Analyzed

● Well Location

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

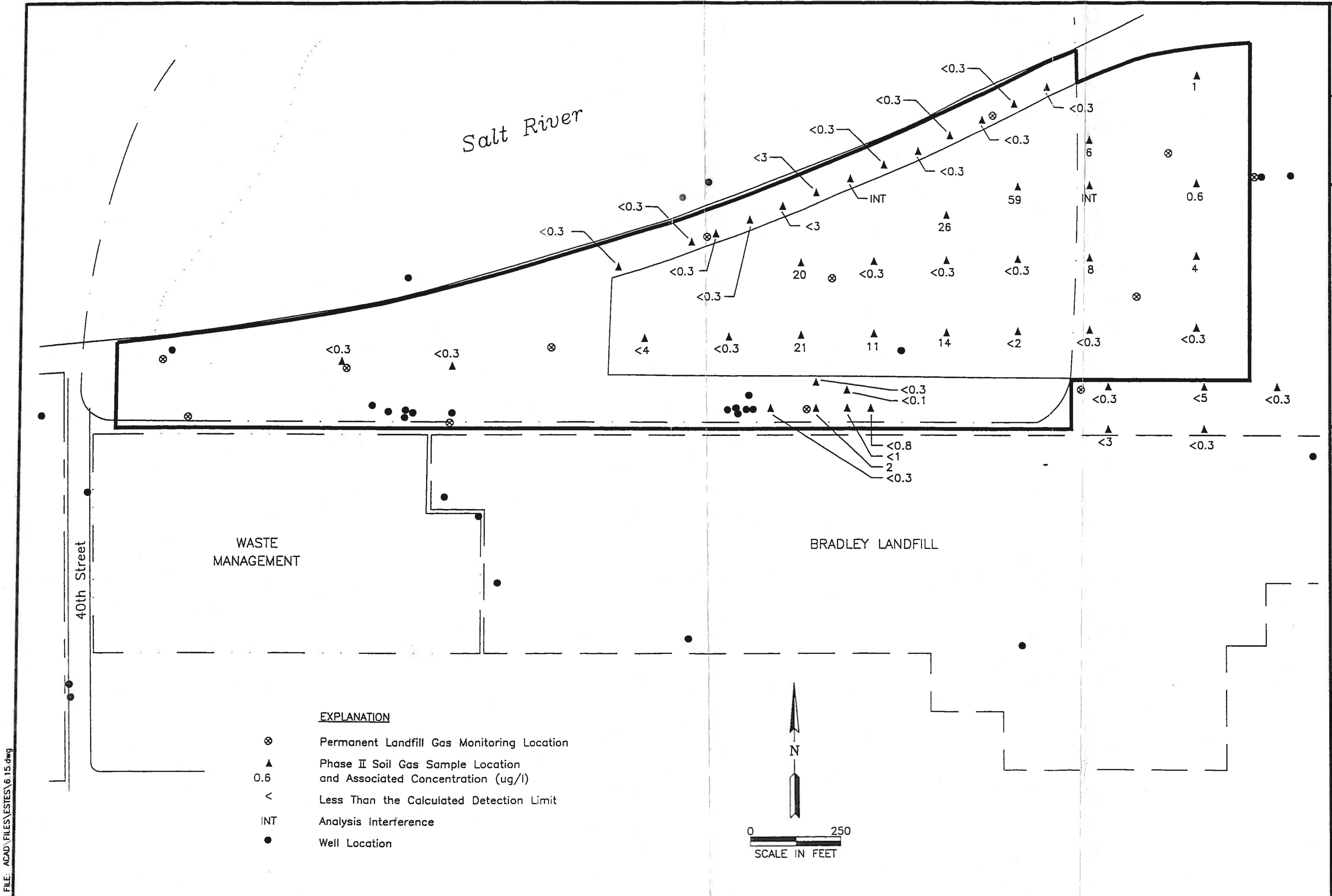
CADD FILE: ACAD\FILES\ESTES\6 14.dwg

ESTES LANDFILL RI
PHOENIX
ARIZONA

PHASE II VINYL CHLORIDE CONCENTRATIONS IN SOIL GAS

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

DATE 7-11-99
DRAWN BY: RBC
PROJECT No. 6699033
SCALE 1"=250'
FIGURE 6.14



EXPLANATION

⊗	Permanent Landfill Gas Monitoring Location
▲ 0.6	Phase II Soil Gas Sample Location and Associated Concentration (ug/l)
<	Less Than the Calculated Detection Limit
INT	Analysis Interference
●	Well Location

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9–97)

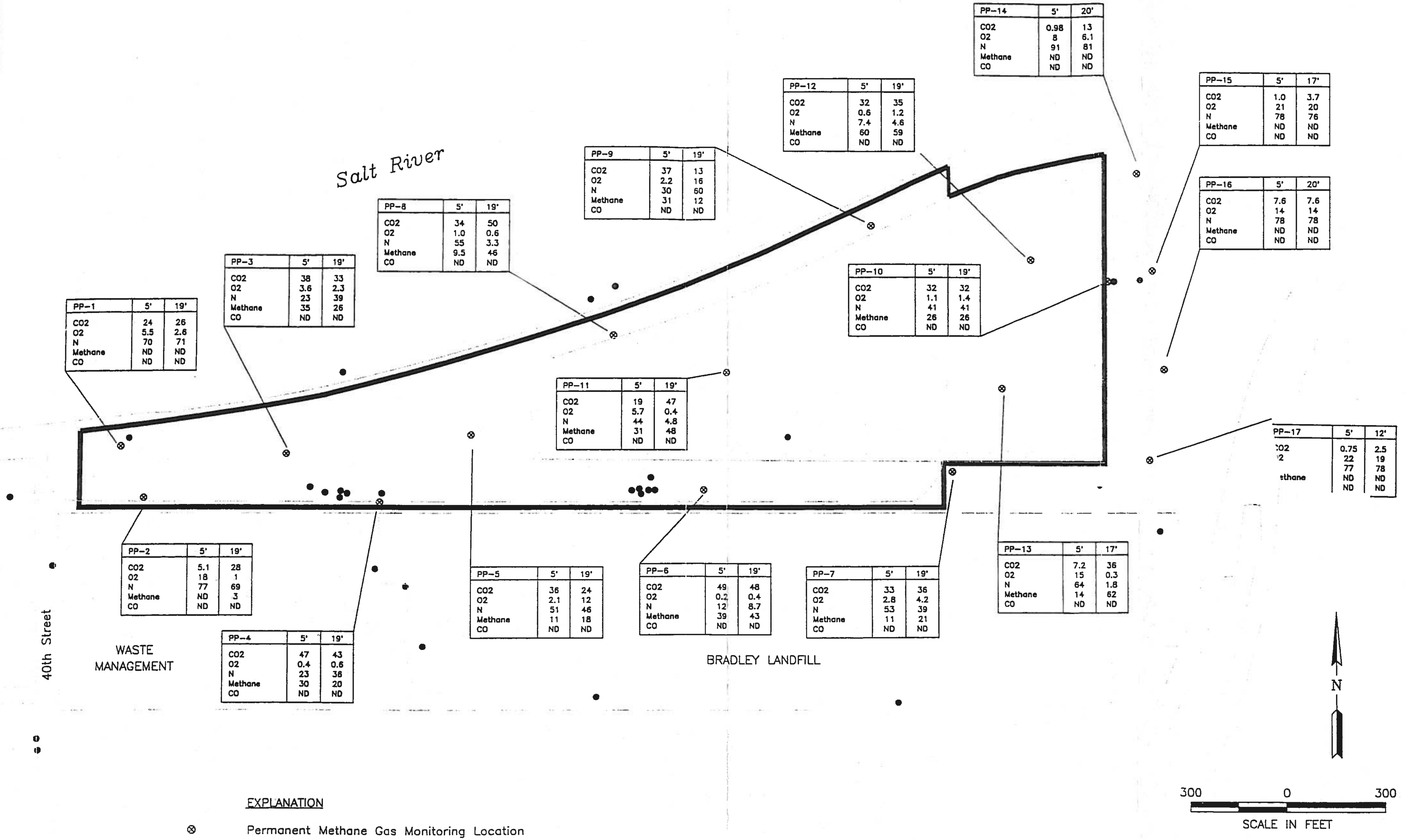
CADD FILE: ACAD\FILES\ESTES\6 15.dwg

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

PHASE II CHLOROBENZENE CONCENTRATIONS IN SOIL GAS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7-11-99
DRAWN BY: RBC
PROJECT No. 6699033
SCALE 1"=250'
FIGURE 6.15



PP-1	5'	19'
CO2	24	26
O2	5.5	2.6
N	70	71
Methane	ND	ND
CO	ND	ND

PP-2	5'	19'
CO2	5.1	28
O2	18	1
N	77	69
Methane	ND	3
CO	ND	ND

PP-3	5'	19'
CO2	38	33
O2	3.6	2.3
N	23	39
Methane	35	26
CO	ND	ND

PP-4	5'	19'
CO2	47	43
O2	0.4	0.6
N	23	36
Methane	30	20
CO	ND	ND

PP-5	5'	19'
CO2	36	24
O2	2.1	12
N	51	46
Methane	11	18
CO	ND	ND

PP-6	5'	19'
CO2	49	48
O2	0.2	0.4
N	12	8.7
Methane	39	43
CO	ND	ND

PP-7	5'	19'
CO2	33	36
O2	2.8	4.2
N	53	39
Methane	11	21
CO	ND	ND

PP-8	5'	19'
CO2	34	50
O2	1.0	0.6
N	55	3.3
Methane	9.5	46
CO	ND	ND

PP-9	5'	19'
CO2	37	13
O2	2.2	16
N	30	60
Methane	31	12
CO	ND	ND

PP-10	5'	19'
CO2	32	32
O2	1.1	1.4
N	41	41
Methane	26	26
CO	ND	ND

PP-11	5'	19'
CO2	19	47
O2	5.7	0.4
N	44	4.8
Methane	31	48
CO	ND	ND

PP-12	5'	19'
CO2	32	35
O2	0.6	1.2
N	7.4	4.6
Methane	60	59
CO	ND	ND

PP-13	5'	17'
CO2	7.2	36
O2	15	0.3
N	64	1.8
Methane	14	62
CO	ND	ND

PP-14	5'	20'
CO2	0.98	13
O2	8	6.1
N	91	81
Methane	ND	ND
CO	ND	ND

PP-15	5'	17'
CO2	1.0	3.7
O2	21	20
N	78	76
Methane	ND	ND
CO	ND	ND

PP-16	5'	20'
CO2	7.6	7.6
O2	14	14
N	78	78
Methane	ND	ND
CO	ND	ND

PP-17	5'	12'
O2	0.75	2.5
2	22	19
	77	78
ethane	ND	ND
	ND	ND

EXPLANATION

⊗	Permanent Methane Gas Monitoring Location
ND	Sample Not Detected at or above the Practical Quantitation Limit
	All Sample Results Reported as Percent by Volume
●	Well Location

Permanent Probes PP-1 through PP-13 were sampled in September 1994.
Permanent Probes PP-14 through PP-17 were sampled in July 1995.

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

CADD FILE: ACAD\FILES\ESTES\6 16.dwg

SCALE 1"=300'
FIGURE
6.16

DATE 7-11-99
DRAWN BY: RBC
PROJECT No. 6699033

ESTES LANDFILL RI
PHOENIX
ARIZONA

LANDFILL GAS DATA

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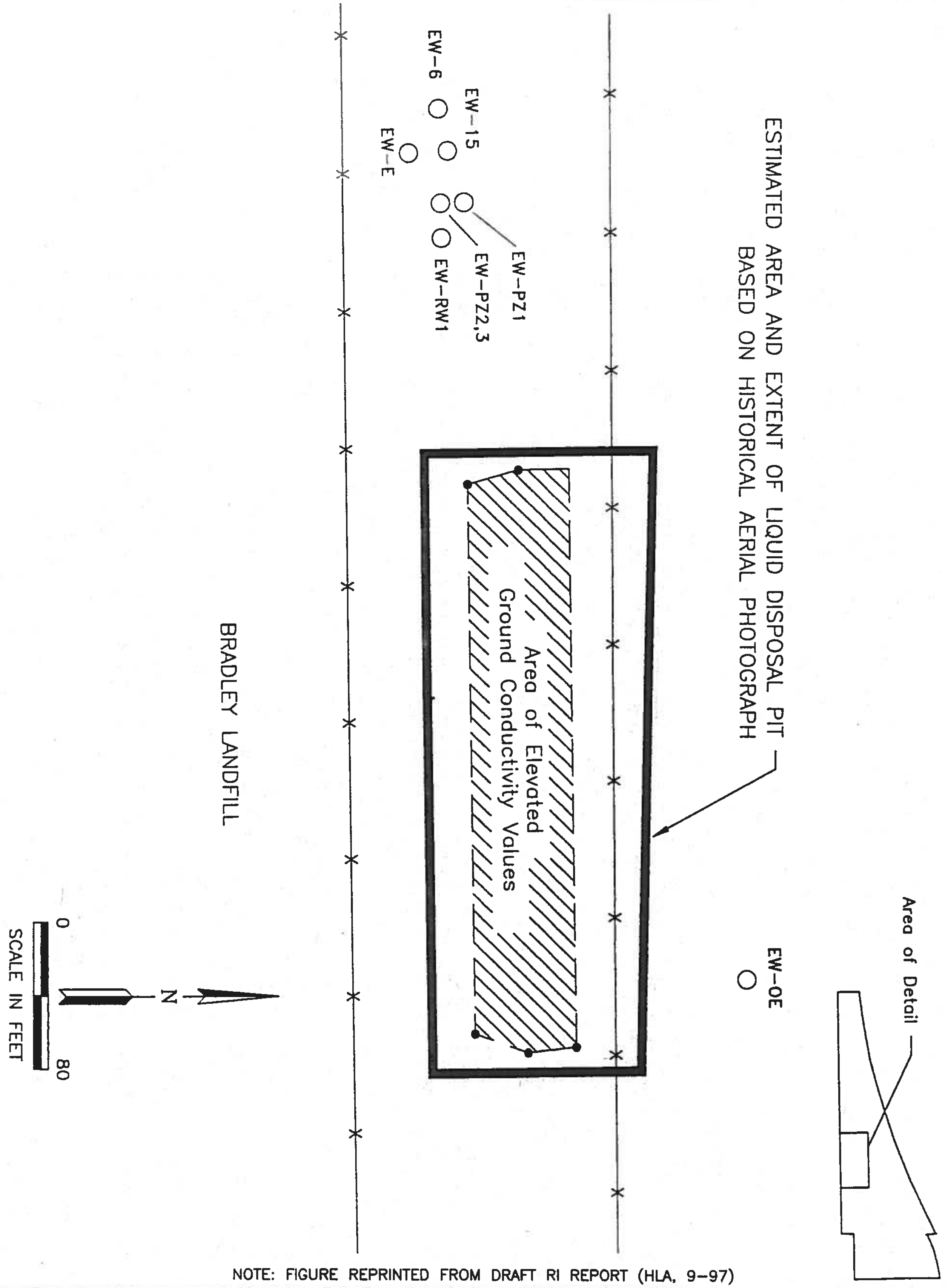
Phoenix, AZ 85008

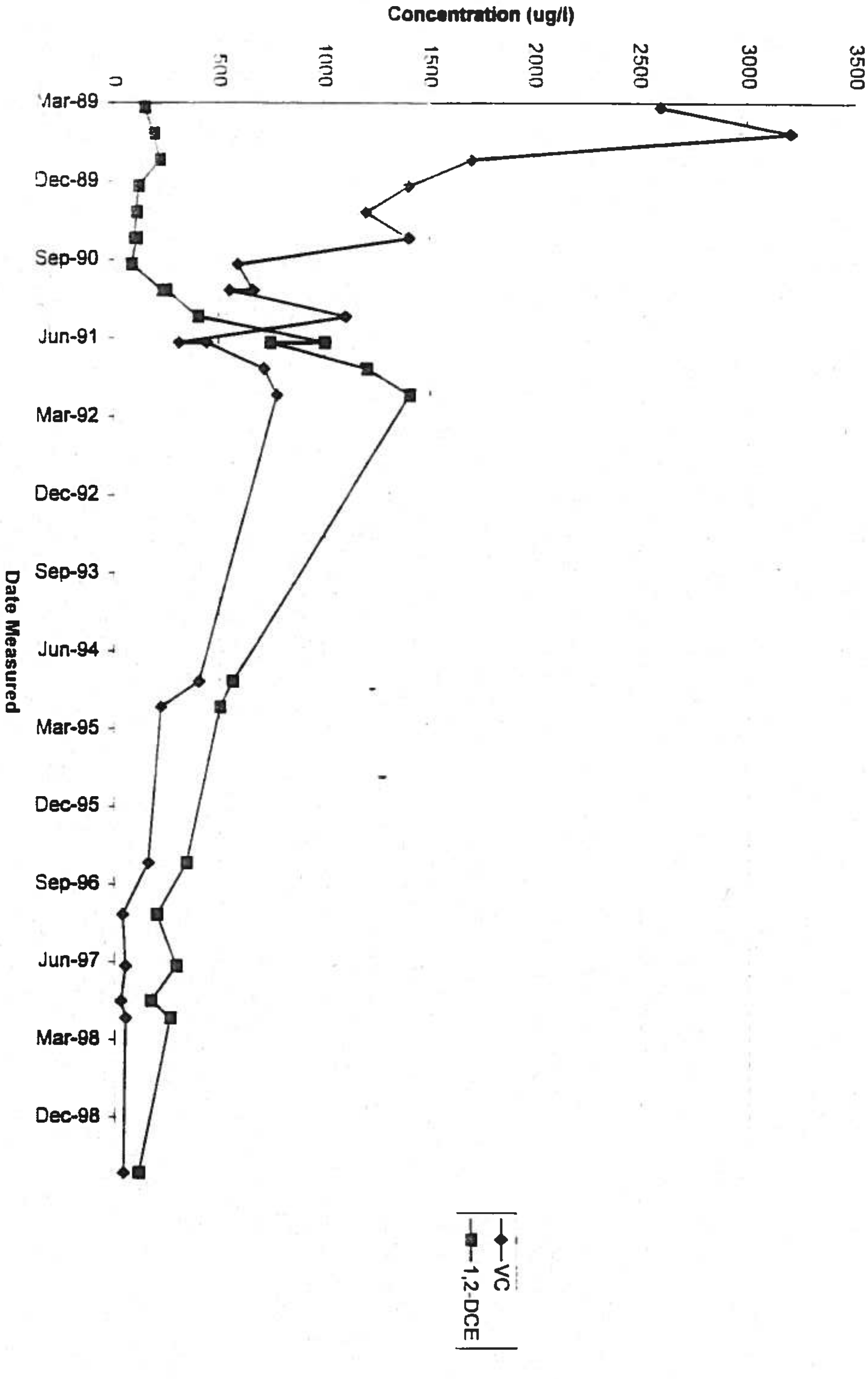
CADD FILE: ACAD\FILES\ESTES\6.17.dwg



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc. A MACTEC Company 428 N. 44th St. # 110 Phoenix, AZ 85008	**AREA OF ELEVATED GROUND CONDUCTIVITY SHOWING EAST-WEST EXTENT OF THE DISPOSAL PIT**	ESTES LANDFILL RI PHOENIX ARIZONA	DATE 7-7-99 DRAWN BY: RBC PROJECT No. 6699033	SCALE 1"=80' FIGURE **6.17**

CADD FILE: ACAD\FILES\ESTES\6.18.dwg



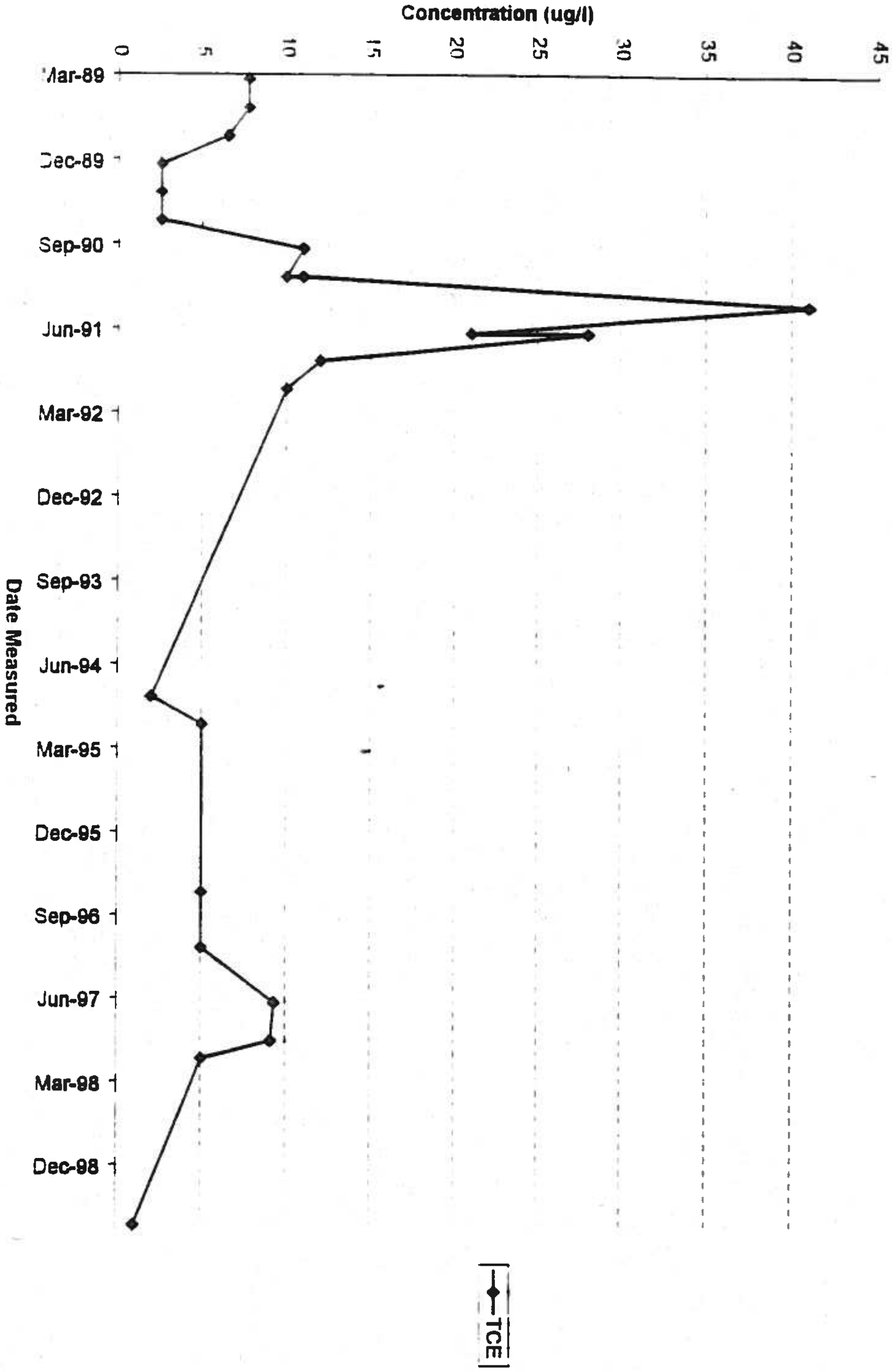
Environmental Science & Engineering, Inc.
A MACTEC Company 428 N. 44th St. # 110 Phoenix, AZ 85008

DECLINING CONCENTRATIONS OF VINYL CHLORIDE & 1,2-DCE AT EW-E
(DATA REPRESENTING 'NO RECHARGE' CONDITIONS)

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE RBC
SCALE NTS
DRAWN BY: RBC
PROJECT No. 6699033
FIGURE 6.18

CADD FILE: ACAD\FILES\ESTES\6.19.dwg



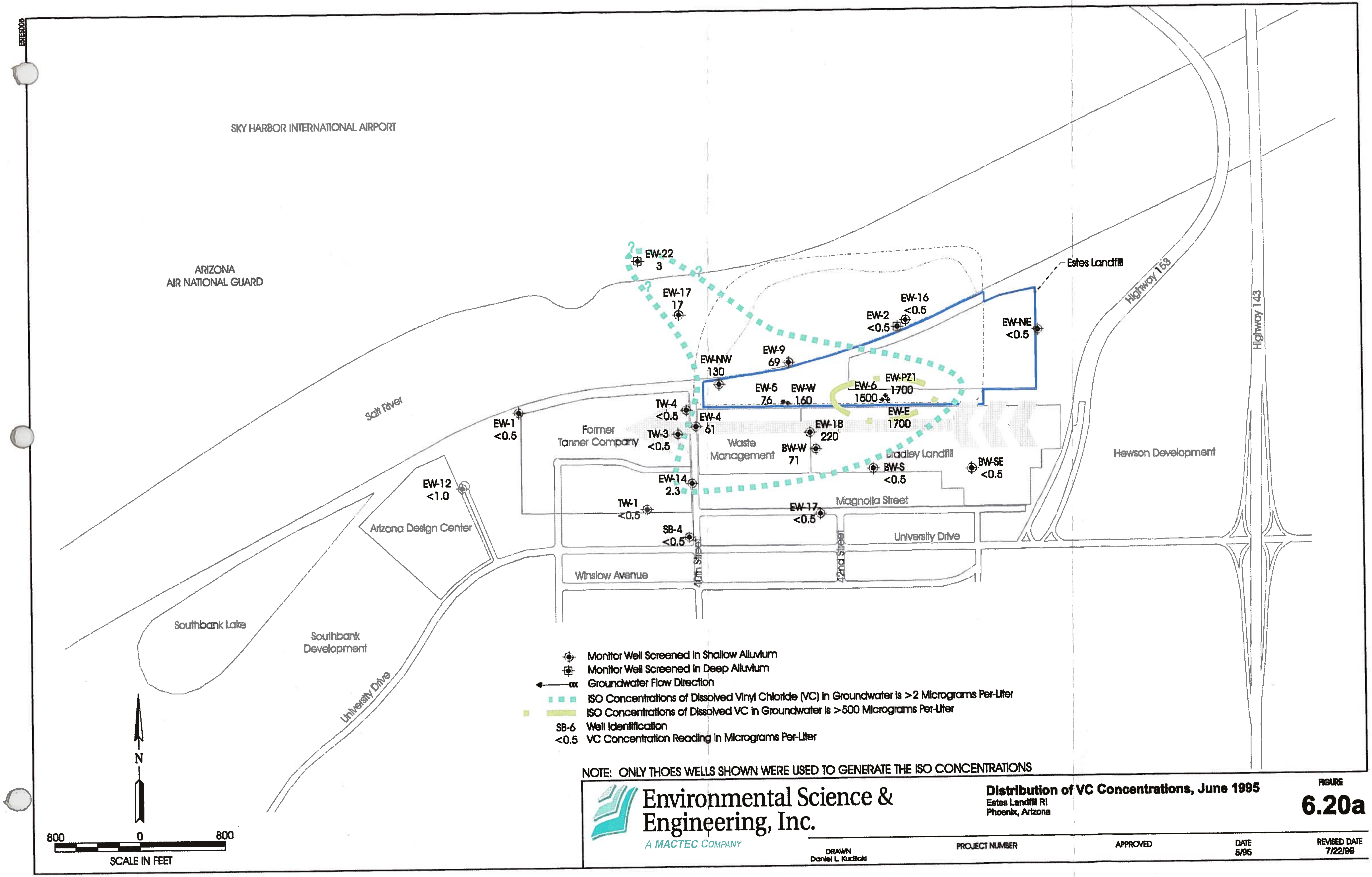
Environmental Science & Engineering, Inc.
A MACTEC Company 428 N. 44th St. # 110 Phoenix, AZ 85008

DECLINING CONCENTRATIONS OF TRICHLOROETHENE AT EW-E

(DATA REPRESENTING 'NO RECHARGE' CONDITIONS)

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE	RBC	SCALE	NTS
DRAWN BY:	RBC	FIGURE	6.19
PROJECT No.	6699033		



NOTE: ONLY THOES WELLS SHOWN WERE USED TO GENERATE THE ISO CONCENTRATIONS

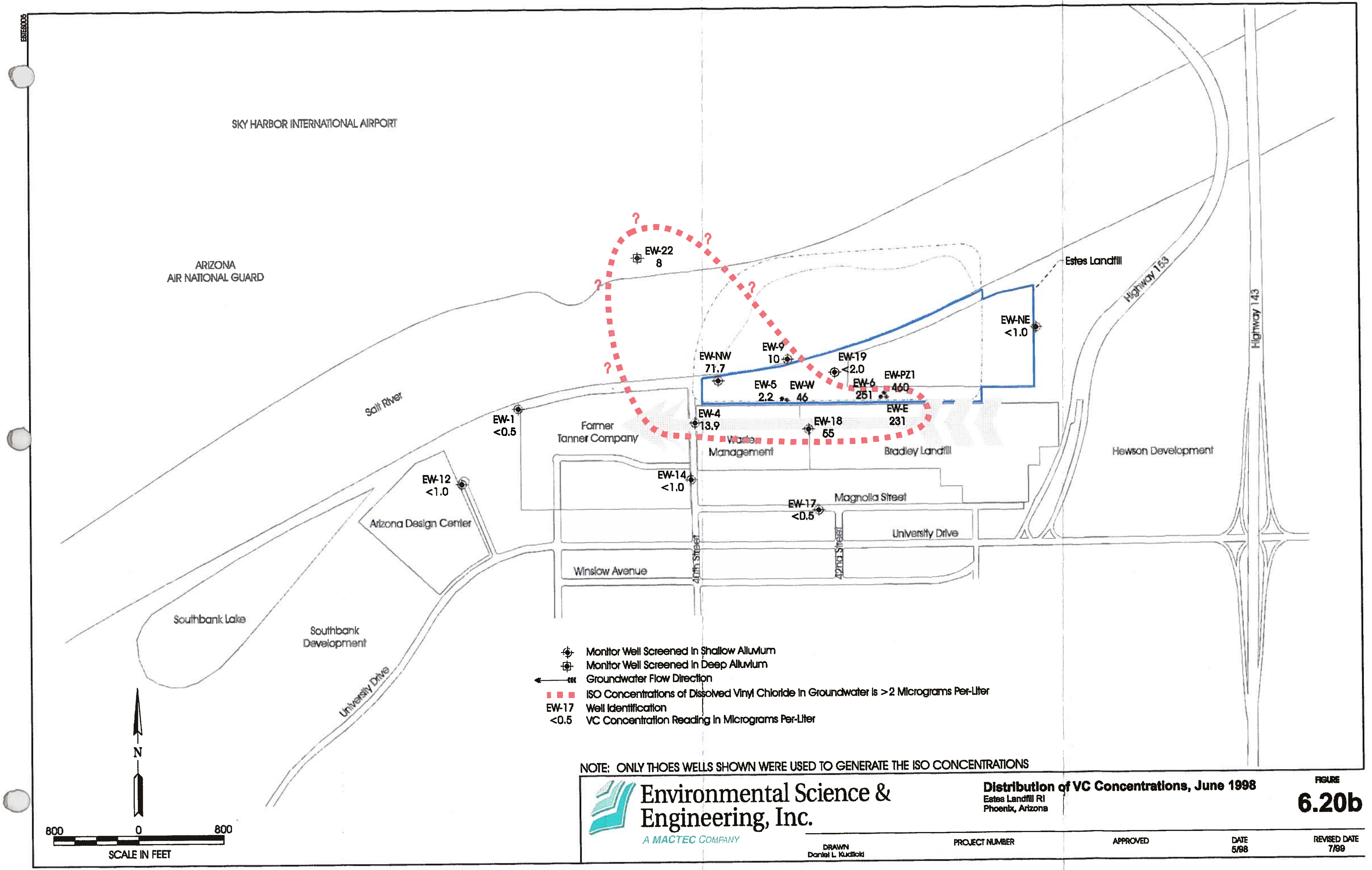
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of VC Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.20a

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/95	7/22/99

ESTES005



NOTE: ONLY THOES WELLS SHOWN WERE USED TO GENERATE THE ISO CONCENTRATIONS

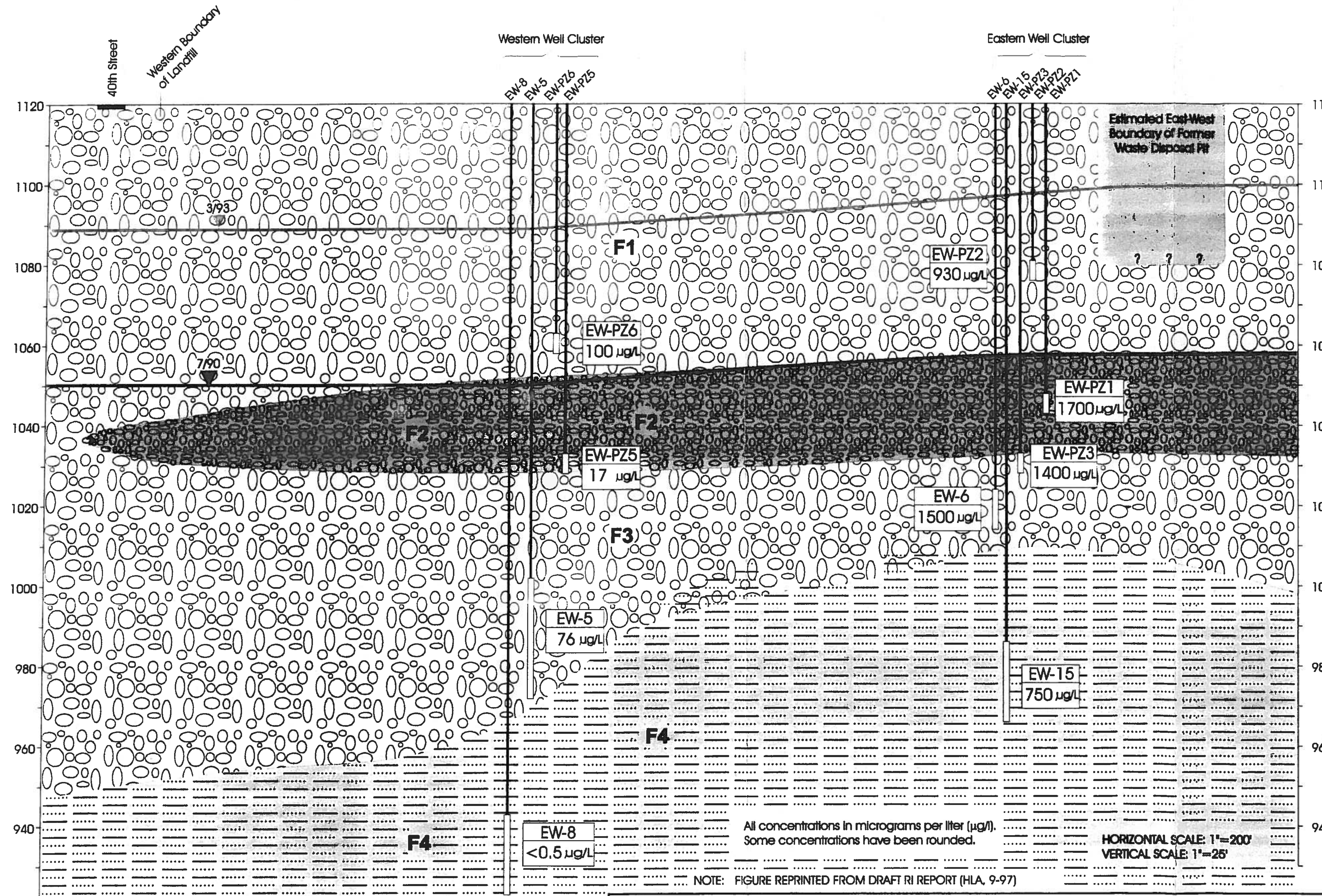
Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

Distribution of VC Concentrations, June 1998
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.20b

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/98	7/99

VOC-XSCT



All concentrations in micrograms per liter (µg/l).
Some concentrations have been rounded.

HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=25'

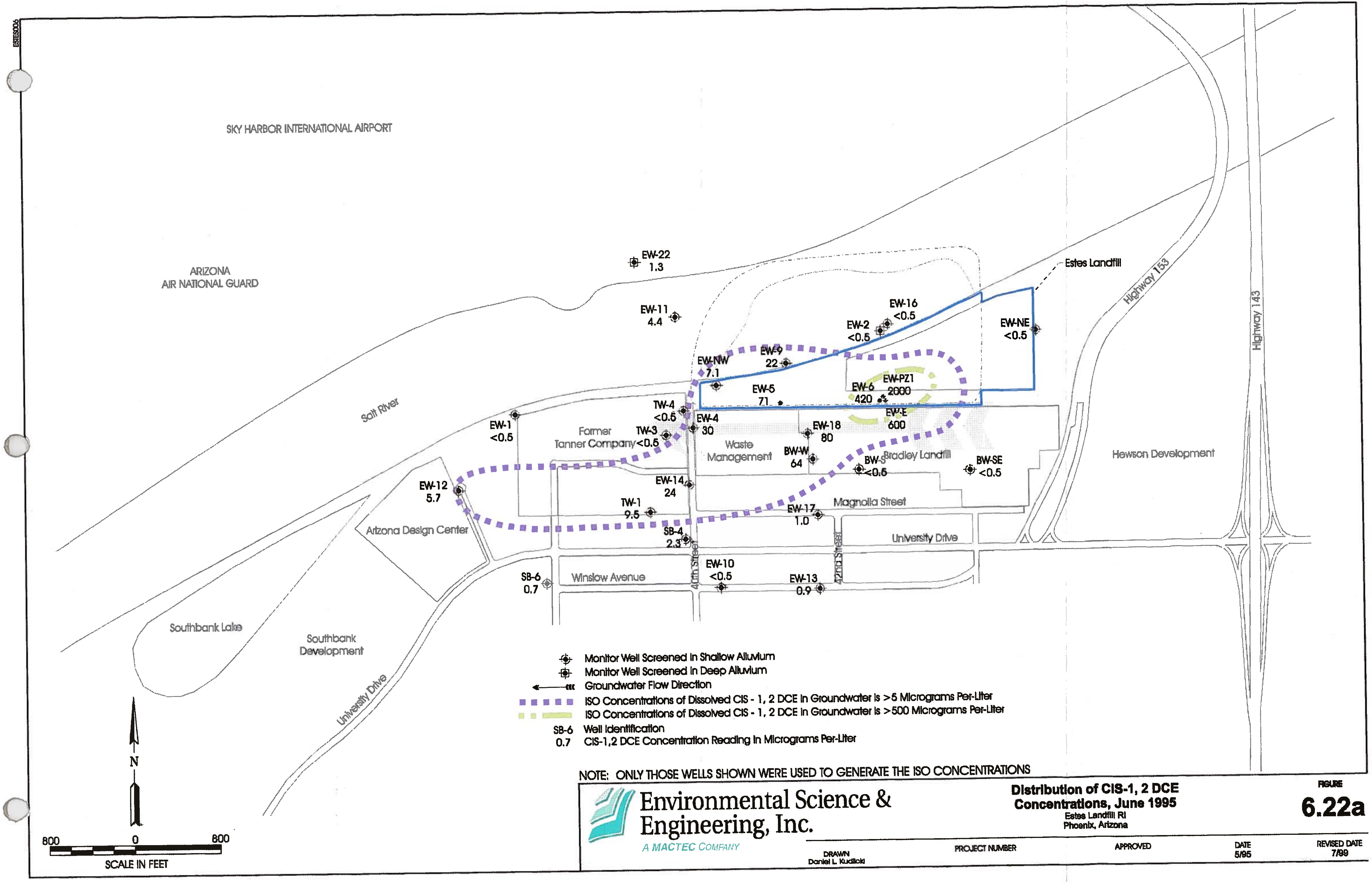
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Profile of Vinyl Chloride Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.21

Drawn	Project Number	Approved	Date	REVISED
Daniel L. Kudlicki			5/95	7/99



NOTE: ONLY THOSE WELLS SHOWN WERE USED TO GENERATE THE ISO CONCENTRATIONS

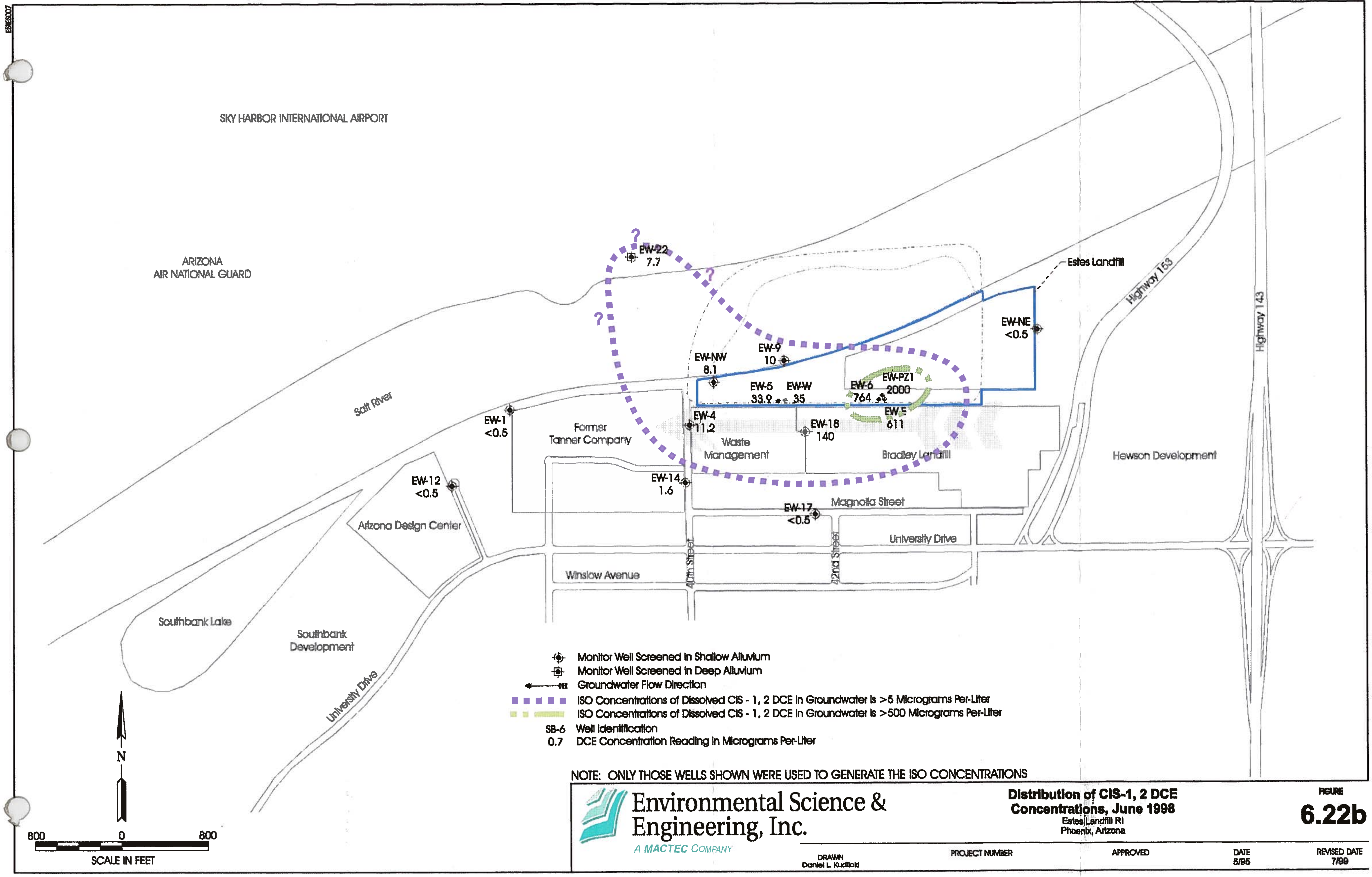
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of CIS-1, 2 DCE Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.22a

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/95	7/99

ESTES007



- Monitor Well Screened in Shallow Alluvium
- Monitor Well Screened in Deep Alluvium
- Groundwater Flow Direction
- ISO Concentrations of Dissolved CIS - 1, 2 DCE in Groundwater is >5 Micrograms Per-Liter
- ISO Concentrations of Dissolved CIS - 1, 2 DCE in Groundwater is >500 Micrograms Per-Liter

SB-6 Well Identification
0.7 DCE Concentration Reading in Micrograms Per-Liter

NOTE: ONLY THOSE WELLS SHOWN WERE USED TO GENERATE THE ISO CONCENTRATIONS

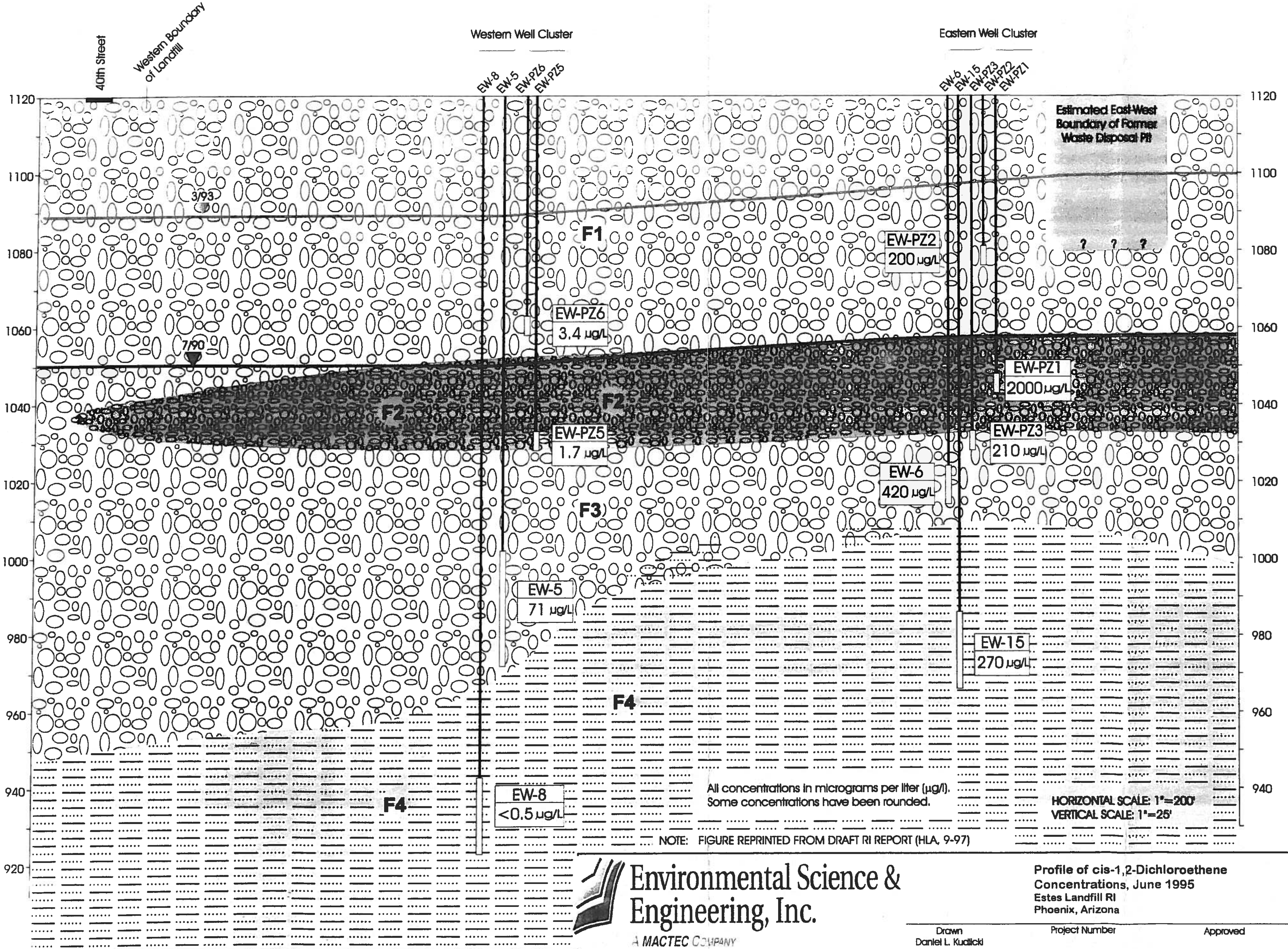
Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

**Distribution of CIS-1, 2 DCE
Concentrations, June 1998**
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.22b

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/95	7/99

/OC.XSCT



All concentrations in micrograms per liter (µg/l).
Some concentrations have been rounded.

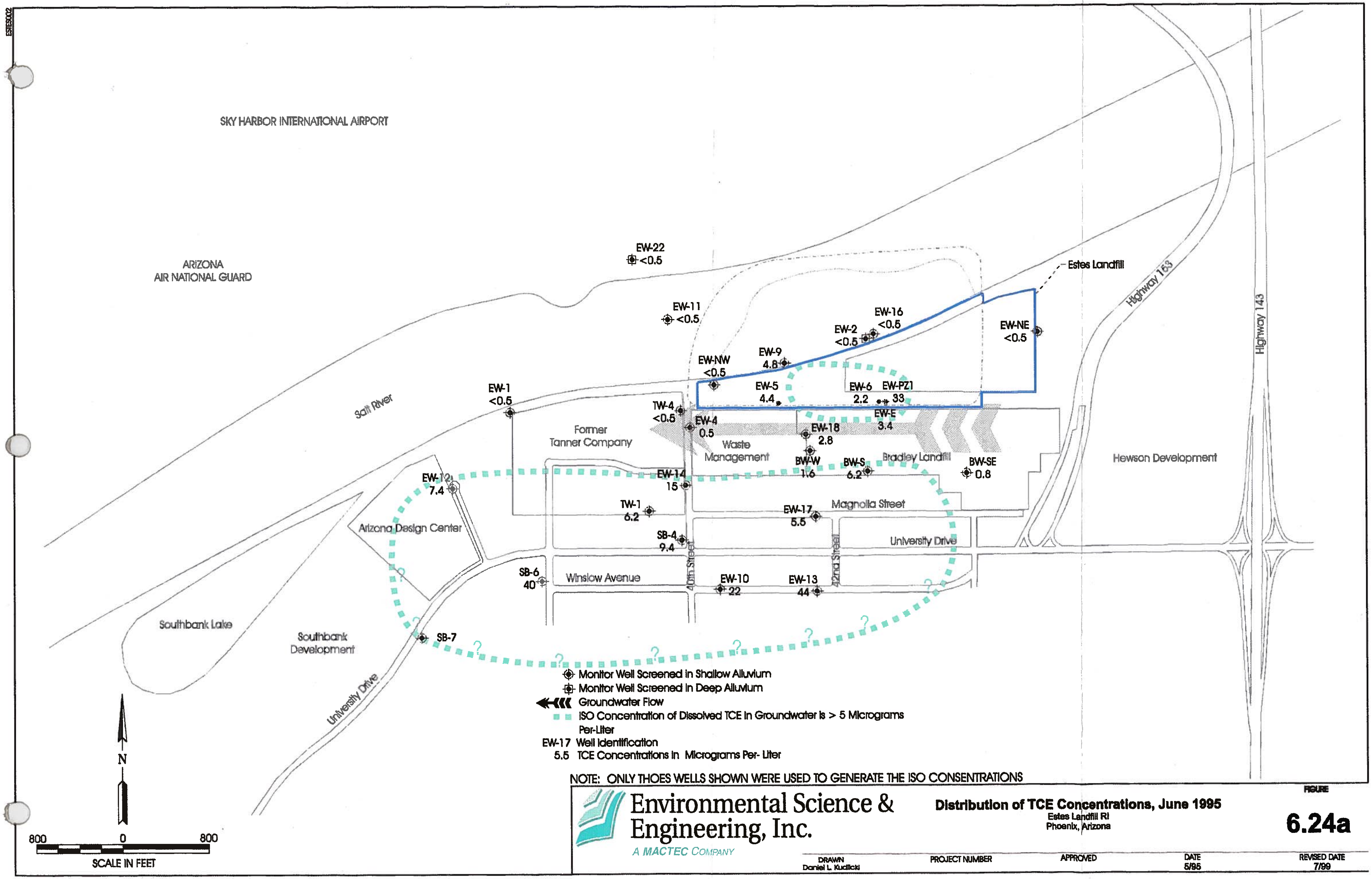
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Profile of cis-1,2-Dichloroethene Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.23

Drawn	Project Number	Approved	Date	REVISED
Daniel L. Kudlicki			5/95	7/99



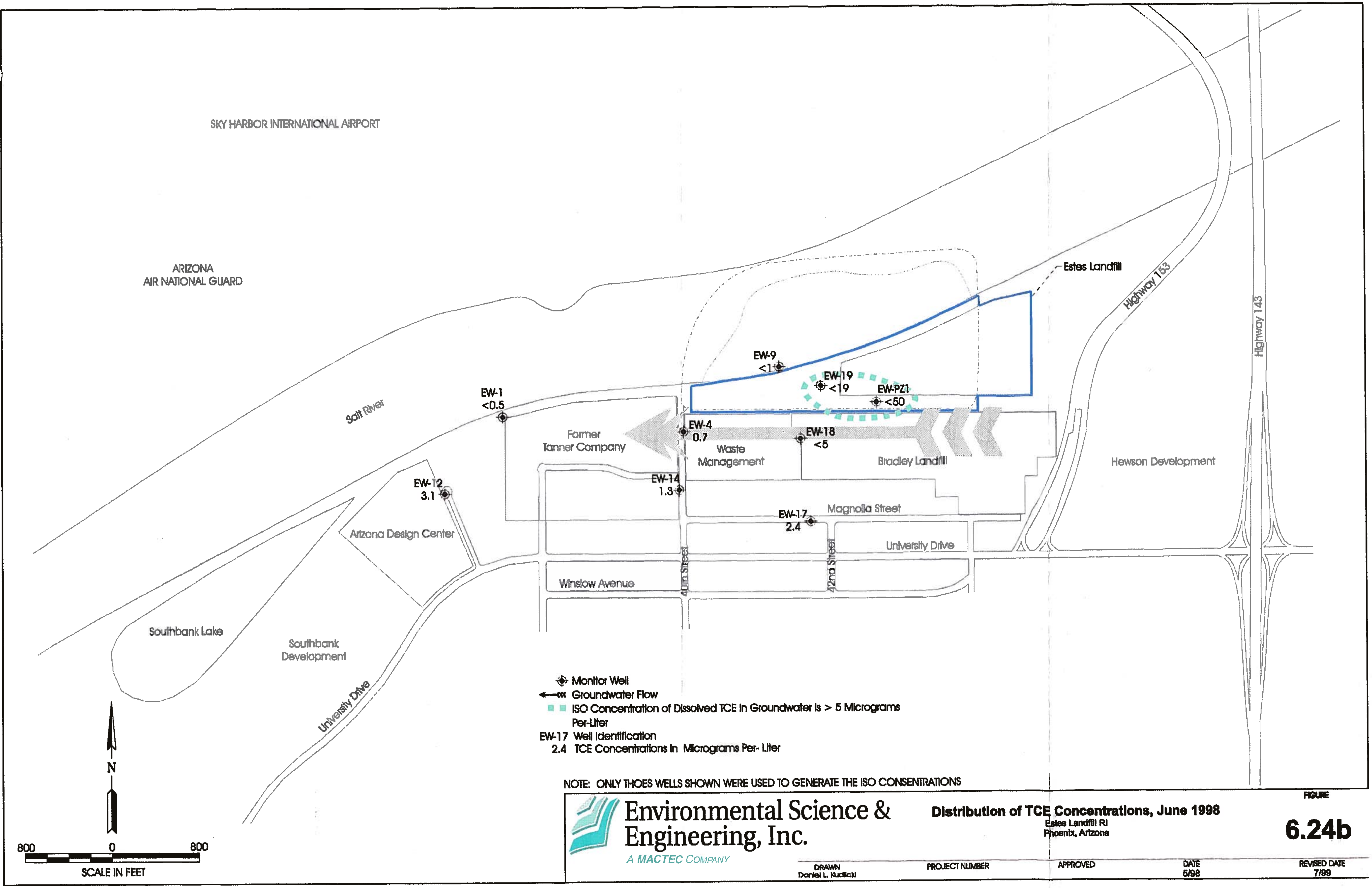
NOTE: ONLY THOES WELLS SHOWN WERE USED TO GENERATE THE ISO CONSENTRATIONS

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of TCE Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.24a

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/95	7/99



⊕ Monitor Well

←⋘ Groundwater Flow

▪ ▪ ISO Concentration of Dissolved TCE in Groundwater is > 5 Micrograms Per-Liter

EW-17 Well Identification

2.4 TCE Concentrations in Micrograms Per- Liter

NOTE: ONLY THOES WELLS SHOWN WERE USED TO GENERATE THE ISO CONSENTRATIONS

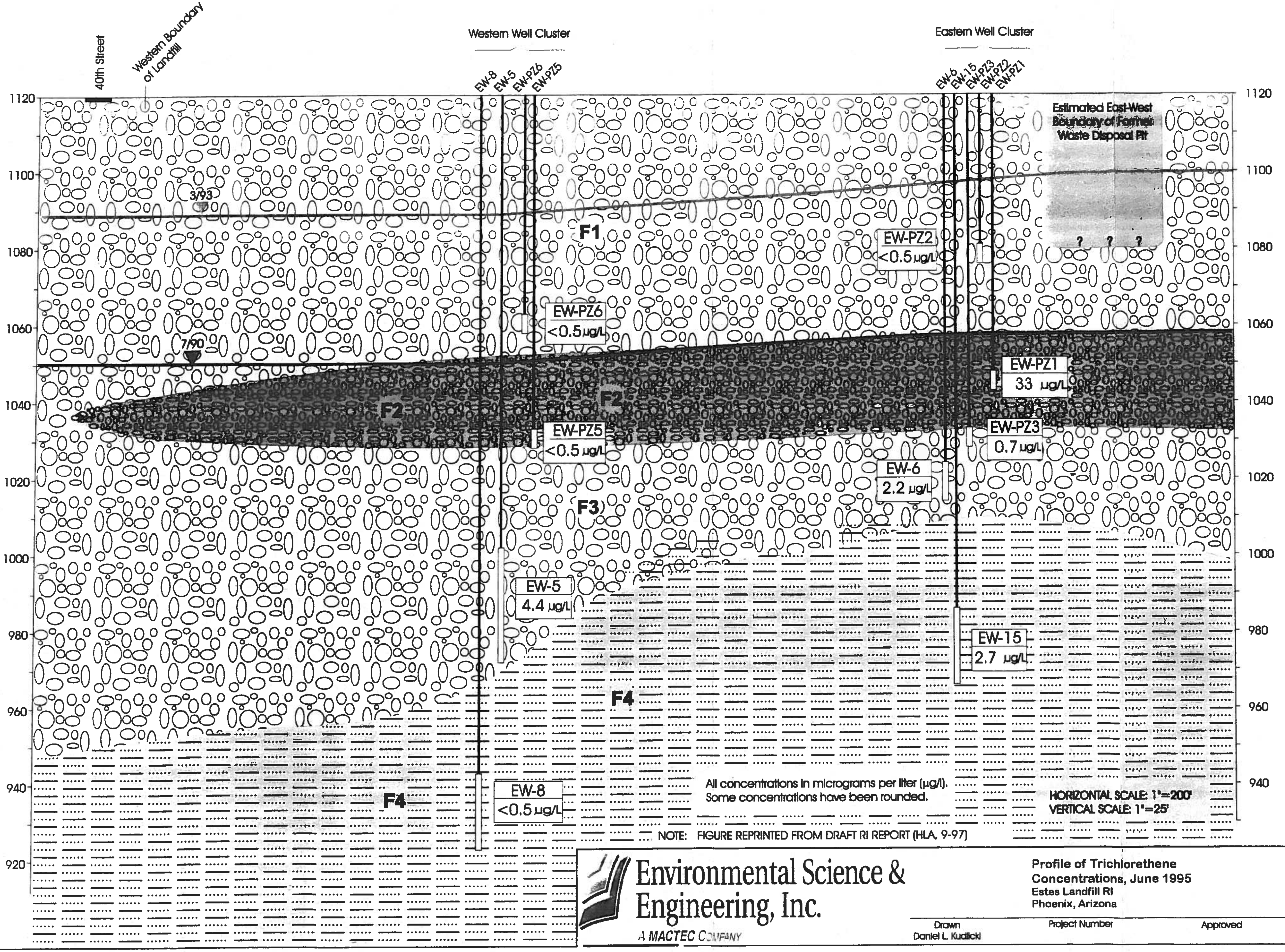
Environmental Science &
Engineering, Inc.
A MACTEC COMPANY

Distribution of TCE Concentrations, June 1998
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.24b

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/98	7/99

VOC XSC1



All concentrations in micrograms per liter (µg/L). Some concentrations have been rounded.

HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=25'

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

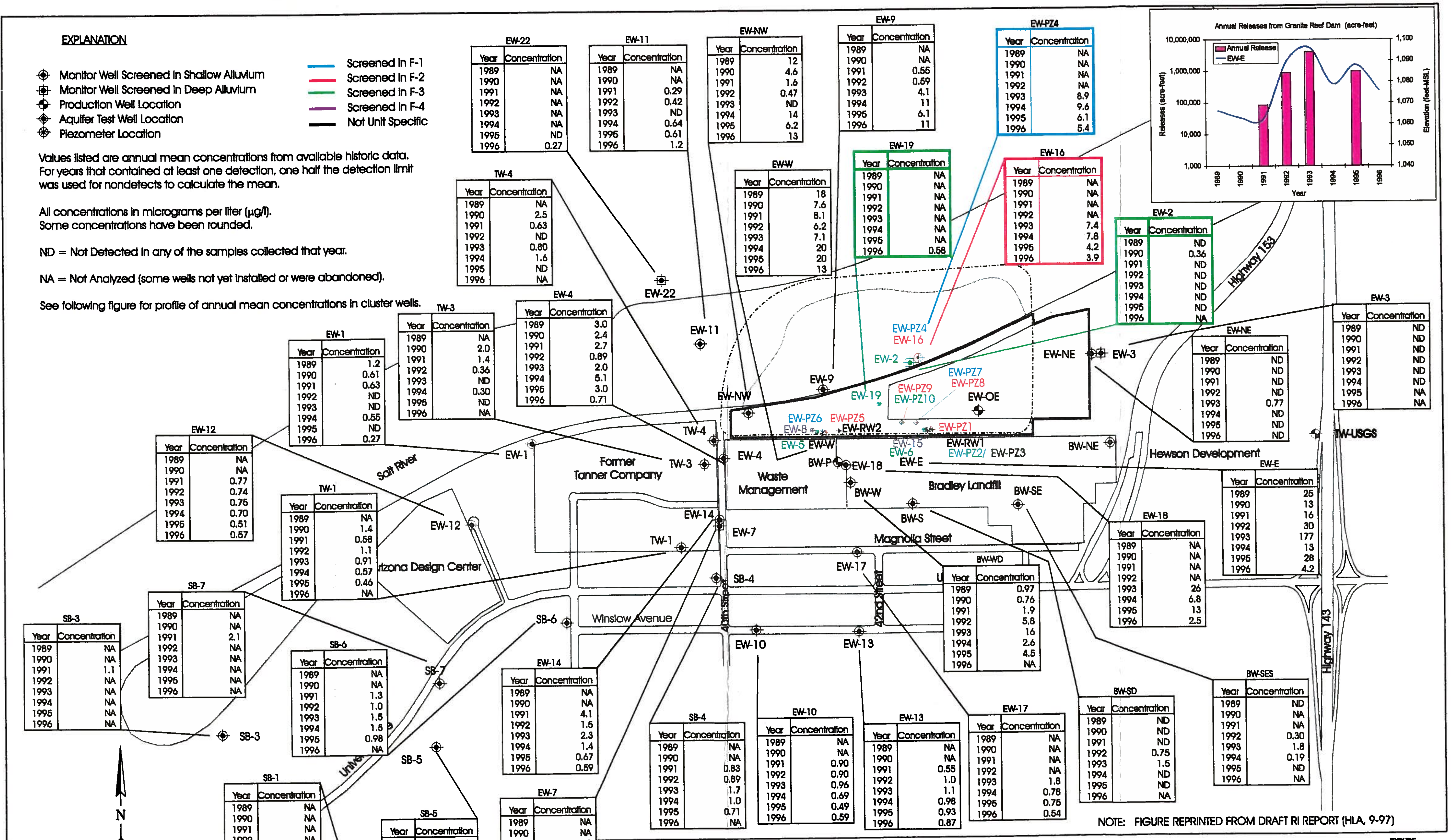
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Profile of Trichlorethene Concentrations, June 1995
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.25

Drawn	Project Number	Approved	Date	REVISED
Daniel L. Kudlicki			5/95	7/99

VOC-YEAR



EXPLANATION

- Monitor Well Screened in Shallow Alluvium
- Monitor Well Screened in Deep Alluvium
- Production Well Location
- Aquifer Test Well Location
- Piezometer Location

- Screened in F-1
- Screened in F-2
- Screened in F-3
- Screened in F-4
- Not Unit Specific

Values listed are annual mean concentrations from available historic data. For years that contained at least one detection, one half the detection limit was used for nondetects to calculate the mean.

All concentrations in micrograms per liter (µg/l). Some concentrations have been rounded.

ND = Not Detected in any of the samples collected that year.

NA = Not Analyzed (some wells not yet installed or were abandoned).

See following figure for profile of annual mean concentrations in cluster wells.

EW-22

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	ND
1996	0.27

EW-11

Year	Concentration
1989	NA
1990	NA
1991	0.29
1992	0.42
1993	ND
1994	0.64
1995	0.61
1996	1.2

EW-NW

Year	Concentration
1989	12
1990	4.6
1991	1.6
1992	0.47
1993	ND
1994	14
1995	6.2
1996	13

EW-9

Year	Concentration
1989	NA
1990	NA
1991	0.55
1992	0.59
1993	4.1
1994	11
1995	6.1
1996	11

EW-PZ4

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	8.9
1994	9.6
1995	6.1
1996	5.4

TW-4

Year	Concentration
1989	NA
1990	2.5
1991	0.63
1992	ND
1993	0.80
1994	1.6
1995	ND
1996	NA

EW-W

Year	Concentration
1989	18
1990	7.6
1991	8.1
1992	6.2
1993	7.1
1994	20
1995	20
1996	13

EW-19

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	0.58

EW-16

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	7.4
1994	7.8
1995	4.2
1996	3.9

EW-2

Year	Concentration
1989	ND
1990	0.36
1991	ND
1992	ND
1993	ND
1994	ND
1995	ND
1996	NA

EW-4

Year	Concentration
1989	3.0
1990	2.4
1991	2.7
1992	0.89
1993	2.0
1994	5.1
1995	3.0
1996	0.71

TW-3

Year	Concentration
1989	NA
1990	2.0
1991	1.4
1992	0.36
1993	ND
1994	0.30
1995	ND
1996	NA

EW-1

Year	Concentration
1989	1.2
1990	0.61
1991	0.63
1992	ND
1993	ND
1994	0.55
1995	ND
1996	0.27

EW-12

Year	Concentration
1989	NA
1990	NA
1991	0.77
1992	0.74
1993	0.75
1994	0.70
1995	0.51
1996	0.57

TW-1

Year	Concentration
1989	NA
1990	1.4
1991	0.58
1992	1.1
1993	0.91
1994	0.57
1995	0.46
1996	NA

EW-3

Year	Concentration
1989	ND
1990	ND
1991	ND
1992	ND
1993	ND
1994	ND
1995	NA
1996	NA

EW-NE

Year	Concentration
1989	ND
1990	ND
1991	ND
1992	ND
1993	0.77
1994	ND
1995	ND
1996	ND

EW-E

Year	Concentration
1989	25
1990	13
1991	16
1992	30
1993	177
1994	13
1995	28
1996	4.2

EW-18

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	26
1994	6.8
1995	13
1996	2.5

BW-WD

Year	Concentration
1989	0.97
1990	0.76
1991	1.9
1992	5.8
1993	16
1994	2.6
1995	4.5
1996	NA

SB-7

Year	Concentration
1989	NA
1990	NA
1991	2.1
1992	NA
1993	NA
1994	NA
1995	NA
1996	NA

SB-3

Year	Concentration
1989	NA
1990	NA
1991	1.1
1992	NA
1993	NA
1994	NA
1995	NA
1996	NA

SB-6

Year	Concentration
1989	NA
1990	NA
1991	1.3
1992	1.0
1993	1.5
1994	1.5
1995	0.98
1996	NA

EW-14

Year	Concentration
1989	NA
1990	NA
1991	4.1
1992	1.5
1993	2.3
1994	1.4
1995	0.67
1996	0.59

SB-1

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	NA

SB-5

Year	Concentration
1989	NA
1990	NA
1991	1.9
1992	NA
1993	NA
1994	NA
1995	NA
1996	NA

EW-7

Year	Concentration
1989	NA
1990	NA
1991	0.32
1992	0.75
1993	ND
1994	0.20
1995	ND
1996	NA

SB-4

Year	Concentration
1989	NA
1990	NA
1991	0.83
1992	0.89
1993	1.7
1994	1.0
1995	0.71
1996	NA

EW-10

Year	Concentration
1989	NA
1990	NA
1991	0.90
1992	0.90
1993	0.96
1994	0.69
1995	0.49
1996	0.59

EW-13

Year	Concentration
1989	NA
1990	NA
1991	0.55
1992	1.0
1993	1.1
1994	0.98
1995	0.93
1996	0.87

EW-17

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	1.8
1994	0.78
1995	0.75
1996	0.54

BW-SD

Year	Concentration
1989	ND
1990	ND
1991	ND
1992	0.75
1993	1.5
1994	ND
1995	ND
1996	NA

BW-SES

Year	Concentration
1989	ND
1990	NA
1991	NA
1992	0.30
1993	1.8
1994	0.19
1995	ND
1996	NA

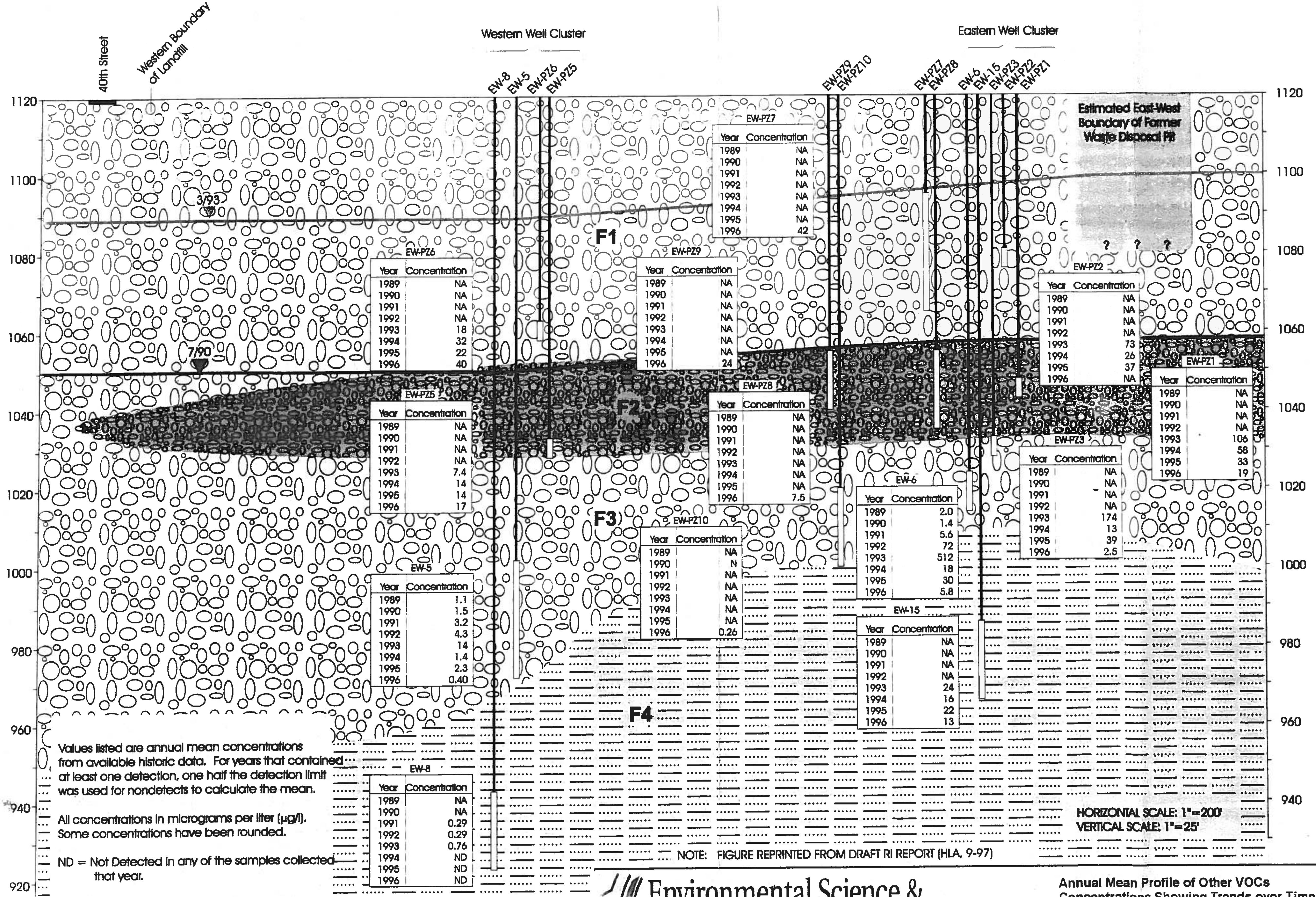
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of Annual Mean Other VOCs Concentrations Showing Trends over Time
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.26

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			5/97	7/99



EW-PZ7

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	42

EW-PZ6

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	18
1994	32
1995	22
1996	40

EW-PZ9

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	24

EW-PZ2

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	73
1994	26
1995	37
1996	NA

EW-PZ1

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	106
1994	58
1995	33
1996	19

EW-PZ5

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	7.4
1994	14
1995	14
1996	17

EW-PZ8

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	7.5

EW-PZ3

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	174
1994	13
1995	39
1996	2.5

EW-6

Year	Concentration
1989	2.0
1990	1.4
1991	5.6
1992	72
1993	512
1994	18
1995	30
1996	5.8

EW-PZ10

Year	Concentration
1989	NA
1990	N
1991	NA
1992	NA
1993	NA
1994	NA
1995	NA
1996	0.26

EW-5

Year	Concentration
1989	1.1
1990	1.5
1991	3.2
1992	4.3
1993	14
1994	1.4
1995	2.3
1996	0.40

EW-15

Year	Concentration
1989	NA
1990	NA
1991	NA
1992	NA
1993	24
1994	16
1995	22
1996	13

EW-8

Year	Concentration
1989	NA
1990	NA
1991	0.29
1992	0.29
1993	0.76
1994	ND
1995	ND
1996	ND

Values listed are annual mean concentrations from available historic data. For years that contained at least one detection, one half the detection limit was used for nondetects to calculate the mean.

All concentrations in micrograms per liter (µg/l). Some concentrations have been rounded.

ND = Not Detected in any of the samples collected that year.

NA = Not Analyzed (some wells not yet installed or were abandoned).

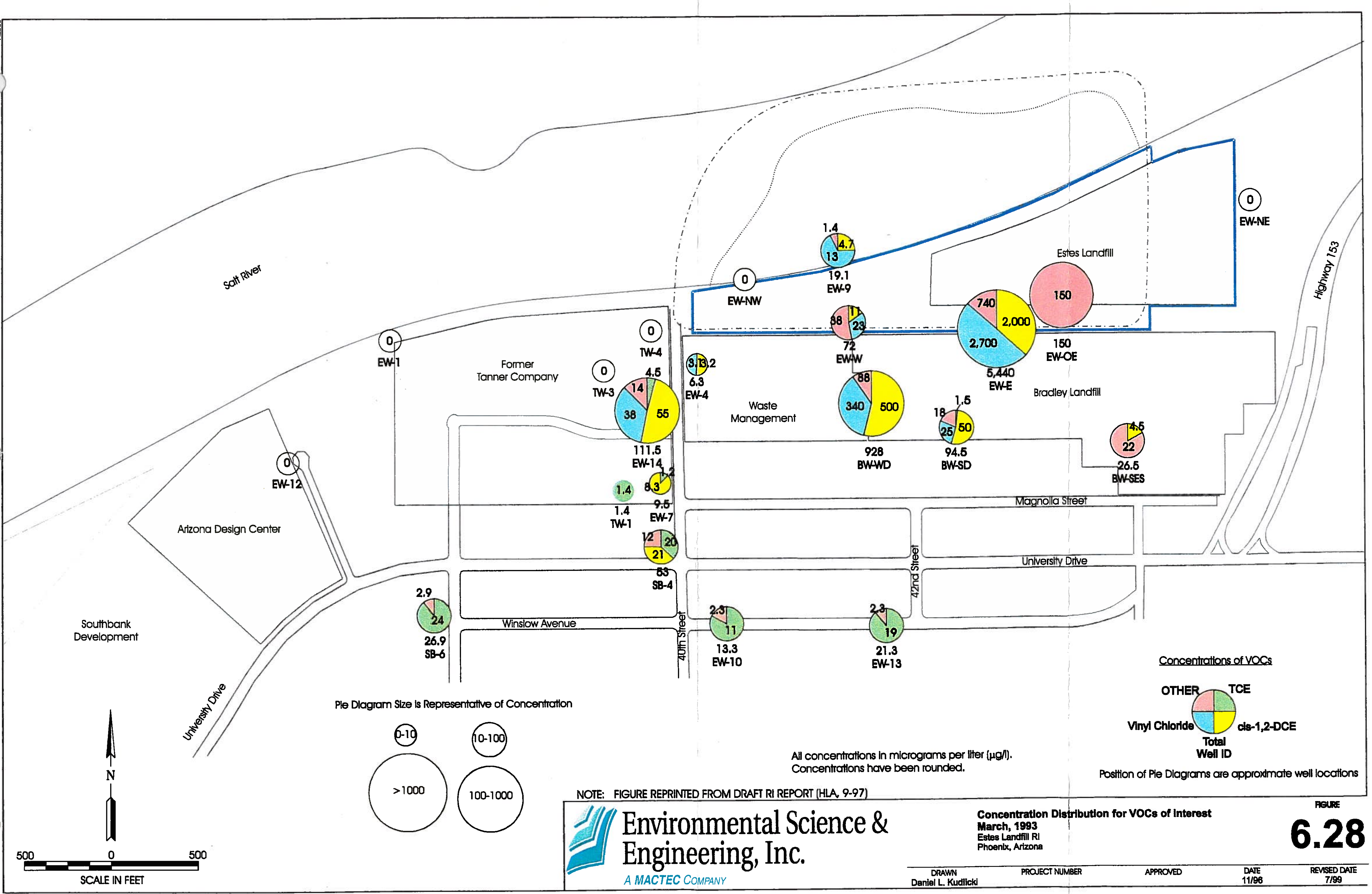
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Annual Mean Profile of Other VOCs Concentrations Showing Trends over Time
Estes Landfill RI
Phoenix, Arizona

Drawn	Project Number	Approved	Date	REVISED
Daniel L. Kudlicki			5/97	7/99

FIGURE
6.27



All concentrations in micrograms per liter (µg/l).
Concentrations have been rounded.

Position of Pie Diagrams are approximate well locations

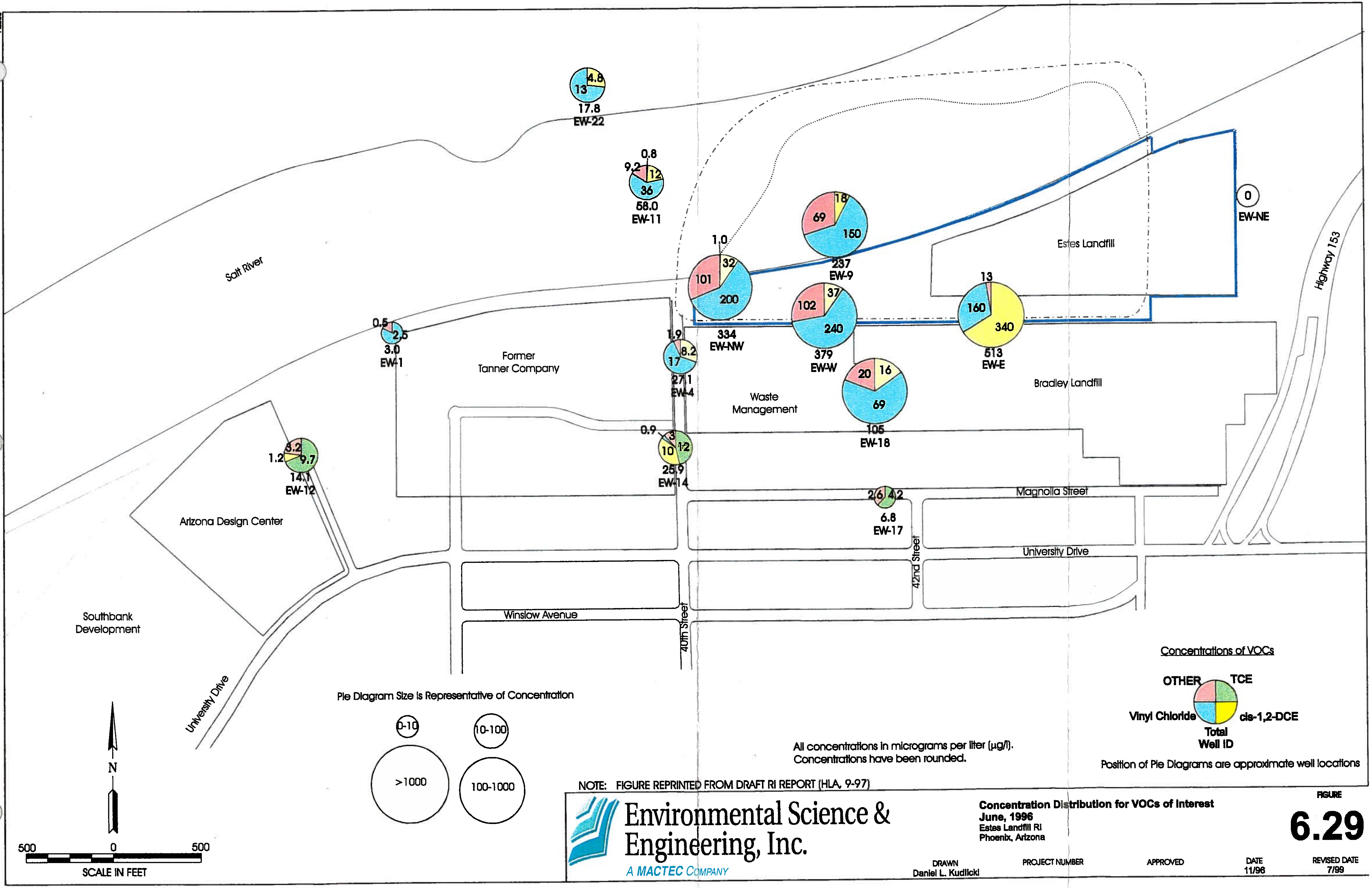
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC Company

Concentration Distribution for VOCs of Interest
March, 1993
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.28

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



All concentrations in micrograms per liter (µg/l).
Concentrations have been rounded.

Position of Pie Diagrams are approximate well locations

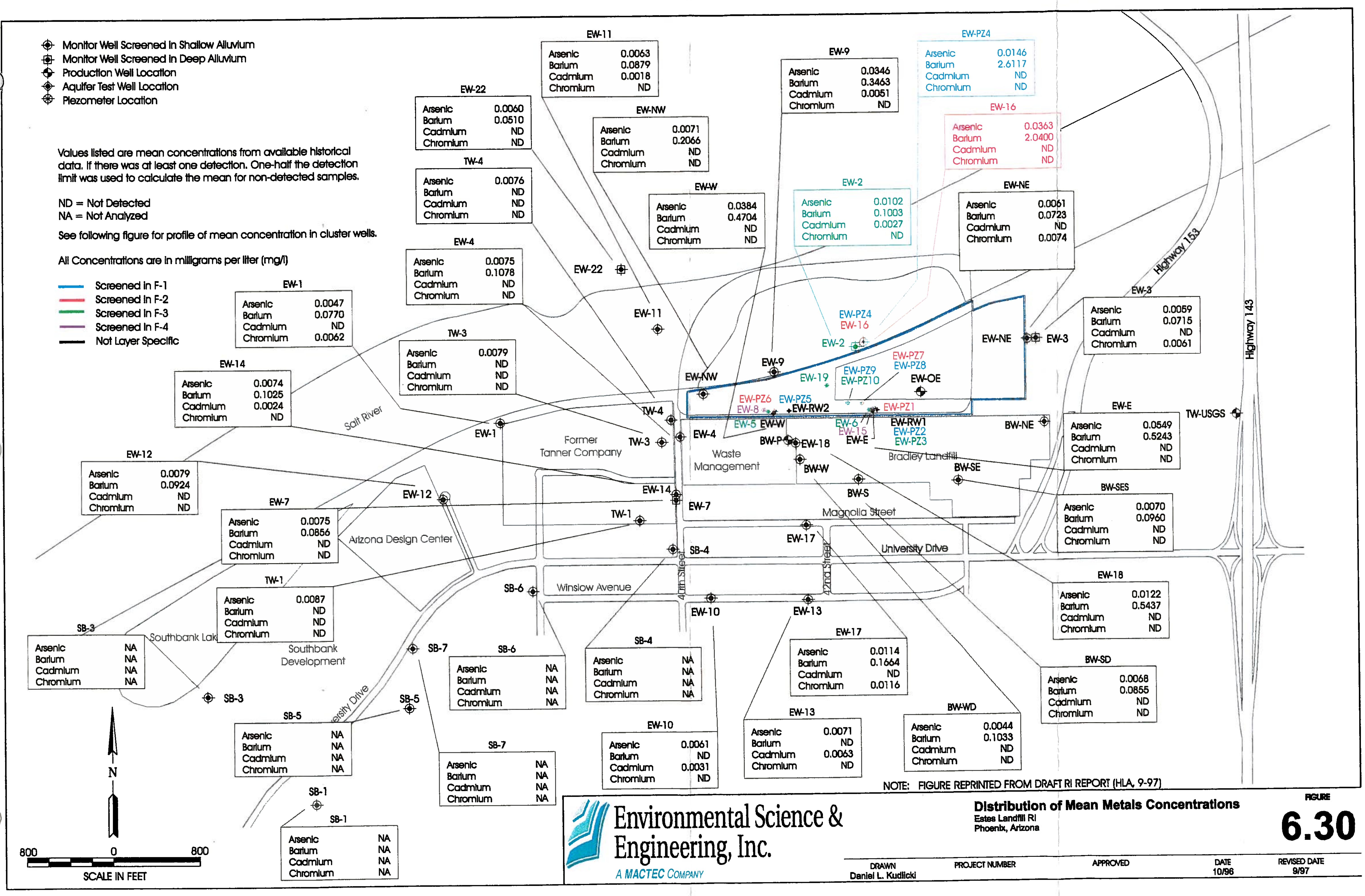
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Concentration Distribution for VOCs of Interest
June, 1996
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.29

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99



Values listed are mean concentrations from available historical data. If there was at least one detection, One-half the detection limit was used to calculate the mean for non-detected samples.

ND = Not Detected
NA = Not Analyzed

See following figure for profile of mean concentration in cluster wells.

All Concentrations are in milligrams per liter (mg/l)

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

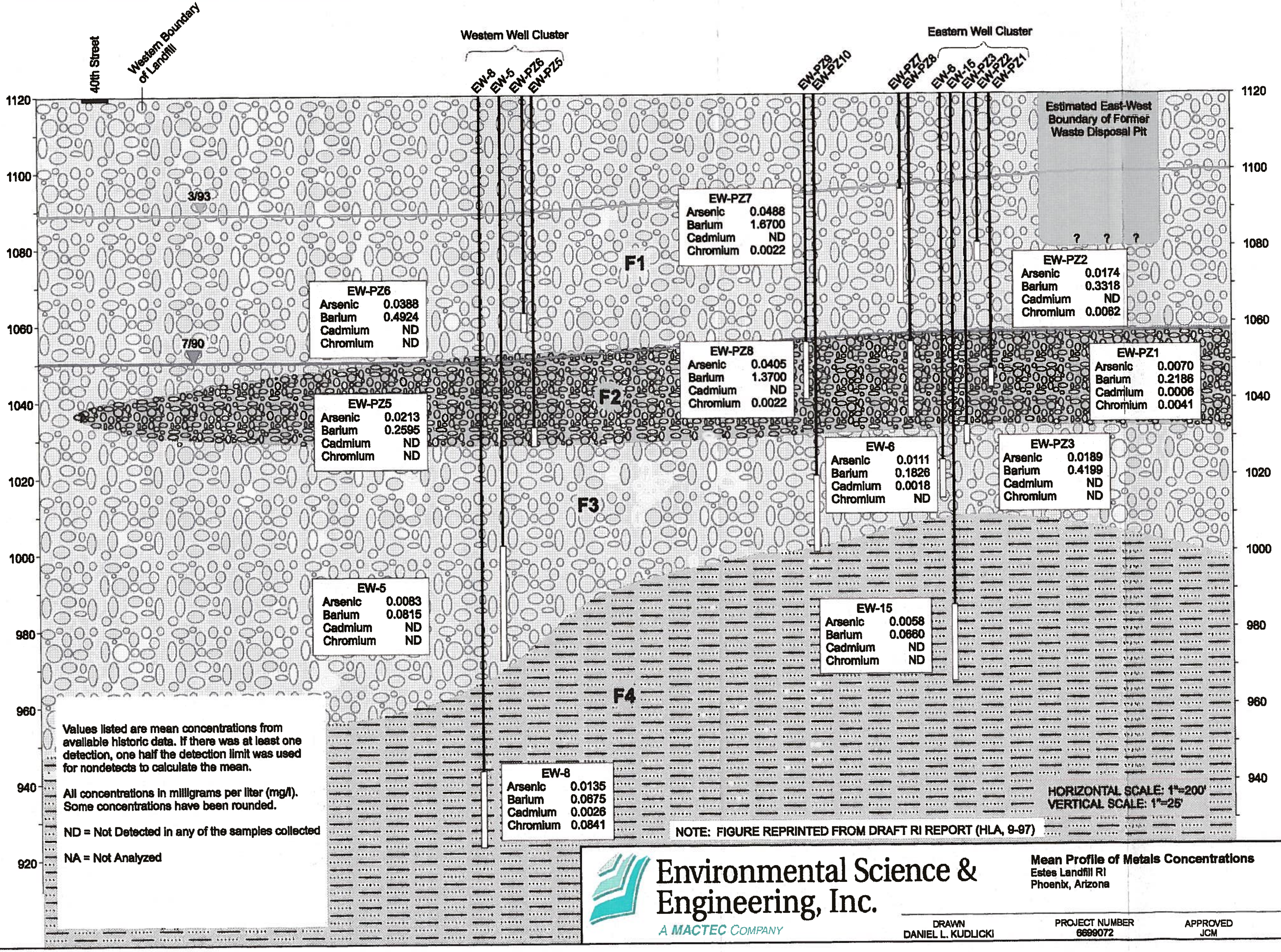
Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of Mean Metals Concentrations
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.30

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			10/96	9/97

XSCT-MTL



Values listed are mean concentrations from available historic data. If there was at least one detection, one half the detection limit was used for nondetects to calculate the mean.

All concentrations in milligrams per liter (mg/l). Some concentrations have been rounded.

ND = Not Detected in any of the samples collected

NA = Not Analyzed

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

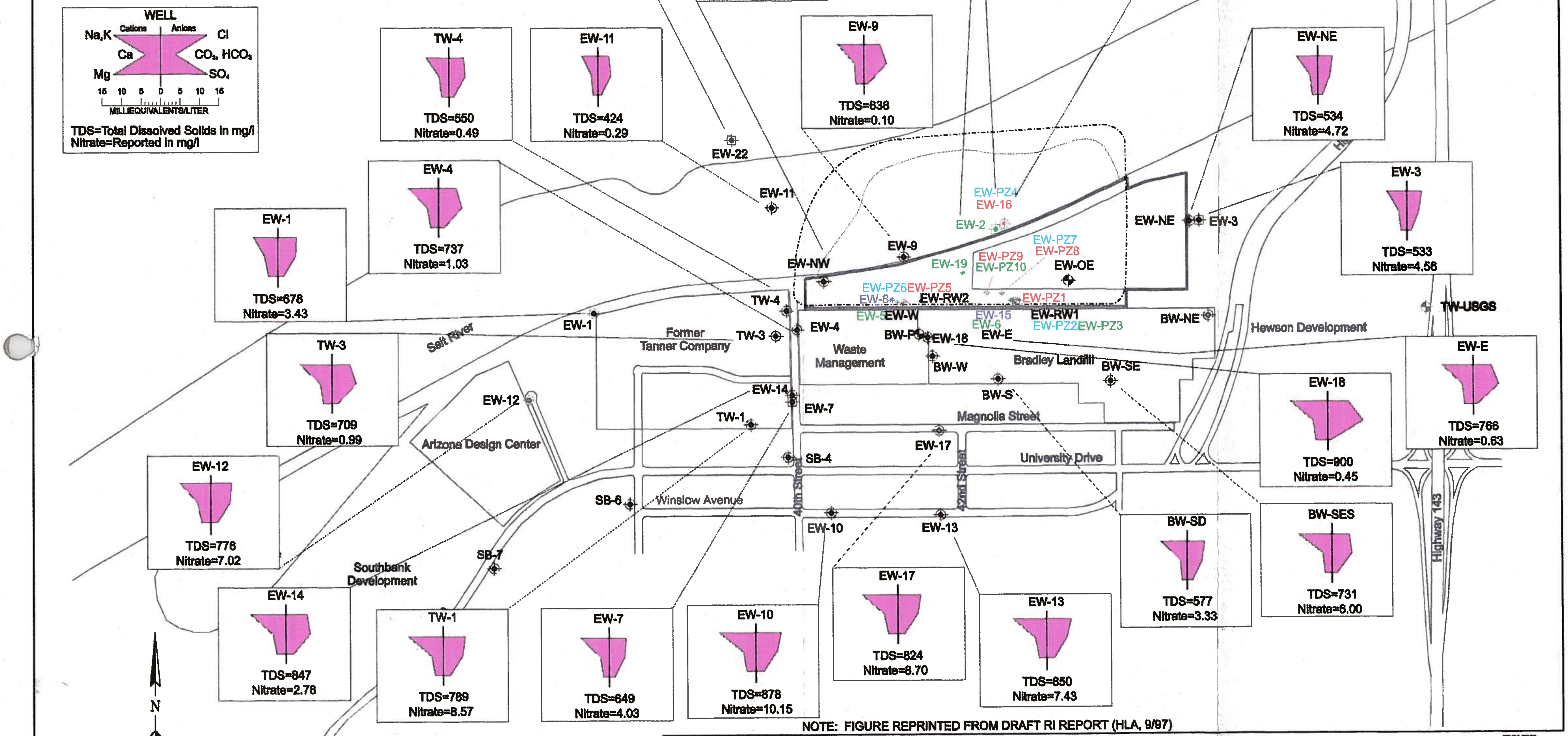
Mean Profile of Metals Concentrations
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.31

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
DANIEL L. KUDLICKI	6699072	JCM	11/96	12/99

Milliequivalent values were calculated using mean concentrations derived from available historic data. If there was at least one detection, one half the detection limit was used for nondetects to calculate the mean.

See following figure for profile of mean concentrations in cluster wells.



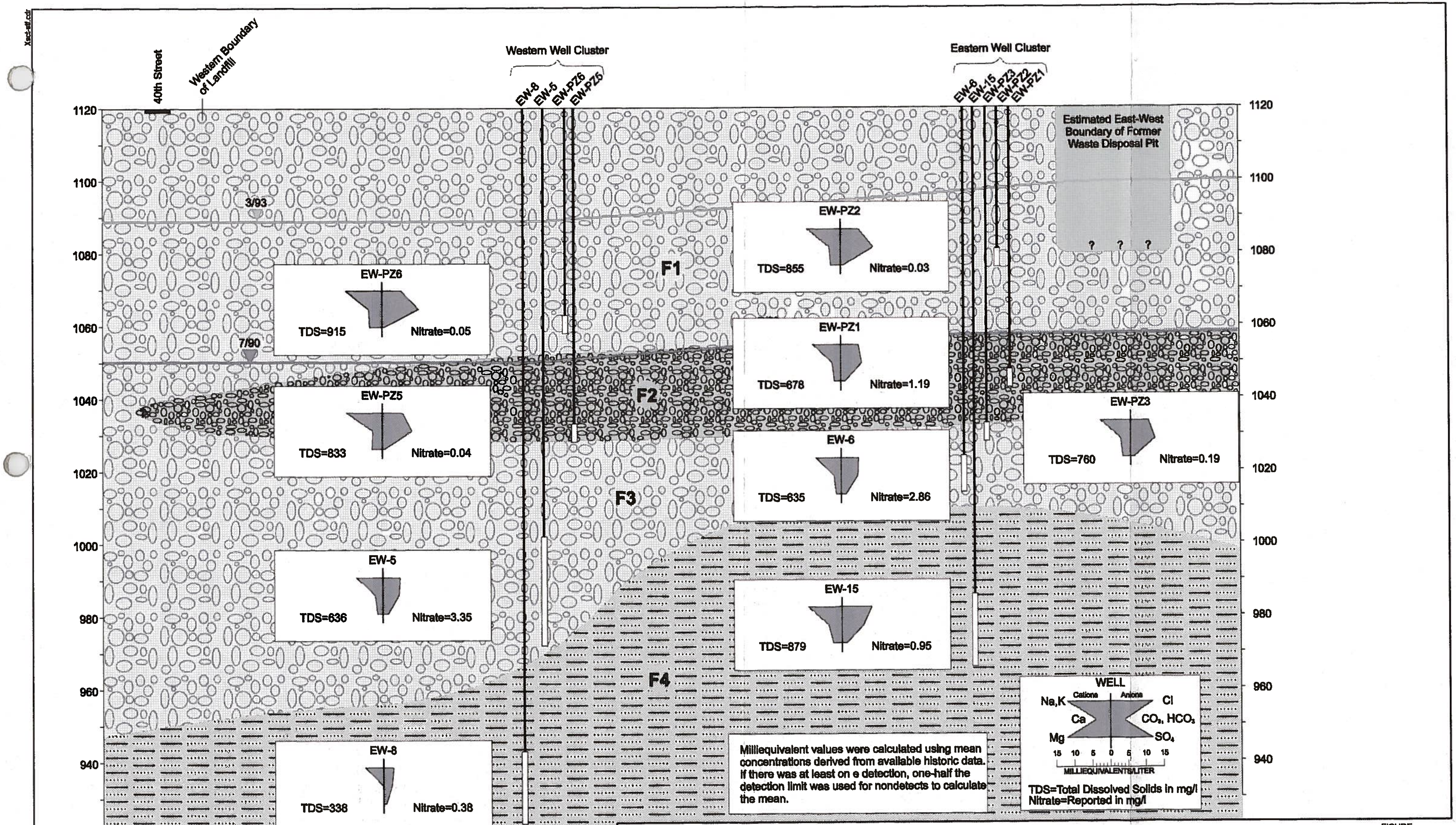
NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9/97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Distribution of Mean Major Ions
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.32

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
DANIEL L. KUDLICKI	6699072	JCM	5/97	12/99



Milliequivalent values were calculated using mean concentrations derived from available historic data. If there was at least on e detection, one-half the detection limit was used for nondetects to calculate the mean.

TDS=Total Dissolved Solids in mg/l
Nitrate=Reported in mg/l

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

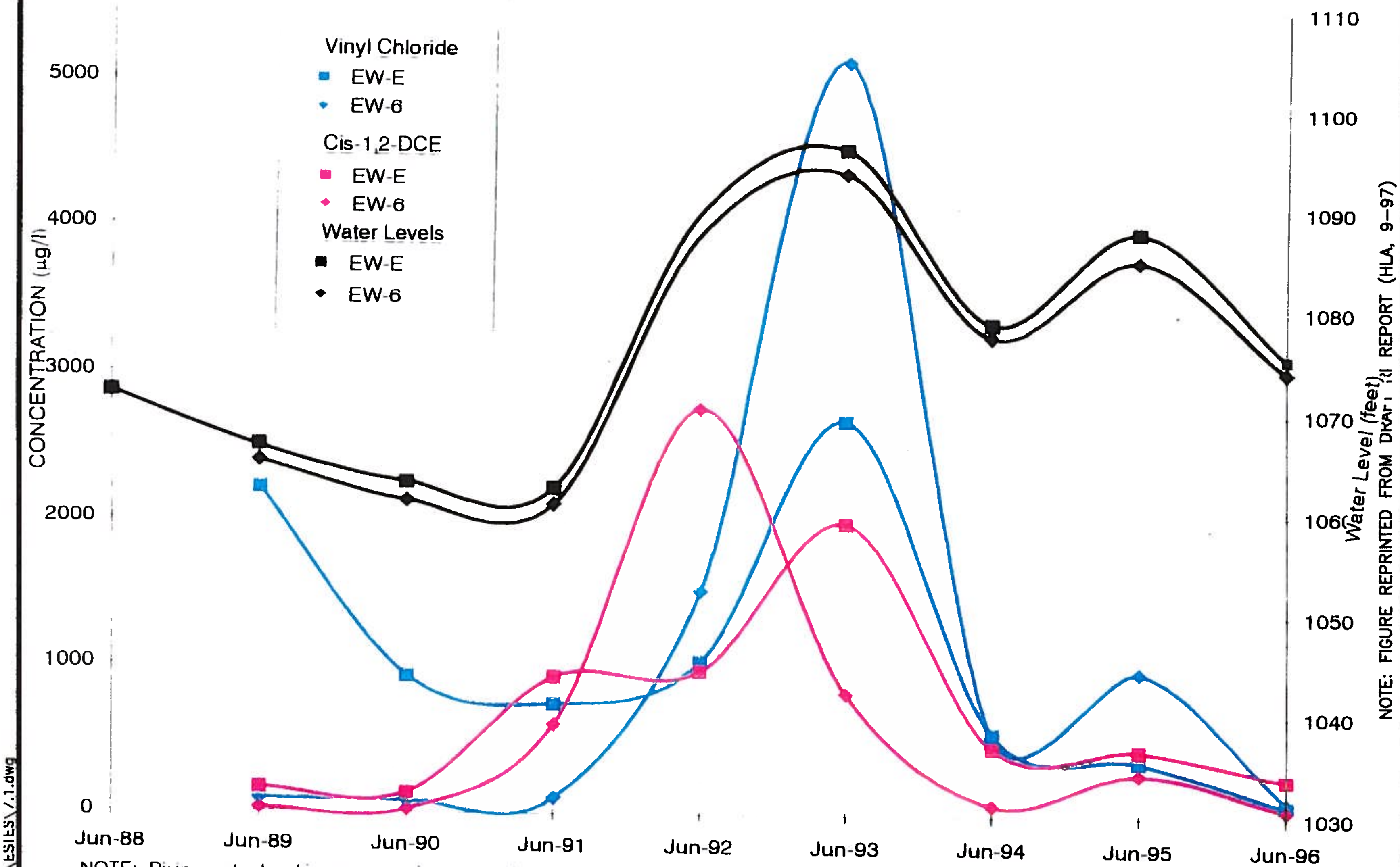
HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=25'

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

Mean Profile of Major Ions
Estes Landfill RI
Phoenix, Arizona

FIGURE
6.33

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
DANIEL L. KUDLICKI	6699072	JCM	11/96	12/99



NOTE: Rising water level is accompanied by a shift in groundwater flow direction from west to southwest

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9–97)

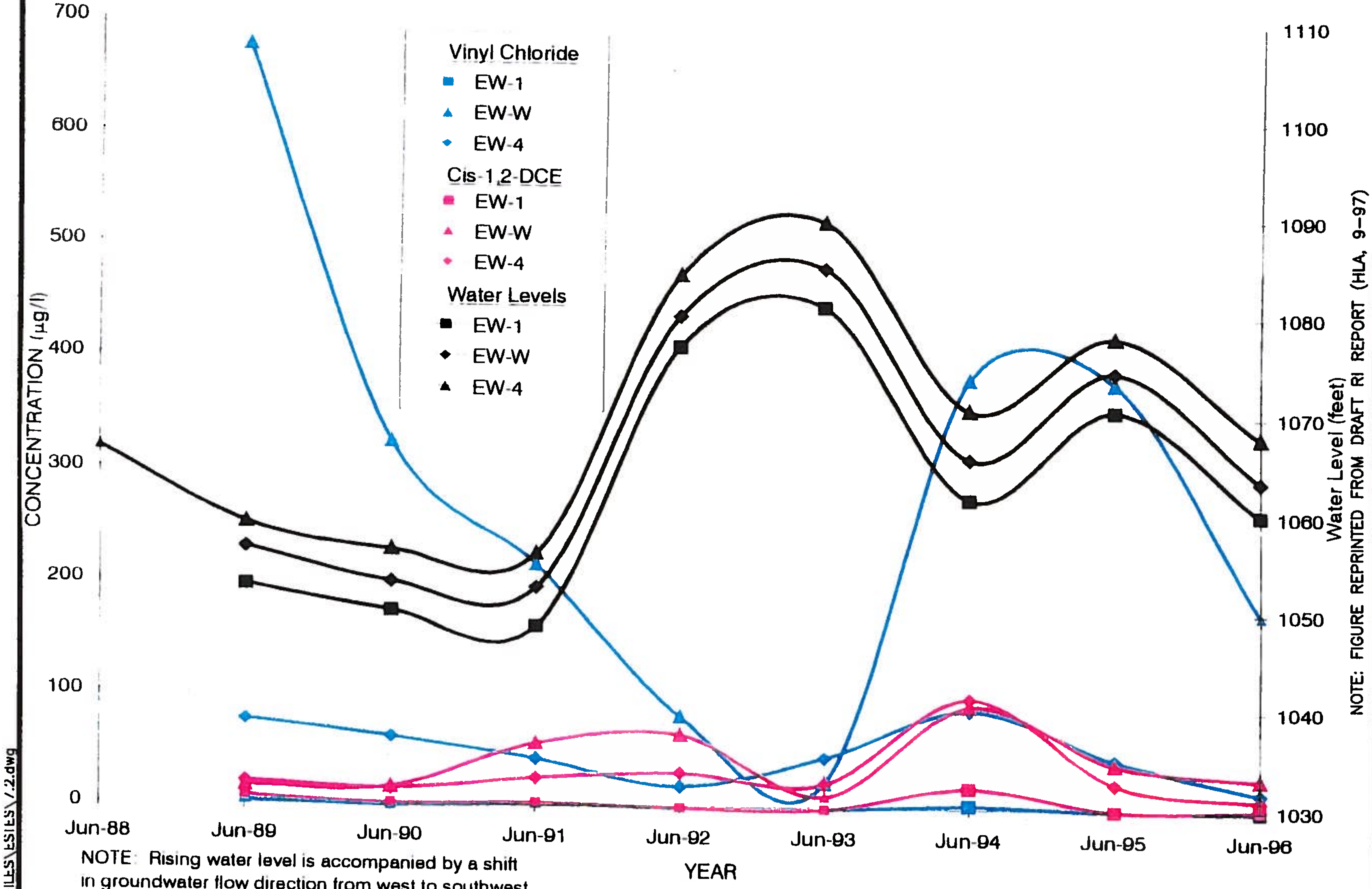
CADD FILE: ACAD\FILES\ESTES\7.1.dwg

DATE 7-7-99	SCALE NTS
DRAWN BY: RBC	FIGURE **7.1**
PROJECT No. 6699033	

ESTES LANDFILL RI
PHOENIX
ARIZONA

CONCENTRATION TRENDS vs. RECHARGE FOR SOURCE AREA WELLS

Environmental Science & Engineering, Inc.
A MACTEC Company 428 N. 44th St. # 110 Phoenix, AZ 85008



NOTE: Rising water level is accompanied by a shift in groundwater flow direction from west to southwest

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

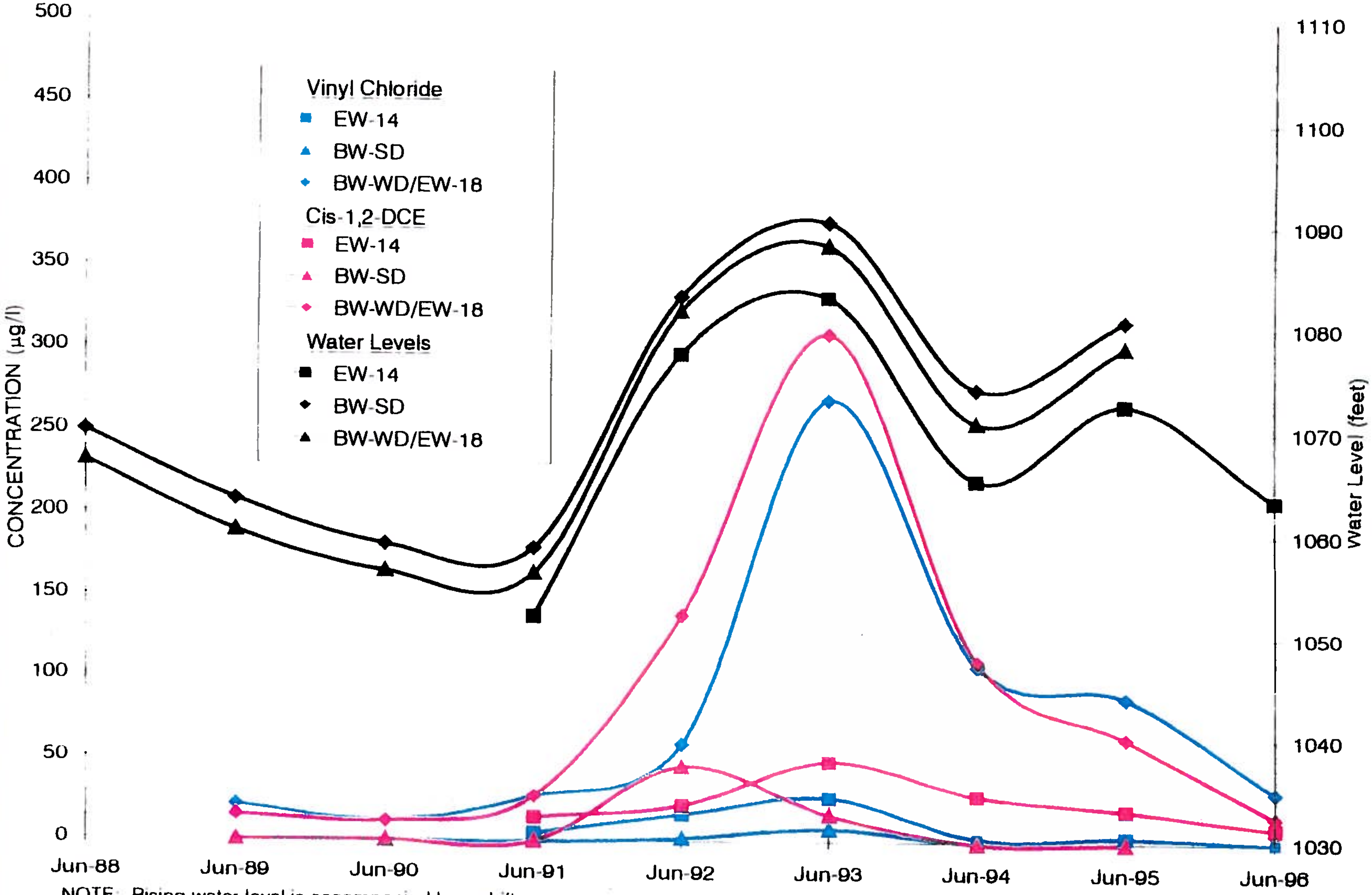
CADD FILE: ACAD\FILES\ESTES\7.2.dwg

SCALE	NTS
DATE	7-7-99
DRAWN BY:	RBC
PROJECT No.	5699033
FIGURE	7.2

ESTES LANDFILL RI
PHOENIX
ARIZONA

CONCENTRATION TRENDS vs. RECHARGE FOR DOWNGRADIENT WELLS

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008



NOTE: Rising water level is accompanied by a shift in groundwater flow direction from west to southwest

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9–97)

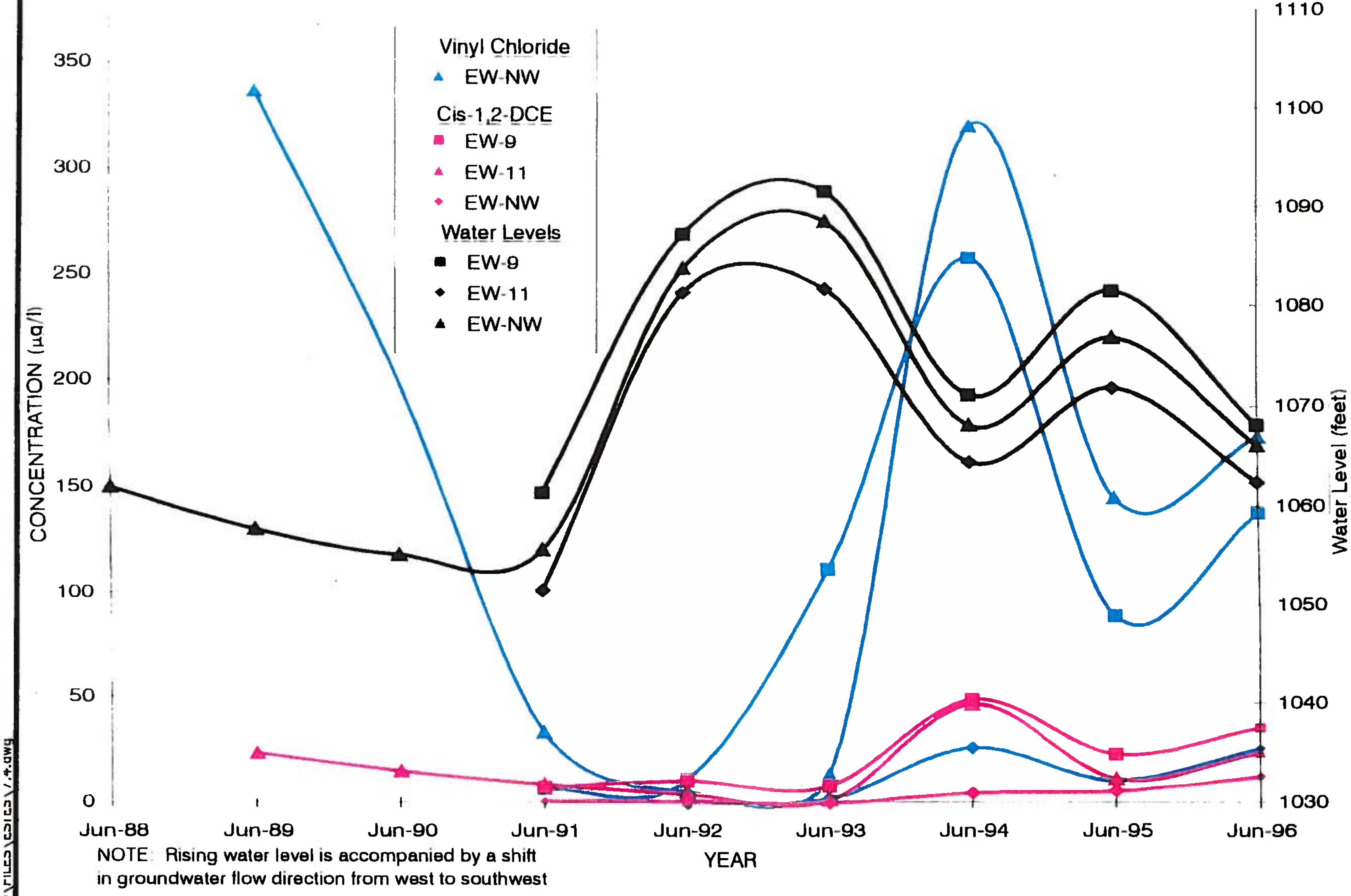
Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

CONCENTRATION TRENDS vs. RECHARGE FOR CROSS–GRADIENT WELLS

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7–7–99
DRAWN BY: RBC
PROJECT No. 6699033
SCALE NTS
FIGURE 7.3

CADD FILE: ACAD\FILES\ESTES\7.3.dwg



NOTE: Rising water level is accompanied by a shift in groundwater flow direction from west to southwest

NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

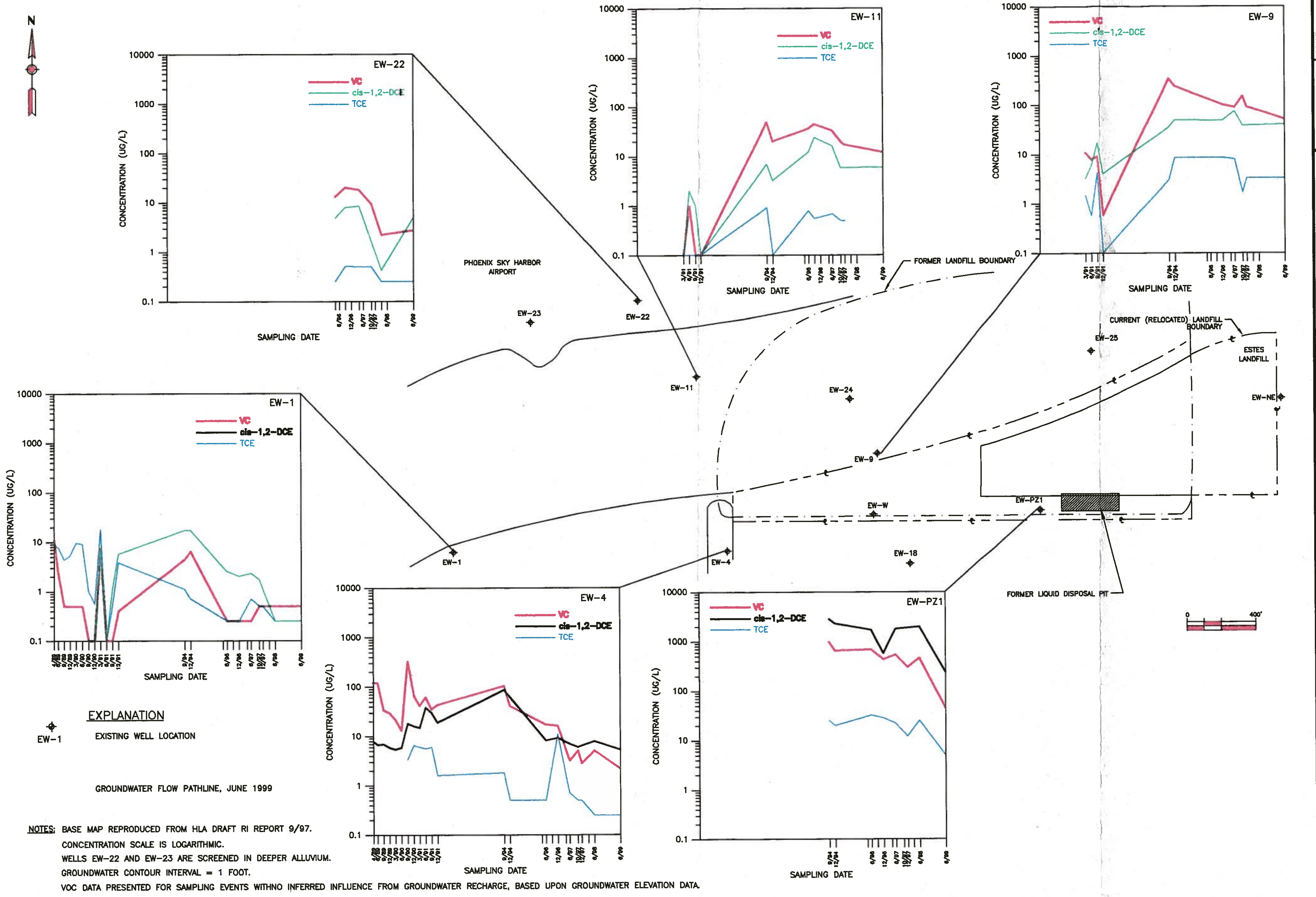
CONCENTRATION TRENDS vs. RECHARGE FOR NW CROSS-GRADIENT WELLS

ESTES LANDFILL RI
PHOENIX
ARIZONA

SCALE	nts
FIGURE	7.4
DATE	7-7-99
DRAWN BY:	RBC
PROJECT No.	6698033

nvironmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008

CADD FILE: ACAD\FILES\ESTES\7.4.dwg



EXPLANATION

EW-1 EXISTING WELL LOCATION

GROUNDWATER FLOW PATHLINE, JUNE 1999

NOTES: BASE MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97.
CONCENTRATION SCALE IS LOGARITHMIC.
WELLS EW-22 AND EW-23 ARE SCREENED IN DEEPER ALLUVIUM.
GROUNDWATER CONTOUR INTERVAL = 1 FOOT.
VOC DATA PRESENTED FOR SAMPLING EVENTS WITHNO INFERRED INFLUENCE FROM GROUNDWATER RECHARGE, BASED UPON GROUNDWATER ELEVATION DATA.

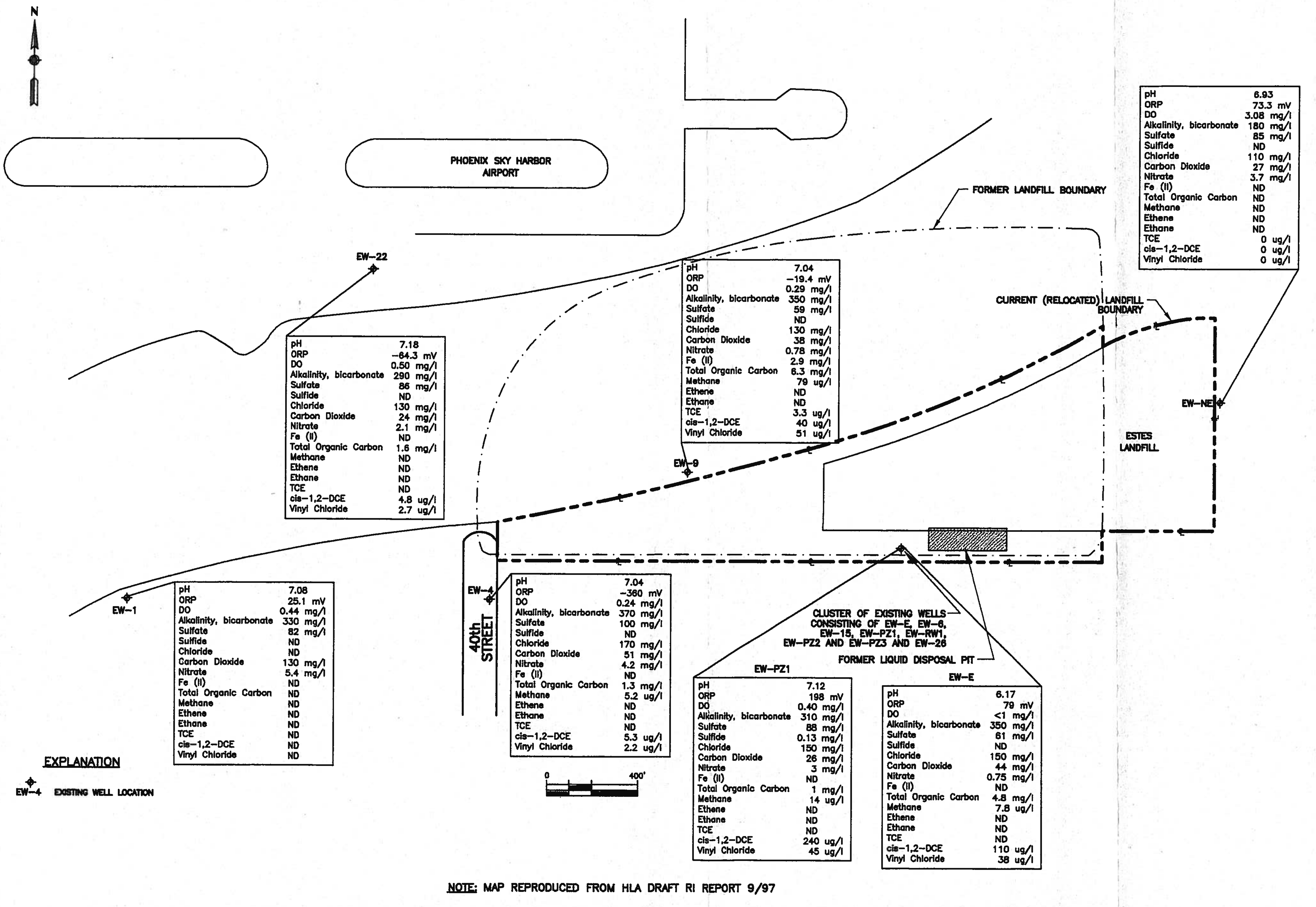
CADD FILE: N:\DATA\WPDOCS\JCM\WOARF\ESTES\ACAD\FLOCONC.dwg

Environmental Science & Engineering, Inc.
A MACTEC Company
426 N. 44th St. # 110
Phoenix, AZ 85008

VOC CONCENTRATIONS OVER TIME SIGNATURE SITE VOC APRIL 1989 TO JUNE 1999

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE 7-20-99
DRAWN BY: RBC
PROJECT No. 6699030
SCALE 1"=~500'
FIGURE 7.5



EW-22

pH	7.18
ORP	-64.3 mV
DO	0.50 mg/l
Alkalinity, bicarbonate	290 mg/l
Sulfate	86 mg/l
Sulfide	ND
Chloride	130 mg/l
Carbon Dioxide	24 mg/l
Nitrate	2.1 mg/l
Fe (II)	ND
Total Organic Carbon	1.6 mg/l
Methane	ND
Ethene	ND
Ethane	ND
TCE	ND
cis-1,2-DCE	4.8 ug/l
Vinyl Chloride	2.7 ug/l

EW-9

pH	7.04
ORP	-19.4 mV
DO	0.29 mg/l
Alkalinity, bicarbonate	350 mg/l
Sulfate	59 mg/l
Sulfide	ND
Chloride	130 mg/l
Carbon Dioxide	38 mg/l
Nitrate	0.78 mg/l
Fe (II)	2.9 mg/l
Total Organic Carbon	6.3 mg/l
Methane	79 ug/l
Ethene	ND
Ethane	ND
TCE	3.3 ug/l
cis-1,2-DCE	40 ug/l
Vinyl Chloride	51 ug/l

EW-NE

pH	6.93
ORP	73.3 mV
DO	3.08 mg/l
Alkalinity, bicarbonate	180 mg/l
Sulfate	85 mg/l
Sulfide	ND
Chloride	110 mg/l
Carbon Dioxide	27 mg/l
Nitrate	3.7 mg/l
Fe (II)	ND
Total Organic Carbon	ND
Methane	ND
Ethene	ND
Ethane	ND
TCE	0 ug/l
cis-1,2-DCE	0 ug/l
Vinyl Chloride	0 ug/l

EW-1

pH	7.08
ORP	25.1 mV
DO	0.44 mg/l
Alkalinity, bicarbonate	330 mg/l
Sulfate	82 mg/l
Sulfide	ND
Chloride	ND
Carbon Dioxide	130 mg/l
Nitrate	5.4 mg/l
Fe (II)	ND
Total Organic Carbon	ND
Methane	ND
Ethene	ND
Ethane	ND
TCE	ND
cis-1,2-DCE	ND
Vinyl Chloride	ND

EW-4

pH	7.04
ORP	-360 mV
DO	0.24 mg/l
Alkalinity, bicarbonate	370 mg/l
Sulfate	100 mg/l
Sulfide	ND
Chloride	170 mg/l
Carbon Dioxide	51 mg/l
Nitrate	4.2 mg/l
Fe (II)	ND
Total Organic Carbon	1.3 mg/l
Methane	5.2 ug/l
Ethene	ND
Ethane	ND
TCE	ND
cis-1,2-DCE	5.3 ug/l
Vinyl Chloride	2.2 ug/l

EW-PZ1

pH	7.12
ORP	198 mV
DO	0.40 mg/l
Alkalinity, bicarbonate	310 mg/l
Sulfate	88 mg/l
Sulfide	0.13 mg/l
Chloride	150 mg/l
Carbon Dioxide	26 mg/l
Nitrate	3 mg/l
Fe (II)	ND
Total Organic Carbon	1 mg/l
Methane	14 ug/l
Ethene	ND
Ethane	ND
TCE	ND
cis-1,2-DCE	240 ug/l
Vinyl Chloride	45 ug/l

EW-E

pH	6.17
ORP	79 mV
DO	<1 mg/l
Alkalinity, bicarbonate	350 mg/l
Sulfate	61 mg/l
Sulfide	ND
Chloride	150 mg/l
Carbon Dioxide	44 mg/l
Nitrate	0.75 mg/l
Fe (II)	ND
Total Organic Carbon	4.8 mg/l
Methane	7.8 ug/l
Ethene	ND
Ethane	ND
TCE	ND
cis-1,2-DCE	110 ug/l
Vinyl Chloride	38 ug/l

EXPLANATION

✦ EW-4 EXISTING WELL LOCATION

NOTE: MAP REPRODUCED FROM HLA DRAFT RI REPORT 9/97

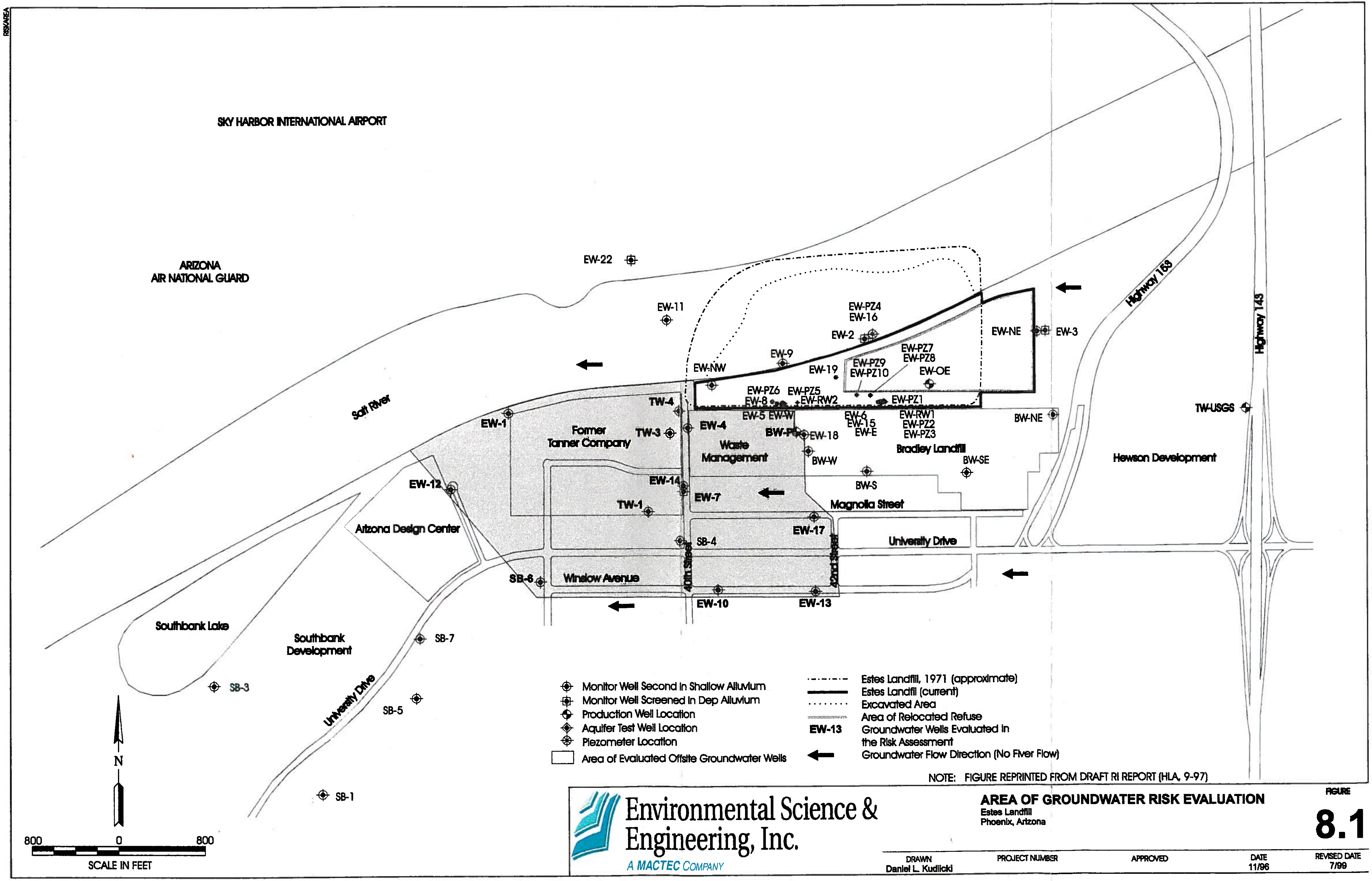
CADD FILE: N:\DATA\WPDOCS\JCM\WOARF\ESTES\ACAD\ATTDATA.dwg

Environmental Science & Engineering, Inc.
A MACTEC Company
428 N. 44th St. # 110
Phoenix, AZ 85008

PARAMETERS USED TO ASSES NATURAL BIOACTIVITY
JUNE 1999 GROUNDWATER SAMPLING DATA

ESTES LANDFILL RI
PHOENIX
ARIZONA

DATE	7-22-99	SCALE	NTS
DRAWN BY:	RBC	FIGURE	7.6
PROJECT No.	6699030		



NOTE: FIGURE REPRINTED FROM DRAFT RI REPORT (HLA, 9-97)

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

AREA OF GROUNDWATER RISK EVALUATION

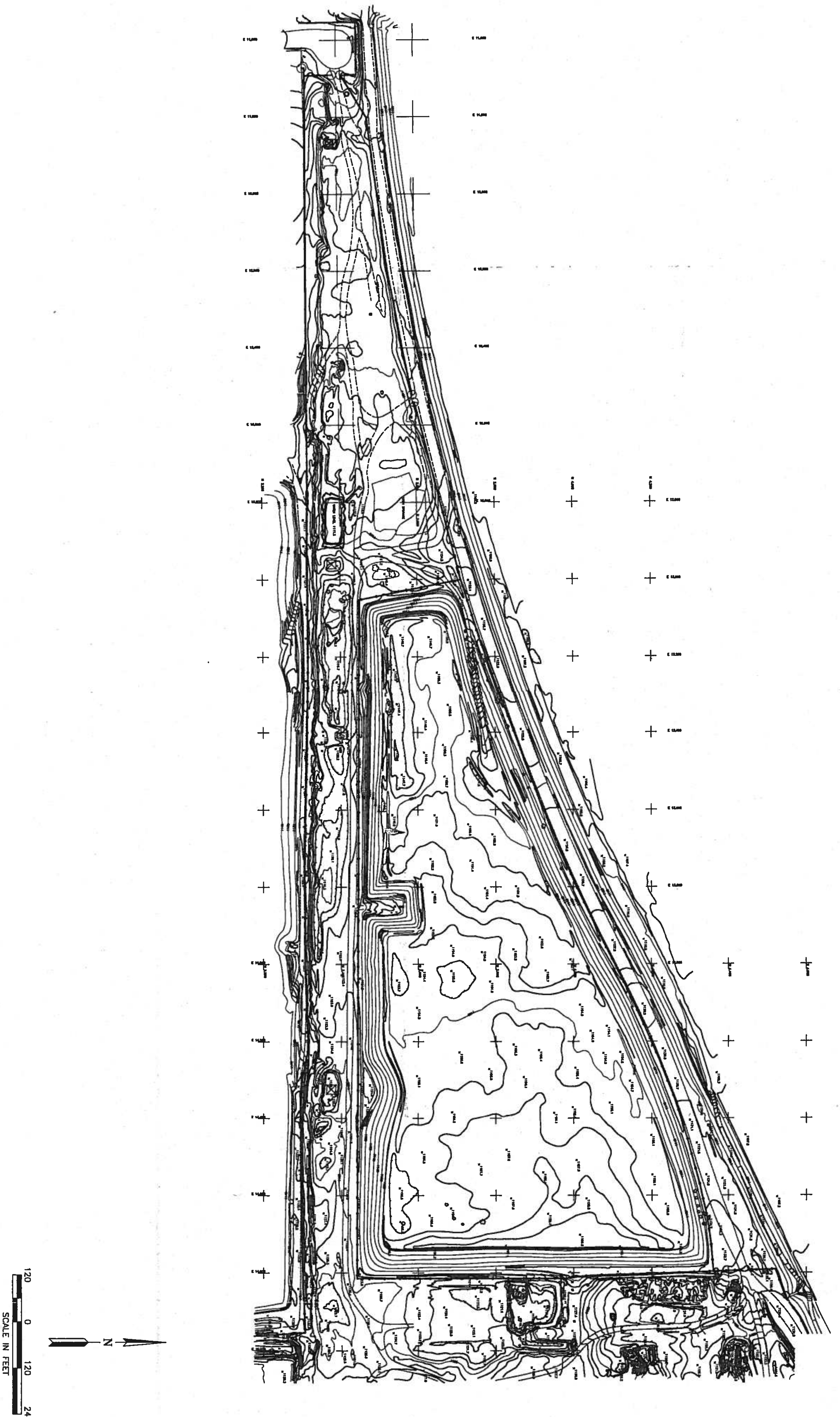
Estes Landfill
Phoenix, Arizona

FIGURE
8.1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
Daniel L. Kudlicki			11/96	7/99

LIST OF PLATES

CADD FILE: H:\CONTOUR.dwg



Environmental Science &
Engineering, Inc.
A MACTEC Company 428 N. 44th St. # 110

TOPOGRAPHIC CONTOUR MAP

ESTES LANDFILL RI
PHOENIX
ARIZONA

REVISION:
REVISION:
REVISION:
REVISION:

DATE 11/96
SCALE 1"=250'
DRAWN BY:
FIGURE 1
PROJECT No.

LIST OF TABLES

TABLE 1.1
PERTINENT TECHNICAL DOCUMENTATION AVAILABLE FOR ESTES LANDFILL

Reference	Date	Information Type	Prepared By
Estes Landfill, Fourth Quarter 1996, Quarterlv Report	2/24/97	Dat/Q	HLA
Estes Landfill, Third Quarter 1996, Quarterly Report	12/31/96	Dat/Q	HLA
Groundwater Modeling Report, Estes Landfill	9/23/96	Dat	HLA
Estes Landfill, Second Quarter 1996, Quarterly Report	9/9/96	Dat/Q	HLA
Estes Landfill, First Quarter 1996, Quarterly Report	6/13/96	Dat/Q	HLA
Field Sampling Plan, Pre-Pilot Testing Evaluation and RI Activities	5/20/96	WP	HLA
Estes Landfill, Fourth Quarter 1995, Quarterly Report	3/29/96	Dat/Q	HLA
Estes Landfill, Third Quarter 1995, Quarterly Report	12/22/95	Dat/Q	HLA
Human Health Risk Assessment, Estes Landfill	12/19/95	RA	HLA
Estes Landfill, Second Quarter 1995, Quarterly Report	9/7/95	Dat/Q	HLA
Draft Risk Assessment, Estes Landfill	8/95	RA	ADHS
Characterization of Background Arsenic Groundwater Concentrations.	8/2/95	RA	HLA
Estes Landfill, First Quarter 1995, Quarterly Report	6/2/95	Dat/Q	HLA
Remedial Data Acquisition, Estes Landfill	4/5/95	Dat	HLA
Surface Soil Sampling, Estes Landfill	3/17/95	DaVRA	HLA
Estes Landfill, Fourth Quarter 1994, Quarterly Report	3/17/95	Dat/Q	HLA
Estes Landfill, Third Quarter 1994, Quarterly Report	12/27/94	Dat/Q	HLA
Conceptual Work Plan, RIMS and Remedial Action Plan, Estes Landfill	10/27/95	WP	HLA
Estes Landfill, Second Qaarter 1994, Quarterly Report	8/30/94	Dat/Q	HLA
Estes Landfill, First Quarter 1994, Quarterly Report	5/27/94	Dat/Q	HLA
Estes Landfill, Fourth Quarter 1993, Quarterly Report	2/16/94	Dat/Q	HLA
Revised Estes Landfill Work Plan, Remedial Data Acquisition	1/20/94	WP	HLA
Estes Landfill, Third Quarter 1993, Quarterly Report	11/30/93	Dat/Q	HLA
Estes Landfill, Second Quarter 1993, Quarterly Report	9/10/93	Dat/Q	HLA
Estes Landfill, First Quarter 1993, Quarterly Report	6/4/93	Dat/Q	HLA
Estes Landfill, Fourth Quarter 1992, Quarterly Report	5/14/93	Dat/Q	HLA
Project Specs. and Contract Docs. for Drilling, Sampling and Well	5/12/93	WP	HLA
Monitor Well Installation, Revised Work Plan, Estes Landfill	3/25/93	WP	HLA
Work Plan, Groundwater Modeling, Estes Landfill	3/4/93	WP	HLA
Estes Landfill, Phase II Groundwater Quality Investigation, Draft Rep.	12/24/92	Dat	HLA
Estes Landfill, GWC/PTS and Phase I RAP, Quarterly Report	12/9/92	Dat/Q	HLA
Application for Permit to Withdrawal Poor Quality Groundwater	11/23/92	Per	HLA
Poor Quality GW Withdrawal Permit Application, Admin and Hydro	10/21/92	Per	HLA
Estes Landfill, GWC/PTS and Phase I RAP, Quarterly Report	10/8/92	Dat/Q	HLA
Additional Aquifer Testing at EW-RW1, Estes Landfill	9/18/92	Dat	HLA
EW-RW2 Aquifer Test, Estes Landfill	7/14/92	Dat	HLA
Additional Monitor Well Installation-Estes Landfill	7/14/92 1	WP	HLA
Estes Landfill, GWCIPTS and Phase I RAP, Quarterly Report	6/2/92	Dat/Q	HLA
Groundwater Monitoring and Sampling Plan, Estes Landfill	2/28/92	WP	HLA
Estes Landfill, Phase II GQI, Quarterly Report	1/24/92	Dat/Q	HLA
Quality Assurance Project Plan, Estes Landfill	1/6/92	WP	HLA
Estes Landfill, Phase II GQL Quarterly Report	11/22/91	Dat/Q	HLA
National Pollution Discharge Elimination System Permit Application	11/6/91	Per	HLA
Pilot Groundwater Treatment and Aquifer Tests, Estes Landfill	10/28/91	PT	HLA
Estes Landfill Site Safety Plan	10/91	WP	HLA
Onsite Groundwater Containment and Phase I RAP, Estes Landfill	8/27/91	WP	HLA
Estes Landfill, Phase II GQI, June 1991 Groundwater Quality Data	8/16/91	Dat/Q	HLA
Bench Scale Groundwater Remediation Treatability Studies	8/13/91	PT	HLA
Source Verification/Soil Gas Survey, Estes Landfill	7/3/91	Dat	HLA
Conceptual Work Plan, Onsite Groundwater Containment and Phase 1	4/28/91	WP	HLA
Temporary Sewer Discharge Permit Application Pilot Test	4/8/91	Per	HLA
Estes Landfill Groundwater Quality Investigation, Draft Report	9/19/90	Dat	HLA
Final Work Plan, Phase II GQl, Estes Landfill	8/8/90 1	WP	HLA
Project Specs. and Contract Docs, for Groundwater Monitoring Wells	6/22/90	WP	HLA

TABLE 1.1
PERTINENT TECHNICAL DOCUMENTATION AVAILABLE FOR ESTES LANDFILL

Reference	Date	Information Type	Prepared By
Conceptual Work Plan, Phase 11 GQI, Estes Landfill	6/19/90	WP	HLA
Job Safetv Plan, Estes Landfill	6/90	WP	HLA
Quarterly Groundwater Sampling Plan for the Estes Landfill	4/26/89	WP	HLA
Pre-Install Groundwater Sampling Plan for the Estes Landfill	8/31/88	WP	HLA
Project Specs. And Contract Docs. Rebid #2 for Groundwater Monitor	6/27/88	WP	HLA
Job Safety Plan, Estes Landfill	9/2/87	WP	HLA
Final Work Plan, Estes Landfill	10/17/86	WP	D&M
Fortieth Street (Bradley) Landfill Site Inspection Report	1/17/86	Dat	ADHS

Notes:

WP - Work Plan
Per - Permit Application or Report
Dat - Data Report
Dat/Q - Quarterly Data Submittal
PT - Treatability Study
RA - Risk Assessment\
HLA - Harding Lawson Associates
ADHS - Arizona Department of Health Services
D&M - Dames & Moore
Data from Harding Lawson and Associates Draft RI report, September 5, 1997

Table 3.1 CLIMATOLOGICAL DATA

Month	Climatic Variable		
	Mean Monthly Precipitation (inches)	Mean Monthly Temperature (degrees F)	
		Maximum	Minimum
January	0.73	65.2	39.4
February	0.59	69.7	42.5
March	0.81	74.5	46.7
April	0.27	83.1	53.0
May	0.14	92.4	61.5
June	0.17	102.0	70.6
July	0.74	105.0	79.5
August	1.02	102.0	77.5
September	0.64	98.0	70.9
October	0.63	87.0	59.1
November	0.54	74.3	46.9
December	0.83	66.4	40.2
ANNUAL	7.11	85.1	57.3

Note:
Data from Harding Lawson and Associates Draft RI report, September 5, 1997

Table 3.2 RELEASES FROM GRANITE REEF DAM

Month	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Jan	0	333,228	0	0	0	0	0	0	12,762	0	0	0
Feb	0	34,386	0	57,900	0	0	0	0	32,357	0	0	928
Mar	0	8,172	0	23,863	180	0	0	0	428,250	0	0	0
Apr	19,982	0	0	24,703	0	0	0	0	549,596	0	0	214
May	0	0	0	0	0	0	0	0	216,541	0	0	0
Jun	0	0	0	0	0	0	0	0	292	0	0	0
Jul	0	0	897	0	0	0	0	0	1,061	32	246	173
Aug	0	692	56	0	0	0	79	0	129	783	0	186
Sep	0	3,894	18	0	0	10,967	0	0	77	0	151	81
Oct	0	0	0	0	0	0	0	39,795	6	0	0	516
Nov	0	0	0	0	0	0	0	3,346	161	0	0	0
Dec	175,718	0	10,749	0	0	0	0	32,238	0	0	0	0
Annual Total	195,700	380,372	11,720	106,466	180	10,967	79	75,379	1,241,232	815	397	2,098

Notes:

Releases are acre-feet per month

Release data were provided by AZ. Dept. of Water Resources Hydrology Dept.

Table 3.2 RELEASES FROM GRANITE REEF DAM

Month	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Jan	0	351	901,114	19,389	0	0	17,836	36,118	168,137	135	0	127
Feb	0	456	155,614	1,829,570	99	0	417,194	0	117,560	224	857	4,336
Mar	0	591,006	600,245	107,710	0	81,038	460,301	0	327,529	1,696	27,706	1,236
Apr	0	954	323,935	78,775	0	8	249,308	0	74,615	5,137	472	13,646
May	0	0	16,179	25,238	0	0	26,553	0	29,594	0	0	0
Jun	0	0	30	91	0	0	139	0	0	0	0	0
Jul	0	319	0	450	0	0	0	286	0	123	0	0
Aug	0	587	0	0	0	0	785	0	61	123	0	0
Sep	0	0	0	38	0	26	716	0	389	0	0	0
Oct	0	0	0	0	0	0	465,773	1,047	442	490	0	1,035
Nov	0	0	0	93	2	107	319	0	359	228	419	0
Dec	0	795,582	0	0	0	97,122	105,512	233,797	54,760	220	325	0
Annual Total	0	1,389,255	1,997,117	2,061,354	101	178,301	1,744,436	271,248	773,446	8,376	29,779	20,380

Notes:

Releases are acre-feet per month

Release data were provided by AZ. Dept. of Water Resources Hydrology Dept.

Table 3.2 RELEASES FROM GRANITE REEF DAM

Month	1989	1990	1991	1992	1993	1994	1995
Jan	0	0	0	71,339	2,050,031	0	32,111
Feb	0	0	0	188,969	1,159,051	0	353,878
Mar	458	0	52,707	331,212	501,216	0	556,182
Apr	0	0	24,339	109,103	202,796	0	26,325
May	0	0	0	43,939	158,923	0	2
Jun	0	0	0	9,394	12	0	0
Jul	0	0	0	0	0	0	0
Aug	0	598	0	82,781	0	0	0
Sep	0	0	410	23,197	0	0	0
Oct	0	0	298	79	0	0	0
Nov	0	0	34	78	0	0	0
Dec	0	0	6,751	20,856	0	0	0
Annual Total	458	598	84,539	880,947	4,072,029	0	968,498

Notes:

Releases are acre-feet per month

Release data were provided by AZ. Dept. of Water Resources Hydrology Dept.

TABLE 3.3
WELLS REGISTERED WITH ADWR NEAR ESTES LANDFILL

Location	Reg. No.	Well Codes			Name	Well Depth (ft)	Case Diameter (in)	Case Depth (ft)	Water Level (ft)	Date Mo	Dy	Yr
A-01-03 01ADA	801658	E	N	C	AZ STATE LAND DEPT	40	6	40	40	00	00	951
A-01-03 01DDD	608430	N	AB	W	SALT RIVER PROJECT	155	20	155	51	08	29	925
A-01-03 02AAA	608380	N	AB	W	SALT RIVER PROJECT	250	20	250	61	08	22	947
A-01-03 03	629634	N	A	W	MILES, JESUS	294	12	0	0	00	00	947
A-01-03 12A	639522	E	D	W	KINGSTON	80	12	80	40	12	08	942
A-01-03 12CAB	601895	N	F	U	GARRETT TURBINE CO	182	20	120	60	00	00	952
A-01-03 12CAB	802382	N	F	C	GARRETT TURBINE CO	182	20	120	60	00	00	952
A-01-03 13DDA	605122	N	F	WU	TANNER CO	291	16	280	60	09	01	961
A-01-03 14AAB	806210	E	N	W	PHOENIX, CITY OF			0	0			
A-01-03 15	509317	T	I	W	CALMAT CO			0	0			
A-01-03 15AB	508675	T	L	D	SHANK-ARTUKOVICH	200	16	200	66	01	11	985
A-01-03 15AC	508674	T	L	D	SHANK-ARTUKOVICH	200	16	200	58	12	21	984
A-01-03 15CD	508672	T	L	U	SHANK-ARTUKOVICH	200	16	200	42	10	10	986
A-01-03 15DB	508673	T	L	D	SHANK-ARTUKOVICH	200	16	200	54	11	26	984
A-01-03 22BBA	611454	N	F	W	CALMAT CO	226	20	0	59	00	00	964
A-01-03 22BCD	611452	N	F	W	AZ SAND & ROCK	0	0	0	0			
A-01-03 25	639512	E	D	W	SORENSON	300	6	0	63			
A-01-03 25D	639515	E	J	W	JOHNSON		6	0	0			
A-01-03 25DDD	640322	E		C	SWS ENTERPRISES INC		8	0	0			
A-01-03 26CCC	806652	E	N	W	AUTO ZONE INC	20	6	0	0			
A-01-03 26CD	638395	E			SANDOVAL			7	0			
A-01-03 26CDA	635536	E	AD	W	EATON		8	0	0			
A-01-03 26DCD	804510	E	AD	C	OURSLAND, REGINA			0	0			

TABLE 3.3
WELLS REGISTERED WITH ADWR NEAR ESTES LANDFILL

Location	Reg. No.	Well Codes			Name	Well Depth (ft)	Case Diameter (in)	Case Depth (ft)	Water Level (ft)	Date		
										Mo	Dy	Yr
A-01-04 05BAB	806411	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	529839	X	M	Q	MOTOROLA INC	158		0	0	04	23	983
A-01-04 05BAC	514169	X	M	O	MOTOROLA INC	123	6	0	0	05	04	986
A-01-04 05BAC	509756	Z	M	O	MOTOROLA INC	62	10	0	0	11	24	984
A-01-04 05BAC	510137	Z	M	O	MOTOROLA INC	62		0	0	02	11	985
A-01-04 05BAC	806401	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806402	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806404	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806405	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806406	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806407	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806408	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAC	806410	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BDB	504822	E	K	U	MOTOROLA INC			0	0			
A-01-04 05BDB	504827	E	O	M	MOTOROLA INC			0	0			
A-01-04 05CBA	606555	N	DAJ	W	OPENSHAW	303	6	303	168	00	00	976
A-01-04 05CBB	640413	E	DA	W	LANGMADE	120	4	40	35	00	00	950
A-01-04 05CC	640383	E	D	W	LANGMADE, ESTATE OF	80	4	50	40	00	00	912
A-01-04 05CCB	806167	E		NU	ADOT	55	20	0	0			
A-01-04 06AAB	531585	P	F	W	MOTOROLA INC	118	14	107	43	11	23	991
A-01-04 06AAB	531586	P	F	W	MOTOROLA INC	120	14	108	43	11	22	995
A-01-04 06AAB	531587	P	F	W	MOTOROLA INC	140	14	128	43	11	09	991
A-01-04 06AAC	531588	P	F	W	MOTOROLA INC	145	14	135	45	10	30	991

TABLE 3.3
WELLS REGISTERED WITH ADWR NEAR ESTES LANDFILL

Location	Reg. No.	Well Codes			Name	Well Depth (ft)	Case Diameter (in)	Case Depth (ft)	Water Level (ft)	Date Mo	Dy	Yr
A-01-03 27CAC	602816	N	A	W	SNITZ	348	6	348	73	07	15	980
A-01-03 34CDC	800891	E	D	W	CARLSON MD	350	6	300	100	00	00	979
A-01-03 35	606960	E			CASON	0	0	0	0			
A-01-03 35	612339	N	AD	W	GROVES	145	6	0	45	00	00	928
A-01-03 35	633658	E	D	W	SOUTHERN PROPERTIES			0	0			
A-01-03 35	642444	E	DJ	W	DOBSON	175	8	165	0	00	00	960
A-01-03 35	805214	N	AD	C	BLAKE FARMS INC		8	0	0			
A-01-03 35	805219	N	AD	C	BLAKE FARMS INC		8	0	0			
A-01-03 35ADA	624380	E	D	W	PANTOVICH			0	0			
A-01-03 35BBA	505861	E	D	W	DEAN	140	10	140	80	08	10	983
A-01-03 35BBA	800608	E	DA	W	DEAN			0	0			
A-01-03 35BDB	643755	N	AJD	W	JENNINGS	127	4	120	68			
A-01-03 36	633944	E	AD	W	STARK	79	8	0	68	05	28	956
A-01-03 36ADA	803725	E	AD	W	DOWNING, LEE	180	8	150	35	11	08	941
A-01-03 36BCD	651052	E	AJ	W	DE BERGE		8	0	0	00	00	957
A-01-03 36BDC	633748	E	JDA	W	CONRAD	200	6	0	67	00	00	971
A-01-03 36DDD	636144	E	D	W	ROBERDS	120	10	120	60	00	00	942
A-01-04 05BAB	531581	P	F	W	MOTOROLA INC			0	0			
A-01-04 05BAB	531582	P	F	W	MOTOROLA INC			0	0			
A-01-04 05BAB	531583	P	F	W	MOTOROLA INC			0	0			
A-01-04 05BAB	531584	P	F	W	MOTOROLA INC			0	0			
A-01-04 05BAB	806403	E	N	W	MOTOROLA INC			0	0			
A-01-04 05BAB	806409	E	N	W	MOTOROLA INC			0	0			

TABLE 3.3
WELLS REGISTERED WITH ADWR NEAR ESTES LANDFILL

Location	Reg. No.	Well Codes			Name	Well Depth (ft)	Case Diameter (in)	Case Depth (ft)	Water Level (ft)	Date		
										Mo	Dy	Yr
A-01-04 06AAC	531589	P	F	W	MOTOROLA INC	167	6	165	46	10	25	991
A-01-04 06AB	628943	N	A	W	THREE O			0	0			
A-01-04 06ABD	801593	E	D	W	TURNAGE	135	8	90	33	00	00	948
A-01-04 06ADB	531590	P	F	W	MOTOROLA INC	155	14	155	0	10	17	991
A-01-04 06ADB	531591	P	F	W	MOTOROLA INC	120	14	120	43	10	11	991
A-01-04 06ADC	531592	P	F	W	MOTOROLA INC	113	6	113	40	10	07	991
A-01-04 06ADC	531593	P	F	W	MOTOROLA INC	105	14	105	40	09	28	991
A-01-04 06CD	636731	E			PHOENIX E INVESTORS		10	0	0			
A-01-04 08AAA	628379	N	A	W	DE BERGERS	600	6	600	80	00	00	925
A-01-04 08B	632352	E	D	W	NORTHERN TRUST CO	136		136	40	00	00	928
A-01-04 08C	606669	N	F	W	PAUL C HELMICK CORP	250	8	180	120			
A-01-04 09BDB	521295	S	A	W	SALT RIVER PROJECT			0	0			
A-01-04 09C	617683	N	FA	W	SALT RIVER PROJECT	78	24	62	0	04	00	941
A-01-04 16BCC	511051	O	F	W	DNA MANAGEMENT			0	0			
A-01-04 17ADA	805439	E	N	U	DAMES & MOORE	60	6	0	0			
A-01-04 17BCD	633634	E	J	W	BLM-PHOENIX DISTRICT	150	10	113	48	00	00	958
A-01-04 17BDD	539269	N	A	W	PBA SPORTS INC			0	0			
A-01-04 17CD	527941	E	N	U	BLASDELL, MACHRINA	30	8	0	0	03	07	990
A-01-04 18CCA	800536	N	F	W	BRADLEY INVESTMENT	300	12	0	100			
A-01-04 18CCC	502980	E	K	O	PHOENIX, CITY OF	100	8	80	82	05	00	982
A-01-04 18CCD	626581	N	N	U	POLLER, ROBERT	155	10	155	0	00	00	958
A-01-04 19ACC	608357	N	AB	W	SALT RIVER PROJECT	438	20	438	57	10	09	951
A-01-04 30	643715	E	D	W	DAILY			0	0	03	00	956

TABLE 3.3
WELLS REGISTERED WITH ADWR NEAR ESTES LANDFILL

Location	Reg. No.	Well Codes			Name	Well Depth (ft)	Case Diameter (in)	Case Depth (ft)	Water Level (ft)	Date		
										Mo	Dy	Yr
A-01-04 30ABB	618699	N	D	W	AZ BOARD OF REGENTS	125	8	119	90	03	00	958
A-01-04 30BB	618698	N	D	W	AZ BOARD OF REGENTS	125	8	125	90	03	00	956
A-01-04 30C	611885	N	A	W	RESTHAVEN PK CMTRY	164	8	160	60	00	00	950
A-01-04 30DDD	617717	N	D	W	SALT RIVER PROJECT	208	6	0	0			
A-01-04 32ACB	806399	E	N	WU	ADOT			0	0			
A-01-04 32ADA	641987	E	DJA	W	LINFIN	110	6	0	83			
A-01-04 32ADD	805551	E	N	U	WESTERN SAVINGS		20	0	0			
A-01-04 32DAA	618719	N	A	W	CORP GALLERIA, THE	90	8	90	0	00	00	932
A-01-04 33	800708	E	D	W	STADMILLER	130	8	0	80	00	00	962
A-01-04 33A	640397	E	AD	U	MILTON, ANKER & B.	30	8	0	0			

WELL CODES:

First Column
E = Exempt (<35 gpm)
N = Non-Exempt (>35 gpm)
O = Non-Domestic
P = Groundwater Withdrawl Permit
S = Service
T = Non-Service
K = Other (Exploration)
L = Drainage
N = None
O = Other (Non-Production)

Second Column
A = Irrigation
B = Utility
D = Domestic
F = Industrial
I = Mining
J = Stock

Third Column
C = Capped
D = Drainage
N = Cathodic
O = Observation
U = Abandoned
W = Water Production

Shaded rows represent closest domestic use wells.

Note:
Data from Harding Lawson and Associates Draft RI Report, September 5, 1997

TABLE 4.1
SIEVE ANALYSES TEST RESULTS

Sample_ID	Date Collected	Sample Type	Retained >3 inch	Pass 3 inch	Pass 2 inch	Pass 1-1/2 inch	Pass 1 inch	Pass 3/4 inch	Pass 1/2 inch	Pass 3/8 inch	Pass No 4+	Pass No 8	Pass No 10	Pass No 16	Pass No 30	Pass No 40	Pass No 50	Pass No 100	Pass No 200	Liquid Limit	Plastic Limit	Plasticity Index
EW-RW2-25	11/4/91	Grab	0.00	100.00		100.00		100.00		100.00	99.00	93.50		79.90	62.30	55.00	44.50	27.70	17.30			
EW-RW2-35	11/4/91	Grab	0.00	100.00		100.00		100.00		97.90	93.00	83.80		74.40	62.70	55.60	44.70	30.10	19.80			
EW-RW2-45	11/4/91	Grab	0.00	100.00		100.00		98.40		85.80	70.60	57.30		44.70	33.30	28.40	21.90	14.50	11.30			
EW-RW2-55	11/5/91	Grab	0.00	100.00		100.00		89.10		59.00	35.30	17.60		11.70	9.60	8.70	7.40	5.50	4.20			
EW-RW2-65	11/5/91	Grab	0.00	100.00		100.00		92.70		72.50	52.90	40.30		30.90	22.00	17.70	13.30	9.00	6.80			
EW-RW2-68.5	11/5/91	Grab	0.00	100.00		100.00		99.30		96.90	89.70	78.70		63.60	36.40	23.90	15.40	10.20	8.60			
EW-RW2-74.5	11/5/91	Grab	0.00	100.00		100.00		100.00		100.00	98.00	87.90		74.20	49.10	32.60	18.70	11.20	9.10			
EW-RW2-80	11/5/91	Grab	0.00	100.00		100.00		92.50		58.10	30.80	14.80		10.60	9.70	9.30	8.70	7.60	6.40			
EW-RW2-94.5	11/5/91	Grab	0.00	100.00		100.00		86.40		53.70	30.80	23.80		21.40	19.90	18.90	17.20	13.50	10.70			
EW-RW2-100	11/6/91	Grab	0.00	100.00		100.00		91.80		66.80	46.80	32.80		26.40	22.30	20.30	18.00	14.40	11.70			
EW-RW2-110	11/6/91	Grab	0.00	100.00		100.00		92.00		64.60	52.60	44.60		36.30	24.50	18.60	12.40	6.90	4.70			
EW-RW2-115	11/6/91	Grab	0.00	100.00		100.00		98.10		85.80	62.00	48.10		40.00	32.00	27.00	20.00	11.20	7.30			
EW-RW2-125	11/6/91	Grab	0.00	100.00		100.00		94.20		72.30	56.40	45.90		35.10	18.90	11.70	5.60	2.00	1.10			
EW-RW2-145	11/6/91	Grab	0.00	100.00		100.00		100.00		75.30	55.20	45.30		38.10	25.90	17.90	9.50	3.10	1.40			
EW-RW2-153.5	11/6/91	Grab	0.00	100.00		100.00		100.00		99.40	87.20	81.70		75.10	65.50	60.40	52.70	34.40	21.90			
EW-PZ5 (20-25)	10/4/93	Grab	3.40	96.60	88.70	75.90	60.20	51.10	40.50	35.40	25.10	19.50	18.40	14.90	10.20	8.80	7.10	3.60	1.30	19.00	17.00	2.00
EW-PZ5 (40-45)	10/4/93	Grab	8.20		91.80	85.60	74.90	66.80	55.20	49.50	37.00	29.40	28.00	23.90	17.60	14.80	11.80	8.40	6.30	29.00	16.00	13.00
EW-PZ5 (60-65)	10/4/93	Grab	17.90	82.10	74.60	66.10	58.90	52.20	43.90	39.60	32.60	28.60	27.70	24.80	19.70	16.70	13.30	9.00	7.00	34.00	18.00	16.00
EW-PZ5 (75-80)	10/4/93	Grab	11.00		89.00	79.00	6.40	55.00	46.00	42.00	32.00	27.00	25.00	22.00	16.00	13.00	11.00	8.00	6.20	34.00	18.00	16.00
EW-PZ5 (85-90)	10/4/93	Grab	5.50	94.50	92.00	85.90	74.80	68.20	59.10	54.80	46.20	39.60	38.20	33.90	27.20	23.50	19.20	13.40	10.10	33.00	18.00	15.00
EW-15 (20-25)	11/2/93	Grab	4.30		95.70	88.30	77.50	69.30	56.60	50.40	38.80	30.20	28.60	24.40	18.90	16.60	13.80	8.70	5.10			
EW-15 (35-40)	11/2/93	Grab	3.00	97.00	87.00	81.00	66.00	56.00	43.00	37.00	25.00	20.00	19.30	17.00	13.00	11.00	9.00	6.00	4.90	30.00	20.00	10.00
EW-15 (50-55)	11/2/93	Grab	3.00	97.00	92.00	85.00	70.00	60.00	51.00	43.00	30.00	24.00	23.00	20.00	15.00	13.00	10.00	6.00	3.90	31.00	17.00	14.00
EW-15 (60-65)	11/2/93	Grab	1.00		99.00	90.00	76.00	68.00	59.00	55.00	47.00	43.00	42.60	41.00	35.00	29.00	22.00	13.00	9.90	32.00	17.00	15.00
EW-15 (75-80)	11/2/93	Grab	2.00	98.00	89.00	79.00	63.00	54.00	42.00	37.00	30.00	26.00	25.00	23.00	19.00	16.00	13.00	10.00	8.00	41.00	19.00	22.00
EW-15 (90-95)	11/2/93	Grab	13.00		87.00	81.00	70.00	61.00	52.00	47.00	40.00	37.00	36.00	34.00	27.00	21.00	14.00	9.00	6.80	33.00	15.00	18.00
EW-15 (100-105)	11/3/93	Grab	3.00	97.00	81.00	72.00	59.00	54.00	45.00	40.00	32.00	28.00	27.00	25.00	20.00	17.00	13.00	9.00	6.30	31.00	15.00	16.00
EW-15 (110-115)	11/3/93	Grab	2.00			98.00	95.00	92.00	88.00	84.00	71.00	61.00	59.00	51.00	40.00	34.00	24.00	13.00	8.90	32.00	14.00	18.00
EW-16 (10-20)	11/12/93	Grab	3.10		96.90	93.30	88.00	84.80	75.70	70.30	56.10	45.20	42.70	34.70	24.40	20.20	15.80	9.60	6.00			
EW-16 (30-35)	11/12/93	Grab	21.00		79.00	65.00	54.00	47.00	38.00	35.00	27.00	21.00	20.00	17.00	14.00	13.00	11.00	9.00	6.70	30.00	18.00	12.00
EW-16 (55-60)	11/12/93	Grab	7.00	93.00	89.00	81.00	69.00	63.00	54.00	50.00	42.00	37.00	36.00	31.00	21.00	17.00	14.00	11.00	9.00	43.00	19.00	24.00
EW-16 (70 -75)	11/12/93	Grab	19.00		81.00	77.00	67.00	61.00	52.00	48.00	39.00	33.00	32.00	28.00	21.00	18.00	14.00	10.00	7.60	30.00	16.00	14.00
EW-16 (90-100)	11/12/93	Grab	3.00	97.00	83.00	72.00	57.00	48.00	37.00	32.00	23.00	19.00	18.00	15.00	11.00	10.00	8.00	6.00	4.70	46.00	23.00	23.00
EW-16 (110-115)	11/12/93	Grab	21.00		79.00	68.00	56.00	50.00	43.00	40.00	30.00	22.00	20.00	14.00	9.00	7.00	6.00	4.00	3.00	29.00	18.00	11.00
EW-16 (130-135)	11/12/93	Grab	1.20			98.80	98.50	97.30	94.80	93.00	89.80	82.30	80.70	76.80	72.20	69.50	65.20	50.90	34.40	28.00	20.00	8.00
B-1 (0-5)	5/20/96	Grab	0.00	100.00	99.00	98.00	97.00	96.00	95.00	93.00	90.00	89.00	89.00	88.00	84.00	81.00	78.00	66.00	44.80	22.00	18.00	4.00
B-1 (6.5-11)	5/20/96	Grab	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.00	98.00	98.00	97.00	94.00	90.00	85.00	66.00	39.00			
B-1 (28-34)	5/20/96	Grab	15.00	85.00	83.00	74.00	66.00	59.00	51.00	46.00	34.00	29.00	28.00	24.00	18.00	15.00	13.00	9.00	6.60	21.00	18.00	3.00
B-1 (46-51)	5/20/96	Grab	11.00	89.00	81.00	73.00	66.00	59.00	52.00	48.00	40.00	36.00	35.00	32.00	27.00	23.00	19.00	14.00	11.00			
B-1 (60-65)	5/20/96	Grab	0.00	100.00	95.00	88.00	81.00	75.00	67.00	63.00	53.00	47.00	46.00	42.00	37.00	34.00	31.00	23.00	17.70			
B-1 (75-80)	5/21/96	Grab	0.00	100.00	91.00	85.00	77.00	66.00	54.00	48.00	37.00	31.00	30.00	27.00	23.00	20.00	17.00	12.00	9.40			
B-1 (86-91)	5/21/96	Grab	0.00	100.00	97.00	96.00	82.00	67.00	54.00	48.00	40.00	36.00	35.00	32.00	26.00	22.00	19.00	14.00	10.70			
B-1 (103-110)	5/21/96	Grab	8.00	92.00		82.00	73.00	63.00	54.00	49.00	39.00	35.00	34.00	31.00	25.00	20.00	16.00	12.00	9.90			

Results are in percent
Table reproduced from Draft RI Report (HLA, 9/97)

TABLE 4.2 LABORATORY VERTICAL PERMEABILITY RESULTS

Sample ID	Date Collected	Depth of Collection	Hydrostratigraphic Unit	Sample Type	Percent Moisture	Dry Density (pcf)	Specific Gravity	Vertical Permeability (cm/sec)
EW-8-175	11/10/90	175	F4	Core	3.4	136.7	2.75	4.16E-05
EW-7-188	12/10/99	188	F4	Core	3.8	130.9	2.69	7.23E-03
EW-12-197	12/30/90	197	F4	Core	9.3	126.1	2.66	1.49E-03
EXB!A CORE 183	10/27/93	183	F4	NX-Core	1.2	90		9.77E-06
EXB!A CORE 202	10/27/93	202	F4	NX-Core	1.1	137.2		2.26E-04
EW-16 CORE 166	11/13/93	166	F4	NX-Core	1.7	133		2.06E-06
EW-16 CORE 186	11/14/93	186	F4	NX-Core	0.9	136.1		2.24E-04
B-1-77	05/21/96	77	F2	Drive	10.9	117.5	2.55	4.90E-07
B-1-80	05/21/96	80	F2	Drive	23.3	109.7	2.8	2.50E-06
B-1-92	05/21/96	92	F3	Drive	6.9	130.2	2.55	1.10E-02
B-2-54	05/24/96	54	F2	Drive	9.9	131.9	2.65	6.30E-06
EW-19-70	05/31/96	70	F2	Drive	8.7	127.5	2.65	3.30E-07
EW-19-85	05/31/96	85	F2	Drive	17.6	111.2	2.65	2.10E-05

Notes:

pcf - pounds per cubic foot

cm/sec - centimeters per second

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 4.3
ENUMERATIONS OF TOTAL AEROBIC AND ANAEROBIC MICROORGANISMS IN SOIL AND GROUNDWATER

Sample Designation	HLA Job No.	Sample Type	Total Microorganisms in cfu/grams(2) and cfu/milliliter(3)	
			Aerobic	Anaerobic
B-1-100	96-6500	soil(1)	1.2×10^5	4.2×10^5
B-1-115	96-6503	soil(1)	1.6×10^5	2.0×10^5
B-2-95	96-6506	soil(1)	1.1×10^5	1.6×10^5
B-2-100	96-6509	soil(1)	1.4×10^5	3.5×10^5
B-2-103	96-6512	soil(1)	3.1×10^5	1.7×10^5
B-2-110	96-6515	soil(1)	6.3×10^5	8.7×10^5
B-1-117	96-9618	soil(1)	1.1×10^5	6.1×10^5
EW-PZ-1 Composite	96-6605	water(1)	2.2×10^5	1.65×10^5

NOTES:

See Figure 6.4 for soil boring locations.

Soil samples were analyzed on June 7, 1996; groundwater samples were analyzed on August 14, 1996.

cfu/gram	Colony forming units per gram.
cfu/milliliter	Colony forming units per milliliter.

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 5.1 BEDROCK GEOLOGY

Boring Id	Location	Date Sampled	Drill Method	Depth to Bedrock	Unit Name	Notes
B-1	A(1-4) 18cac	5/22/96	Rotosonic	119	Tempe Beds	Well lithified red sandstone with silt
B-2	A(1-4) 18cac	5/28/96	Rotosonic	118	Tempe Beds	Fairly lithified sandy with pea gravel
B-2 (Earth	A(1-3) 12cdc	4/14/95	Becker	137	Tempe Beds	Logged by Martin Minter (Earth Tech) - his call for Ttb
B-3 (Earth	A(1-3) 13acc	4/19/95	Becker	180	Tempe Beds	Logged by G. Bender (Earth Tech) - his call for Ttb
B-5 (Earth	A(1-3) 14daa	4/26/95	Becker	189	Tempe Beds	Logged by Martin Minter (Earth Tech) - his call for Ttb
EW-12	A(1-3) 13dcc	1/18/91	Air Rotary/Core	182	Camels Head?	Similar to EXB1A?
EW-15	A(1-4) 18cac	11/24/93	Becker/Core	113	Camels Head?	Poorly lithified, looks like Tovrea granite clasts, some up to 6", angular
EW-16	A(1-4) 18cac	11/14/93	Becker/Core	140	Tempe Beds	Classic Tempe Beds, excellent core recovery
EW-17	A(1-4) 18ccc	11/14/93	Becker/Core	175	Tempe Beds	Looks like coarse zone from Tempe Beds along Curry Road
EW-19	A(1-4) 18cac	6/3/96	Rotosonic	113	Tempe Beds	Fairly lithified sandy with pea gravel
EW-22	A(1-3) 13acd	4/22/95	Becker	162	Tempe Beds	Boring B-4 (Earth Tech) Logged by Martin Minter (Earth Tech) - his call for Ttb
EW-3	A(1-4) 18dbd	1/12/89	Mud Rotary	140	Tempe Beds?	Apparently Tempe Beds based on deeper samples
EW-6	A(1-4) 18cac	2/16/89	Air Rotary	113	Camels Head?	Orange silt was noted in EW-15 above bedrock
EW-7	A(1-3) 13ddd	12/27/90	Air Rotary/Core	161	Tempe Beds	Similar to EW-17
EW-8	A(1-4) 18cbd	11/15/90	Air Rotary/Core	153	Tempe Beds	Similar to EW-16
EW-RW1	A(1-4) 18cac	11/30/90	Air Rotary	114	Tempe Beds?	Does not agree with EW-15, but could be Tempe Beds?
EW-RW2	A(1-4) 18cbd	11/12/91	Dual Rotary	153	Tempe Beds	Probably Tempe Beds
EX-B1A	A(1-3) 13dac	10/12/93	Becker/Core	178	Camels Head?	Poorly lithified, with 1/2" clasts, could be coarse grained Tempe Beds
USBR	A(1-3) 13dbb	10/13/64	Cable Tool?	158	Tempe Beds?	USBR Boring - At 200 feet hit classic Tempe Beds

Note:
Data from Harding Lawson and Associates Draft RI Report, September 5, 1997

TABLE 6.1 SUMMARY OF SURFACE SOIL ANALYTICAL DATA

Chemicals	Range of Onsite [a] Concentrations (mg/kg)	Background Sample [a] Concentrations (mg/kg)	Average AZ Soil [b] Concentrations (mg/kg)	EPA Region IX [c] PRG (mg/kg)
Metals				
Antimony	<0.3	<0.3	1.7	680
Arsenic	2.6-4.3	2.9	9.4	2
Barium	47.5-126	61.9	161	100,000
Berylium	<0.3-0.38	0.25	1.1	1.1
Boron	<5	<5	NP	61,000
Cadmium	0.06-0.80	0.08	0.4	850
Chromium	2.6-9.7	4.3	17.5	1,600
Copper	11.3-258	9.5	16.6	63,000
Lead	7.9-109	5.3	7.7	1,000
Manganese	18.4-269	162	NP	8,300
Mercury	<0.1	<0.1	0.05	510
Nickel	8.1-18.1	15.4	18.2	34,000
Selenium	<0.3	<0.3	0.6	8,500
Silver	<0.3-0.15	<0.03	0.5	8,500
Thallium	<0.3	<0.3	0.7	140
Organochlorine Pesticides and PCBs				
Beta-BHC	<0.005-0.038	<0.005	NA	1.1
4,4'-DDD	<0.01-0.06	<0.01	NA	7.9
4,4'-DDE	<0.01-0.7	<0.01	NA	5.6
4,4'-DDT	<0.01-0.6	<0.01	NA	5.6
Aroclor 1254	<0.03-0.08	<0.03	NA	19
Semi-Volatiles				
bis(2-ethylhexyl)phthalate	<0.17-0.27	<0.17	NA	140

Notes:

See Figure 6.1 for subsurface soil sample locations

a - Source: Surface soil sampling; HLA, 1995

b - Earth Technology, 1991

c - Commercial/Industrial use

mg/kg milligrams per kilogram

EPA U.S. Environmental Protection Agency

PRG Preliminary Remediation Goal

NA Not applicable - not found in native soil

NP Not provided

AZ Arizona

TABLE 6.2 SOIL BORING/TEST PIT DATA

Location	Total Depth (Feet bgs)	Refuse Depth (Feet bgs)	Refuse Thickness (Feet)	Comments
SR-3	37.0	1	31	paper, plastic, glass, wood and construction debris
SR-6	39.0	2	32	newspaper, plastic, glass, vegetation and wood
SR-10	43.0	2	35	paper, plastic, glass, wood, and construction debris
SR-2	7.0	none	-	some refuse at 1-4 feet
SR-4	7.0	0	ND	cement, block, wood, metal and mixed domestic
SR-5	8.0	1	ND	construction and domestic
SR-7	5.5	none	-	some domestic refuse at 1 foot
SR-9	5.0	none	-	some domestic refuse at 1.5 feet
SR-11	6.0	none	-	some domestic refuse at 1-2 feet
SR-12	6.0	none	-	some domestic refuse at 1.5 feet
SR-13	4.5	none	-	some domestic refuse at 1-3 feet
SR-14	7.0	none	-	
SR-15	8.0	none	-	
CH-1	9.5	6	ND	wood, car parts
CH-2	10.0	none	-	
CH-3	10.0	none	-	
CH-4	11.0	none	-	trace of refuse
CH-5	11.0	none		
CH-6	11.0	5	ND	paper, plastic, and vegetation
CH-7	11.5	none	-	
CH-8	3.0	1	ND	concrete and cobbles
CH-9	44.0	16	21	newspaper, wood vegetation, plastic and tires
CH-10	10.0	none	-	
CH-11	7.0	none	-	trace of refuse
CH-12	10.0	none	-	
CH-13	8.0	none	-	trace of refuse
CH-14	9.5	none	-	
CH-16	39.0	none	-	
CH-18	6.5	none	-	trace of refuse
CH-20	7.0	0	ND	asphaltic concrete, some pipe
CH-23	7.0	none	-	
CH-25	7.0	none	-	

TABLE 6.2 SOIL BORING/TEST PIT DATA

Location	Total Depth (Feet bgs)	Refuse Depth (Feet bgs)	Refuse Thickness (Feet)	Comments
CH-111	29.0	none	-	
CH-116	7.5	4	ND	wood, paper, wire and plastic
CH-118	43.0	7	24	glass, plastic, brick and vegetation
CH-119	49.0	13	29	wood, newspaper, plastic, metal and vegetation
CH-120	44.0	none	-	
CH-121	47.0	11	27	paper, glass, plastic, metal and vegetation
CH-122	29.0	4	11	newspaper, wood, vegetation and ashes
CH-123	44.0	none	-	trace of refuse
CH-124	49.0	20	25	wood, vegetation, glass and plastic
CH-125	33.0	none	-	some refuse at 20-23 feet
CH-126	25.0	none	-	
CH-127	30.0	19	12	wood, vegetation, glass, newspaper, and plastic
CH-128	31.0	none	-	
CH-129	29.0	none	-	
CH-130	29.0	none	-	

NOTES:
See Figure 6.2 for soil boring locations.
Source: SH&B, 1988.
All measurements in feet.

bgs	below ground surface
ND	Not detected

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 6.3
SUMMARY OF SUBSURFACE SOIL ANALYTICAL DATA
VOCs, METALS, PESTICIDES, AND PCBs

Parameter	EPA Test Method	Sample ID, Sample Depth and Date Collected																
		EL-1 40'-41' 5-10-93	EL-1(DUP) 40'-41' 5-10-93	EL-1 50'-51' 5-10-93	EL-2 10'-11' 5-11-93	EL-2(DUP) 10'-11' 5-11-93	EL-2 20'-21' 5-11-93	EL-3 25'-26' 5-11-93	EL-3 45'-46' 5-11-93	EL-4 10'-11' 5-12-93	EL-4 30'-31' 5-12-93	EL-4(DUP) 30'-31' 5-12-93	EL-7 40'-41' 5-13-93	EL-7 50'-51' 5-13-93	EL-8 15'-16' 5-13-93	EL-8(DUP) 15'-16' 5-13-93	EL-6 10'-11' 5-14-93	EL-6(DUP) 10'-11' 5-14-93
Silver	6010	1	2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	6010	<6	<6	<6	<5	<5	5	<5	<5	6	14	14	<5	<5	<5	5	<5	<5
Barium	6010	140	140	100	386	397	98	66.8	57.1	92.1	138	130	79.8	86.5	122	143	95.5	85.6
Beryllium	6010	0.2	0.2	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	0.4
Cadmium	6010	2.0	2.1	1.0	0.4	0.4	0.5	<0.3	<0.3	<0.3	3.9	1.4	<0.3	<0.3	0.8	0.8	<0.3	<0.3
Chromium	6010	26	24	27	24	26.7	20.9	21.3	19.2	14.8	36.4	47.4	22.2	35.8	22.7	23.2	22.7	26.4
Copper	6010	75	69	27	117	84.8	59.7	41.1	40.6	32.3	114	108	32.2	874	33.6	45.5	24.3	33.3
Mercury	7471	<0.2	<0.2	<0.2	0.2	0.3	0.2	<0.1	<0.1	0.2	0.3	0.4	0.9	<0.1	0.2	0.2	<0.1	<0.1
Nickel	6010	27	34	18	28.4	34.3	16.3	14.3	13.4	35.2	36.5	35.7	26.6	25.0	19.6	19.6	16.9	18.2
Lead	6010	110	69	38	567	1,780	103	12	20	35	156	199	20	1,250	101	151	17	16
Antimony	6010	<6	<6	<6	<3	<3	<3	<3*	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Selenium	6010	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Thallium	6010	<10	<10	<10	<5*	<5*	<5	<5*	<5*	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc	6010	230	270	87	232	227	204	86.9	85.8	78.9	2,210	1,440	56.8	578	88.5	104	67.0	71.8
Aldrin	8080	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Alpha-BHC	8080	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Beta-BHC	8080	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Gamma-BHC	8080	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Delta-BHC	8080	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Alpha-Chlordane	8080	<1.0	<1.0	<0.5	<5.0	<5.0	<1.0	<0.25	<0.5	<0.5	<2.5	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Gamma-Chlordane	8080	<1.0	<1.0	<0.5	<5.0	<5.0	<1.0	<0.25	<0.5	<0.5	<2.5	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDD	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	0.33	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	0.2	0.2	<0.2	<0.2
4,4'-DDE	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	0.06	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	1.1	0.2	<0.2	<0.2
4,4'-DDT	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulfate	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Ketone	8080	<0.2	<0.2	<0.1	<1.0	<1.0	<0.2	<0.05	<0.1	<0.1	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	8010	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Heptachlor Epoxide	8010	<0.100	<0.100	<0.050	<0.50	<0.50	<0.100	<0.025	<0.050	<0.050	<0.250	<0.250	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Methoxychlor	8010	<1.0	<1.0	<0.5	<5.0	<5.0	<1.0	<0.025	<0.5	<0.5	<2.5	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toxaphene	8010	<2.0	<2.0	<0.10	<10	<10	<2.0	<0.5	<1.0	<1.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Aroclor 1016	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1221	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1232	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1242	8010	<0.6	<0.6	<0.3	<3.0	<3.0	0.03	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1248	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1254	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Aroclor 1260	8010	<0.6	<0.6	<0.3	<3.0	<3.0	<0.6	<0.15	<0.3	<0.3	<1.5	<1.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Bromodichloromethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bromoform	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bromomethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Carbon Tetrachloride	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	8010	<0.025	<0.025	<0.025	0.29	0.22	0.05	<0.025	<0.025	<0.025	0.03	0.03	0.04	0.05	0.03	0.04	<0.025	<0.025
Chloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 6.3
SUMMARY OF SUBSURFACE SOIL ANALYTICAL DATA
VOCs, METALS, PESTICIDES, AND PCBs

Parameter	EPA Test Method	Sample ID, Sample Depth and Date Collected																
		EL-1 40'-41' 5-10-93	EL-1(DUP) 40'-41' 5-10-93	EL-1 50'-51' 5-10-93	EL-2 10'-11' 5-11-93	EL-2(DUP) 10'-11' 5-11-93	EL-2 20'-21' 5-11-93	EL-3 25'-26' 5-11-93	EL-3 45'-46' 5-11-93	EL-4 10'-11' 5-12-93	EL-4 30'-31' 5-12-93	EL-4(DUP) 30'-31' 5-12-93	EL-7 40'-41' 5-13-93	EL-7 50'-51' 5-13-93	EL-8 15'-16' 5-13-93	EL-8(DUP) 15'-16' 5-13-93	EL-6 10'-11' 5-14-93	EL-6(DUP) 10'-11' 5-14-93
Chloromethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibromochloromethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,3-Dichlorobenzene	8010	<0.025	<0.025	<0.025	<0.125	<0.125	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
1,2- & 1,4-Dichlorobenzene	8010	0.09	0.14	0.04	2.0	1.5	0.32	0.07	<0.025	<0.025	0.12	0.11	0.27	0.18	0.07	0.08	0.09	0.10
Dichlorodifluoromethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,1-Dichloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,1-Dichloroethene	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethene (Total)	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cis-1,3-Dichloropropene	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trans-1,3-Dichloropropene	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methylene Chloride	8010	<0.01	<0.01	<0.01	<0.5	<0.5	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrachloroethene	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trichloroethene	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trichlorofluoromethane	8010	<0.025	<0.025	<0.025	<0.125	<0.125	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Trichlorotrifluoroethane	8010	<0.10	<0.10	<0.10	<0.50	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Vinyl Chloride	8010	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chloroethyl Vinyl Ether	8010	<0.025	<0.025	<0.025	<0.125	<0.125	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025

NOTES:

Source: Hargis & Associates, 1993.

See Figure 6.3 for soil boring locations.

Soil borings completed by Hargis & Associates were identified as numbers 1 through 8. However, the soil samples were identified as EL-1 through EL-8 with a specific sample depth.

Sample depth in feet below grade.

All concentrations reported in milligrams per kilogram.

DUP	Duplicate sample.
mg/kg	Milligrams per kilogram.
<	Less than.
*	Antimony analysis was performed by EPA Test Method 7041.
*	Thallium analysis were performed by EPA Test Method 7841.

Table reprinted from draft RI Report (HLA, 9/97)

TABLE 6.4 SUMMARY OF SUBSURFACE ANALYTICAL DATA
OTHER ANALYSES

Parameter	Sample ID, Sample Depth and Date Collected								Units
	EL-1 40'-41' 5-10-93	EL-1(DUP) 40'-41' 5-10-93	EL-1 50'-51' 5-10-93	EL-2 10'-11' 5-11-93	EL-2(DUP) 10'-11' 5-11-93	EL-2 20'-21' 5-11-93	EL-3 25'-26' 5-11-93	EL-3 45'-46' 5-11-93	
Moisture Content (ASTM D2216-80)	17.1	16.9	11.6	18.1	16.1	17.9	4.4	5.7	%
TCLP Lead (TCLP 1311/6010)	NA	NA	NA	NA	NA	NA	NA	NA	mg/l

NOTES:
Source: Hargis & Associates, 1993.
See Figure 6.3 for soil boring location.
Soil borings completed by Hargis & Associates were identified as numbers 1 through 8. However, the soil samples were identified as EL-1 through EL-8 with a specific sample depth.
Sample Depth in feet below grade.

DUP	Duplicate sample
ASTM	American Society for Testing and Materials
TCLP	Toxicity Characteristic Leaching Procedure
NA	Not Analyzed
%	Percent
mg/l	Milligrams per liter
<	Less than

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 6.4 SUMMARY OF SUBSURFACE SOIL ANALYTICAL DATA
OTHER ANALYSES

Parameter	Sample ID, Sample Depth and Date Collected								Units
	EL-4 10'-11' 5-12-93	EL-4 30'-31' 5-12-93	EL-4(DUP) 30'-31' 5-12-93	EL-7 40'-41' 5-13-93	EL-7 50'-51' 5-13-93	EL-8 15'-16' 5-13-93	EL-8(DUP) 15'-16' 5-13-93	EL-6 10'-11' 5-14-93	
Moisture Content (ASTM D2216-80)	10.5	15.2	13.9	17.8	16.2	13.8	13.2	11.6	%
TCLP Lead (TCLP 1311/6010)	NA	NA	NA	NA	NA	NA	NA	NA	mg/l

NOTES:

Source: Hargis & Associates, 1993.

See Figure 6.3 for soil boring location.

Soil borings completed by Hargis & Associates were identified as numbers 1 through 8. However, the soil samples were identified as EL-1 through EL-8 with a specific sample depth.

Sample Depth in feet below grade.

DUP	Duplicate sample
ASTM	American Society for Testing and Materials
TCLP	Toxicity Characteristic Leaching Procedure
NA	Not Analyzed
%	Percent
mg/l	Milligrams per liter

<Less than

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 6.4 SUMMARY OF SUBSURFACE SOIL ANALYTICAL DATA
OTHER ANALYSES

Parameter	Sample ID, Sample Depth and Date Collected						Units
	EL-6(DUP) 10'-11' 5-14-93	EL-2 -- 5-24-93*	EL-4 -- 5-24-93*	EL-1 -- 5-24-93*	EL-7 -- 5-24-93*	EL-8 -- 5-24-93*	
Moisture Content (ASTM D2216-80)	10.4	NA	NA	NA	NA	NA	%
TCLP Lead (TCLP 1311/6010)	NA	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l

NOTES:

Source: Hargis & Associates, 1993.

See Figure 6.3 for soil boring location.

Soil borings completed by Hargis & Associates were identified as numbers 1 through 8. However, the soil samples were identified as EL-1 through EL-8 with a specific sample depth.

Sample Depth in feet below grade.

DUP	Duplicate sample
ASTM	American Society for Testing and Materials
TCLP	Toxicity Characteristic Leaching Procedure
NA	Not Analyzed
%	Percent
mg/l	Milligrams per liter
<	Less than

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 6.5 VOC ANALYTICAL RESULTS
SOIL BORINGS B-1 AND B-2

EPA Method 8021	B-1-72	B-1-80	B-1-92	B-2-65	B-2-70
Benzene	<50	<50	<50	<50	<50
Bromodichloromethane	<50	<50	<50	<50	<50
Bromoform	<50	<50	<50	<50	<50
Bromomethane	<50	<50	<50	<50	<50
Carbon tetrachloride	<50	<50	<50	<50	<50
Chlorobenzene	<50	<50	<50	<50	<50
Chloroethane	<50	<50	<50	<50	<50
Chloroform	<50	<50	<50	<50	<50
Chloromethane	<50	<50	<50	<50	<50
Dibromochloromethane	<50	<50	<50	<50	<50
1,2-Dichlorobenzene	<50	<50	<50	<50	<50
1,3-Dichlorobenzene	<50	<50	<50	<50	<50
1,4-Dichlorobenzene	<50	<50	<50	<50	<50
Dichlorodifluoromethane	<50	<50	<50	64*	62*
1,1-Dichloroethane	<50	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50	<50
1,1-Dichloroethene	<50	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	<50	<50	<50
trans-1,2-Dichloroethene	<50	<50	<50	<50	<50
1,2-Dichloropropane	<50	<50	<50	<50	<50
cis-1,3-Dichloropropene	<50	<50	<50	<50	<50
trans-1,3-Dichloropropene	<50	<50	<50	<50	<50
Ethylbenzene	<50	<50	<50	<50	<50
Methylene Chloride	<200	<200	<200	<200	<200
1,1,2,2-Tetrachloroethane	<50	<50	<50	<50	<50
Tetrachloroethene (PCE)	<50	<50	<50	<50	<50
Toluene	<50	<50	<50	<50	<50
1,1,1-Trichloroethane	<50	<50	<50	<50	<50
1,1,2-Trichloroethane	<50	<50	<50	<50	<50
Trichloroethene (TCE)	<50	<50	<50	<50	<50
Trichlorofluoromethane	<50	<50	<50	<50	<50
Vinyl Chloride	<50	<50	<50	<50	<50
m,p-Xylene	<100	<100	<100	<100	<100
o-Xylene	<50	<50	<50	<50	<50

NOTES:

See Figure 6.4 for soil boring locations.
Soil samples collected in June, 1996.
All concentrations reported in micrograms per kilogram.

VOC	Volatile organic compound
EPA	U.S. Environmental Protection Agency
B-1-72	Indicates soil boring number and depth of sample collection.
<	Less than, the number represents the minimum reporting limit.
*	Detected compounds may have been due to background laboratory contamination.
	Sample was reanalyzed past the EPA recommended holding time. The compounds were below the minimum reporting limit in the repeat analysis. Detected compounds may have been due to background laboratory contamination.

Data from Harding Lawson and Associates Draft RI report. September 5, 1997

TABLE 6.5 VOC ANALYTICAL RESULTS
SOIL BORINGS B-1 AND B-2

EPA Method 8021	B-2-75	B-2-80	B-2-85	B-2-90
Benzene	<50	<50	<50	<50
Bromodichloromethane	<50	<50	<50	<50
Bromoform	<50	<50	<50	54
Bromomethane	<50	<50	<50	<50
Carbon tetrachloride	<50	<50	<50	<50
Chlorobenzene	<50	<50	<50	<50
Chloroethane	<50	<50	<50	<50
Chloroform	<50	<50	<50	<50
Chloromethane	<50	<50	<50	<50
Dibromochloromethane	<50	<50	<50	92
1,2-Dichlorobenzene	67**	<50	<50	<50
1,3-Dichlorobenzene	53**	<50	<50	<50
1,4-Dichlorobenzene	<50	<50	<50	<50
Dichlorodifluoromethane	130*	220*	240*	<50
1,1-Dichloroethane	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50
1,1-Dichloroethene	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	94*	<50
trans-1,2-Dichloroethene	<50	<50	<50	<50
1,2-Dichloropropane	<50	<50	<50	<50
cis-1,3-Dichloropropene	<50	<50	<50	<50
trans-1,3-Dichloropropene	<50	<50	<50	<50
Ethylbenzene	<50	<50	<50	<50
Methylene Chloride	<200	700*	580*	280*
1,1,2,2-Tetrachloroethane	<50	<50	<50	<50
Tetrachloroethene (PCE)	<50	<50	<50	<50
Toluene	<50	<50	<50	<50
1,1,1-Trichloroethane	<50	<50	<50	<50
1,1,2-Trichloroethane	<50	<50	<50	<50
Trichloroethene (TCE)	<50	<50	<50	<50
Trichlorofluoromethane	<50	<50	<50	<50
Vinyl Chloride	<50	<50	<50	<50
m,p-Xylene	<100	<100	<100	<100
o-Xylene	<50	<50	<50	<50

NOTES:

See Figure 6.4 for soil boring locations.

Soil samples collected in June, 1996.

All concentrations reported in micrograms per kilogram.

VOC	Volatile organic compound.
EPA	U.S. Environmental Protection Agency.
B-1-72	Indicates soil boring number and depth of sample collection.
<	Less than, the number represents the minimum reporting limit.
*	Detected compounds may have been due to background laboratory contamination.
**	Sample was reanalyzed past the EPA recommended holding time. The compounds were below the minimum reporting limit in the repeat analysis. Detected compounds may have been due to background laboratory contamination

Data from Harding Lawson and Associates Draft RI report, September 5, 1997

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B1-(S/37.5)-(5-5-99)	Soil	37.5	05/05/99	EPA 6010B	Arsenic	5	8.4	10	mg/Kg
				EPA 6010B	Barium	1	90	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.4	38	mg/Kg
				EPA 6010B	Chromium	2	31	2,100	mg/Kg
				EPA 6010B	Copper	2.5	61	2,800	mg/Kg
				EPA 6010B	Lead	2.5	6	400	mg/Kg
				EPA 6010B	Manganese	0.05	460	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.027	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	18	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	37	23,000	mg/Kg
QST-B1-(S/54)-(5-5-99)	Soil	54	05/05/99	EPA 6010B	Arsenic	5	7.9	10	mg/Kg
				EPA 6010B	Barium	0.01	65	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	32	2,100	mg/Kg
				EPA 6010B	Copper	2.5	38	2,800	mg/Kg
				EPA 6010B	Lead	2.5	5	400	mg/Kg
				EPA 6010B	Manganese	5	340	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.027	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	16	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	24	23,000	mg/Kg
QST-B2-(S/8)-(5/3/99)	Soil	8	05/03/99	EPA 8082	Aroclor 1242	1,000	3,200	2,500	ug/Kg
				EPA 8260B	1,4-Dichlorobenzene	100	120	190,000	ug/Kg
				EPA 8260B	Naphthalene	250	290	2,600,000	ug/Kg
				EPA 6010B	Barium	1	76	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.2	38	mg/Kg
				EPA 6010B	Chromium	2	16	2,100	mg/Kg
				EPA 6010B	Copper	2.5	58	2,800	mg/Kg
				EPA 6010B	Lead	2.5	39	400	mg/Kg
				EPA 6010B	Manganese	0.05	160	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.11	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	10	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	68	23,000	mg/Kg
QST-B2-(S/65)-(5/4/99)	Soil	65	05/04/99	EPA 8260B	Carbon Disulfide	250	370	7,500	ug/Kg
				EPA 6010B	Arsenic	5	9.3	10	mg/Kg
				EPA 6010B	Barium	1	49	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.83	38	mg/Kg
				EPA 6010B	Chromium	2	19	2,100	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B2-(S/65)-(5/4/99)	Soil	65	05/04/99	EPA 6010B	Copper	2.5	24	2,800	mg/Kg
				EPA 6010B	Lead	2.5	6.2	400	mg/Kg
				EPA 6010B	Manganese	0.05	230	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	22	23,000	mg/Kg
QST-B3-(S/45)-(5/3/99)	Soil	45	05/03/99	EPA 6010B	Arsenic	5	9.9	10	mg/Kg
				EPA 6010B	Barium	0.01	170	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.97	38	mg/Kg
				EPA 6010B	Chromium	2	17	2,100	mg/Kg
				EPA 6010B	Copper	2.5	63	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.9	400	mg/Kg
				EPA 6010B	Manganese	5	760	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	14	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	39	23,000	mg/Kg
QST-B3-(S/75)-(5/4/99)	Soil	75	05/04/99	EPA 6010B	Arsenic	5	11	10	mg/Kg
				EPA 6010B	Barium	0.01	93	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.99	38	mg/Kg
				EPA 6010B	Chromium	2	25	2,100	mg/Kg
				EPA 6010B	Copper	2.5	44	2,800	mg/Kg
				EPA 6010B	Lead	2.5	6.1	400	mg/Kg
				EPA 6010B	Manganese	5	360	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	17	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	46	23,000	mg/Kg
QST-B4-(S/35)-(5-4-99)	Soil	35	05/04/99	EPA 6010B	Barium	1	56	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.93	38	mg/Kg
				EPA 6010B	Chromium	2	19	2,100	mg/Kg
				EPA 6010B	Copper	2.5	33	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4	400	mg/Kg
				EPA 6010B	Manganese	0.05	270	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	22	23,000	mg/Kg
QST-B4-(S/49)-(5-4-99)	Soil	49	05/04/99	EPA 6010B	Barium	1	150	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.72	38	mg/Kg
				EPA 6010B	Chromium	2	22	2,100	mg/Kg
				EPA 6010B	Copper	2.5	43	2,800	mg/Kg
				EPA 6010B	Lead	2.5	8.7	400	mg/Kg
				EPA 6010B	Manganese	0.05	280	3,200	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B4-(S/49)-(5-4-99)	Soil	49	05/04/99	EPA 6010B	Nickel	2.5	11	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	29	23,000	mg/Kg
QST-B5-(S/20)-(5-5-99)	Soil	20	05/05/99	EPA 6010B	Barium	1	110	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2.1	38	mg/Kg
				EPA 6010B	Chromium	2	28	2,100	mg/Kg
				EPA 6010B	Copper	2.5	89	2,800	mg/Kg
				EPA 6010B	Lead	2.5	20	400	mg/Kg
				EPA 6010B	Manganese	0.05	320	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.15	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	41	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	110	23,000	mg/Kg
QST-B5-(S/43)-(5-5-99)	Soil	43	05/05/99	EPA 8270	Diethyl phthalate	100	200	52,000,000	ug/Kg
				EPA 6010B	Barium	0.01	66	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.75	38	mg/Kg
				EPA 6010B	Chromium	2	22	2,100	mg/Kg
				EPA 6010B	Copper	2.5	20	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3	400	mg/Kg
				EPA 6010B	Manganese	5	130	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.025	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	9.1	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	17	23,000	mg/Kg
QST-B6-(S/36)-(5-6-99)	Soil	36	05/06/99	EPA 6010B	Barium	1	90	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	25	2,100	mg/Kg
				EPA 6010B	Copper	2.5	48	2,800	mg/Kg
				EPA 6010B	Lead	2.5	5.3	400	mg/Kg
				EPA 6010B	Manganese	0.05	450	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.029	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	13	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	34	23,000	mg/Kg
QST-B6-(S/55)-(5/6/99)	Soil	55	05/06/99	EPA 6010B	Barium	0.01	38	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.89	38	mg/Kg
				EPA 6010B	Chromium	2	24	2,100	mg/Kg
				EPA 6010B	Copper	2.5	42	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.5	400	mg/Kg
				EPA 6010B	Manganese	5	270	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B6-(S/55)-(5-6-99)	Soil	55	05/06/99	EPA 6010B	Zinc	2.5	29	23,000	mg/Kg
QST-B7-(S/37)-(5-12-99)	Soil	37	05/12/99	EPA 6010B	Arsenic	5	6	10	mg/Kg
				EPA 6010B	Barium	1	67	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.67	38	mg/Kg
				EPA 6010B	Chromium	2	17	2,100	mg/Kg
				EPA 6010B	Copper	2.5	20	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.6	400	mg/Kg
				EPA 6010B	Manganese	5	280	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	14	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	22	23,000	mg/Kg
QST-B7-(S/55)-(5-12-99)	Soil	55	05/12/99	EPA 6010B	Arsenic	5	7.9	10	mg/Kg
				EPA 6010B	Barium	1	61	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.89	38	mg/Kg
				EPA 6010B	Chromium	2	28	2,100	mg/Kg
				EPA 6010B	Copper	2.5	25	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.2	400	mg/Kg
				EPA 6010B	Manganese	5	330	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	16	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	23	23,000	mg/Kg
QST-B8-(S/35)-(5-11-99)	Soil	35	05/11/99	EPA 6010B	Arsenic	5	6.1	10	mg/Kg
				EPA 6010B	Barium	1	58	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.79	38	mg/Kg
				EPA 6010B	Chromium	2	43	2,100	mg/Kg
				EPA 6010B	Copper	2.5	22	2,800	mg/Kg
				EPA 6010B	Lead	2.5	2.9	400	mg/Kg
				EPA 6010B	Manganese	5	280	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	15	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	27	23,000	mg/Kg
QST-B8-(S/45)-(5-11-99)	Soil	45	05/11/99	EPA 6010B	Barium	1	47	5,300	mg/Kg
				EPA 6010B	Chromium	2	21	2,100	mg/Kg
				EPA 6010B	Copper	2.5	16	2,800	mg/Kg
				EPA 6010B	Manganese	5	170	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.051	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	11	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	25	23,000	mg/Kg
				EPA 6010B	Barium	1	81	5,300	mg/Kg
QST-B9-(S/20)-(5-12-99)	Soil	20	05/12/99	EPA 6010B	Cadmium	0.5	1.5	38	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B9-(S/20)-(5-12-99)	Soil	20	05/12/99	EPA 6010B	Chromium	2	55	2,100	mg/Kg
				EPA 6010B	Copper	2.5	39	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.2	400	mg/Kg
				EPA 6010B	Manganese	5	410	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	20	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	48	23,000	mg/Kg
QST-B9-(S/50)-(5-12-99)	Soil	50	05/12/99	EPA 6010B	Arsenic	5	5.5	10	mg/Kg
				EPA 6010B	Barium	1	64	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.57	38	mg/Kg
				EPA 6010B	Chromium	2	20	2,100	mg/Kg
				EPA 6010B	Copper	2.5	16	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.4	400	mg/Kg
				EPA 6010B	Manganese	5	220	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	18	23,000	mg/Kg
QST-B10-(S/10)-(5-11-99)	Soil	10	05/11/99	EPA 6010B	Barium	1	59	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.5	38	mg/Kg
				EPA 6010B	Chromium	2	9.4	2,100	mg/Kg
				EPA 6010B	Copper	2.5	9.3	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.9	400	mg/Kg
				EPA 6010B	Manganese	5	180	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	8.9	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	25	23,000	mg/Kg
QST-B10-(S/50)-(5-12-99)	Soil	50	05/12/99	EPA 6010B	Antimony	5	7	31	mg/Kg
				EPA 6010B	Arsenic	5	10	10	mg/Kg
				EPA 6010B	Barium	1	140	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.5	38	mg/Kg
				EPA 6010B	Chromium	2	180	2,100	mg/Kg
				EPA 6010B	Copper	2.5	29	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.8	400	mg/Kg
				EPA 6010B	Manganese	5	690	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	28	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	26	23,000	mg/Kg
QST-B11-(S/5)-(5-19-99)	Soil	5	05/19/99	EPA 8081A	4,4'-DDD	5	9.9	19,000	ug/Kg
				EPA 8081A	4,4'-DDE	5	20	13,000	ug/Kg
				EPA 6010B	Barium	1	82	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B11-(S/5)-(5-19-99)	Soil	5	05/19/99	EPA 6010B	Chromium	2	15	2,100	mg/Kg
				EPA 6010B	Copper	2.5	8.3	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.2	400	mg/Kg
				EPA 6010B	Manganese	5	170	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	17	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	18	23,000	mg/Kg
QST-B11-(S/66)-(5-19-99)	Soil	66	05/19/99	EPA 8270	Bis(2-ethylhexyl)phthalate	2,000	2,300	320,000	ug/Kg
				EPA 6010B	Barium	1	47	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.66	38	mg/Kg
				EPA 6010B	Chromium	2	15	2,100	mg/Kg
				EPA 6010B	Copper	2.5	17	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.4	400	mg/Kg
				EPA 6010B	Manganese	5	190	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	9.5	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	29	23,000	mg/Kg
QST-B12-(S/34)-(5-20-99)	Soil	34	05/20/99	EPA 6010B	Barium	1	65	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.4	38	mg/Kg
				EPA 6010B	Chromium	2	19	2,100	mg/Kg
				EPA 6010B	Copper	2.5	30	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.8	400	mg/Kg
				EPA 6010B	Manganese	5	340	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.029	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	19	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	46	23,000	mg/Kg
QST-B12-(S/45)-(5-20-99)	Soil	45	05/20/99	EPA 6010B	Barium	1	36	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	22	2,100	mg/Kg
				EPA 6010B	Copper	2.5	16	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.6	400	mg/Kg
				EPA 6010B	Manganese	5	160	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.021	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	16	23,000	mg/Kg
QST-B12-(S/45)-(DUP)	Soil	45	05/20/99	EPA 6010B	Barium	1	31	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1	38	mg/Kg
				EPA 6010B	Chromium	2	28	2,100	mg/Kg
				EPA 6010B	Copper	2.5	17	2,800	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B12-(S/45)-(DUP)	Soil	45	05/20/99	EPA 6010B	Lead	2.5	3.7	400	mg/Kg
				EPA 6010B	Manganese	5	88	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	11	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	16	23,000	mg/Kg
QST-B13-(S/40)-(5-20-99)	Soil	40	05/20/99	EPA 6010B	Barium	1	38	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	14	2,100	mg/Kg
				EPA 6010B	Copper	2.5	9.3	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.4	400	mg/Kg
				EPA 6010B	Manganese	5	140	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	18	23,000	mg/Kg
QST-B13-(S/40)-(DUP)	Soil	40	05/20/99	EPA 6010B	Arsenic	5	7	10	mg/Kg
				EPA 6010B	Barium	1	28	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.3	38	mg/Kg
				EPA 6010B	Chromium	2	15	2,100	mg/Kg
				EPA 6010B	Copper	2.5	6.7	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.9	400	mg/Kg
				EPA 6010B	Manganese	5	150	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	13	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	17	23,000	mg/Kg
QST-B13-(S/50)-(5-20-99)	Soil	50	05/20/99	EPA 6010B	Arsenic	5	6	10	mg/Kg
				EPA 6010B	Barium	1	52	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.98	38	mg/Kg
				EPA 6010B	Chromium	2	26	2,100	mg/Kg
				EPA 6010B	Copper	2.5	42	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3	400	mg/Kg
				EPA 6010B	Manganese	5	200	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	11	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	31	23,000	mg/Kg
QST-B13-(S/50)-(DUP)	Soil	50	05/20/99	EPA 6010B	Arsenic	5	6.5	10	mg/Kg
				EPA 6010B	Barium	1	80	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.96	38	mg/Kg
				EPA 6010B	Chromium	2	26	2,100	mg/Kg
				EPA 6010B	Copper	2.5	20	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.9	400	mg/Kg
				EPA 6010B	Manganese	5	180	3,200	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B13-(S/50)-(DUP)	Soil	50	05/20/99	EPA 6010B	Nickel	2.5	11	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	35	23,000	mg/Kg
QST-B14-(S/50)-(5-6-99)	Soil	50	05/06/99	EPA 8260B	1,4-Dichlorobenzene	130	270	190,000	ug/Kg
				EPA 8260B	Naphthalene	330	2,300	2,600,000	ug/Kg
				EPA 8260B	1,2,4-Trimethylbenzene	130	260	-	ug/Kg
				EPA 8270	Naphthalene	3,000	5,800	2,600,000	ug/Kg
				EPA 6010B	Barium	1	63	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	12	38	mg/Kg
				EPA 6010B	Chromium	2	8.5	2,100	mg/Kg
				EPA 6010B	Copper	2.5	120	2,800	mg/Kg
				EPA 6010B	Manganese	0.05	490	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.24	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	35	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	350	23,000	mg/Kg
QST-B14-(S/76)-(5-6-99)	Soil	76	05/06/99	EPA 8270	Bis(2-ethylhexyl)phthalate	1,000	1,200	320,000	ug/Kg
				EPA 6010B	Barium	0.01	210	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	27	2,100	mg/Kg
				EPA 6010B	Copper	2.5	45	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.8	400	mg/Kg
				EPA 6010B	Manganese	5	1,700	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.024	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	20	1,500	mg/Kg
				EPA 6010B	Thallium	5	6.6	-	mg/Kg
				EPA 6010B	Zinc	2.5	25	23,000	mg/Kg
QST-B15-(S/39)-(5-6-99)	Soil	39	05/06/99	EPA 8082	Aroclor 1254	50	130	2,500	ug/Kg
				EPA 6010B	Barium	1	96	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2.7	38	mg/Kg
				EPA 6010B	Chromium	2	24	2,100	mg/Kg
				EPA 6010B	Copper	2.5	46	2,800	mg/Kg
				EPA 6010B	Lead	2.5	88	400	mg/Kg
				EPA 6010B	Manganese	0.05	240	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.08	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	22	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	320	23,000	mg/Kg
QST-B15-(S/66)-(5-6-99)	Soil	66	05/06/99	EPA 6010B	Arsenic	5	14	10	mg/Kg
				EPA 6010B	Barium	0.01	390	5,300	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B15-(S/66)-(5-6-99)	Soil	66	05/06/99	EPA 6010B	Cadmium	0.5	1.4	38	mg/Kg
				EPA 6010B	Chromium	2	21	2,100	mg/Kg
				EPA 6010B	Copper	2.5	72	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.4	400	mg/Kg
				EPA 6010B	Manganese	5	3,800	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.021	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	55	1,500	mg/Kg
				EPA 6010B	Thallium	5	6.1	-	mg/Kg
				EPA 6010B	Zinc	2.5	47	23,000	mg/Kg
QST-B16-(S/26)-(5-7-99)	Soil	26	05/07/99	EPA 8081A	4,4'-DDE	50	93	13,000	ug/Kg
				EPA 8260B	Chlorobenzene	100	240	65,000	ug/Kg
				EPA 8260B	1,4-Dichlorobenzene	100	200	190,000	ug/Kg
				EPA 8260B	Naphthalene	250	690	2,600,000	ug/Kg
				EPA 8270	Fluoranthene	4,000	4,400	2,600,000	ug/Kg
				EPA 6010B	Barium	1	95	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2.9	38	mg/Kg
				EPA 6010B	Chromium	2	26	2,100	mg/Kg
				EPA 6010B	Copper	2.5	99	2,800	mg/Kg
				EPA 6010B	Lead	2.5	78	400	mg/Kg
				EPA 6010B	Manganese	0.05	240	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.29	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	29	1,500	mg/Kg
				EPA 6010B	Thallium	5	5.5	-	mg/Kg
				EPA 6010B	Zinc	2.5	200	23,000	mg/Kg
QST-B16-(S/26)-(DUP)	Soil	26	05/07/99	EPA 8260B	1,4-Dichlorobenzene	100	140	190,000	ug/Kg
				EPA 8260B	Naphthalene	250	320	2,600,000	ug/Kg
				EPA 8270	Fluoranthene	2,000	2,400	2,600,000	ug/Kg
				EPA 6010B	Barium	0.01	85	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2	38	mg/Kg
				EPA 6010B	Chromium	2	20	2,100	mg/Kg
				EPA 6010B	Copper	2.5	40	2,800	mg/Kg
				EPA 6010B	Lead	2.5	30	400	mg/Kg
				EPA 6010B	Manganese	5	190	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.4	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	15	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	260	23,000	mg/Kg
QST-B16-(S/75)-(5-7-99)	Soil	75	05/07/99	EPA 6010B	Barium	1	290	5,300	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B16-(S/75)-(5-7-99)	Soil	75	05/07/99	EPA 6010B	Cadmium	0.5	1.4	38	mg/Kg
				EPA 6010B	Chromium	2	25	2,100	mg/Kg
				EPA 6010B	Copper	2.5	30	2,800	mg/Kg
				EPA 6010B	Lead	2.5	5	400	mg/Kg
				EPA 6010B	Manganese	0.05	1,400	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	24	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	27	23,000	mg/Kg
QST-B17-(S/15)-(5-7-99)	Soil	15	05/07/99	EPA 8081A	4,4'-DDE	100	260	13,000	ug/Kg
				EPA 8260B	Chlorobenzene	100	270	65,000	ug/Kg
				EPA 8260B	1,4-Dichlorobenzene	100	120	190,000	ug/Kg
				EPA 6010B	Barium	1	110	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	9.9	38	mg/Kg
				EPA 6010B	Chromium	2	19	2,100	mg/Kg
				EPA 6010B	Copper	2.5	89	2,800	mg/Kg
				EPA 6010B	Lead	2.5	63	400	mg/Kg
				EPA 6010B	Manganese	0.05	260	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.18	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	24	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	220	23,000	mg/Kg
QST-B17-(S/65)-(5-7-99)	Soil	65	05/07/99	EPA 6010B	Arsenic	5	9.2	10	mg/Kg
				EPA 6010B	Barium	0.01	47	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1	38	mg/Kg
				EPA 6010B	Chromium	2	21	2,100	mg/Kg
				EPA 6010B	Copper	2.5	33	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.6	400	mg/Kg
				EPA 6010B	Manganese	5	250	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	13	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	32	23,000	mg/Kg
QST-B18-(S/40)-(5-10-99)	Soil	40	05/10/99	EPA 8081A	4,4'-DDE	10	12	13,000	ug/Kg
				EPA 6010B	Barium	0.01	97	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2	38	mg/Kg
				EPA 6010B	Chromium	2	23	2,100	mg/Kg
				EPA 6010B	Copper	2.5	17	2,800	mg/Kg
				EPA 6010B	Lead	2.5	8.6	400	mg/Kg
				EPA 6010B	Manganese	5	260	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.032	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	21	1,500	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B18-(S/40)-(5-10-99)	Soil	40	05/10/99	EPA 6010B	Zinc	2.5	32	23,000	mg/Kg
QST-B19-(S/40)-(5/10/99)	Soil	40	05/10/99	EPA 6010B	Barium	0.01	120	5,300	mg/Kg
				EPA 6010B	Chromium	2	3.8	2,100	mg/Kg
				EPA 6010B	Copper	2.5	15	2,800	mg/Kg
				EPA 6010B	Manganese	5	140	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.031	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	5.2	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	14	23,000	mg/Kg
QST-B19-(S/70)-(5-10-99)	Soil	70	05/10/99	EPA 6010B	Arsenic	5	6.4	10	mg/Kg
				EPA 6010B	Barium	1	140	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.5	38	mg/Kg
				EPA 6010B	Chromium	2	28	2,100	mg/Kg
				EPA 6010B	Copper	2.5	54	2,800	mg/Kg
				EPA 6010B	Lead	2.5	5	400	mg/Kg
				EPA 6010B	Manganese	0.05	1,100	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.042	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	20	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	37	23,000	mg/Kg
QST-B20-(S/25)-(5-11-99)	Soil	25	05/11/99	EPA 8081A	4,4'-DDE	25	57	13,000	ug/Kg
				EPA 8260B	1,4-Dichlorobenzene	100	150	190,000	ug/Kg
				EPA 8260B	Naphthalene	250	260	2,600,000	ug/Kg
				EPA 6010B	Barium	0.01	100	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	3	38	mg/Kg
				EPA 6010B	Chromium	2	23	2,100	mg/Kg
				EPA 6010B	Copper	2.5	73	2,800	mg/Kg
				EPA 6010B	Lead	2.5	80	400	mg/Kg
				EPA 6010B	Manganese	5	250	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.24	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	25	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	220	23,000	mg/Kg
QST-B20-(S/64)-(5-11-99)	Soil	64	05/11/99	EPA 6010B	Arsenic	5	5.4	10	mg/Kg
				EPA 6010B	Barium	1	110	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.6	38	mg/Kg
				EPA 6010B	Chromium	2	40	2,100	mg/Kg
				EPA 6010B	Copper	2.5	31	2,800	mg/Kg
				EPA 6010B	Lead	2.5	8.3	400	mg/Kg
				EPA 6010B	Manganese	0.05	400	3,200	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B20-(S/64)-(5-11-99)	Soil	64	05/11/99	EPA 7471A	Mercury	0.02	0.03	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	15	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	26	23,000	mg/Kg
QST-B21-(S/20)-(5-11-99)	Soil	20	05/11/99	EPA 8260B	Naphthalene	250	1,200	2,600,000	ug/Kg
				EPA 6010B	Arsenic	5	6.8	10	mg/Kg
				EPA 6010B	Barium	1	85	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	2.1	38	mg/Kg
				EPA 6010B	Chromium	2	25	2,100	mg/Kg
				EPA 6010B	Copper	2.5	140	2,800	mg/Kg
				EPA 6010B	Lead	2.5	27	400	mg/Kg
				EPA 6010B	Manganese	0.05	380	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.12	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	20	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	140	23,000	mg/Kg
QST-B21-(S/80)-(5-11-99)	Soil	80	05/11/99	EPA 6010B	Arsenic	5	8.4	10	mg/Kg
				EPA 6010B	Barium	1	45	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.94	38	mg/Kg
				EPA 6010B	Chromium	2	25	2,100	mg/Kg
				EPA 6010B	Copper	2.5	25	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.5	400	mg/Kg
				EPA 6010B	Manganese	5	230	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	74	23,000	mg/Kg
EW-24-(S/40)-(5-26-99)	Soil	40	05/26/99	EPA 6010B	Arsenic	5	7.9	10	mg/Kg
				EPA 6010B	Barium	1	63	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.2	38	mg/Kg
				EPA 6010B	Chromium	2	33	2,100	mg/Kg
				EPA 6010B	Copper	2.5	36	2,800	mg/Kg
				EPA 6010B	Lead	2.5	6.3	400	mg/Kg
				EPA 6010B	Manganese	5	330	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	21	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	30	23,000	mg/Kg
EW-24-(S/50)-(5-26-99)	Soil	50	05/26/99	EPA 6010B	Arsenic	5	11	10	mg/Kg
				EPA 6010B	Barium	1	170	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.83	38	mg/Kg
				EPA 6010B	Chromium	2	16	2,100	mg/Kg

TABLE 6.6 SUMMARY OF DETECTED CONSTITUENTS IN SUBSURFACE SOIL, ESTES LANDFILL, PHOENIX, ARIZON

SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMITS	SAMPLE RESULTS	ACTION LEVELS	UNITS
EW-24-(S/50)-(5-26-99)	Soil	50	05/26/99	EPA 6010B	Copper	2.5	64	2,800	mg/Kg
				EPA 6010B	Lead	2.5	5.6	400	mg/Kg
				EPA 6010B	Manganese	5	320	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	14	1,500	mg/Kg
				EPA 6010B	Thallium	5	6	-	mg/Kg
				EPA 6010B	Zinc	2.5	73	23,000	mg/Kg
EW-25-(S/35)-(5-24-99)	Soil	35	05/24/99	EPA 6010B	Arsenic	5	17	10	mg/Kg
				EPA 6010B	Barium	1	46	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	1.1	38	mg/Kg
				EPA 6010B	Chromium	2	52	2,100	mg/Kg
				EPA 6010B	Copper	2.5	15	2,800	mg/Kg
				EPA 6010B	Lead	2.5	4.1	400	mg/Kg
				EPA 6010B	Manganese	5	220	3,200	mg/Kg
				EPA 7471A	Mercury	0.02	0.026	6.7	mg/Kg
				EPA 6010B	Nickel	2.5	13	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	17	23,000	mg/Kg
EW-25-(S/45)-(5-24-99)	Soil	45	05/24/99	EPA 6010B	Arsenic	5	6.7	10	mg/Kg
				EPA 6010B	Barium	1	40	5,300	mg/Kg
				EPA 6010B	Cadmium	0.5	0.81	38	mg/Kg
				EPA 6010B	Chromium	2	21	2,100	mg/Kg
				EPA 6010B	Copper	2.5	15	2,800	mg/Kg
				EPA 6010B	Lead	2.5	3.9	400	mg/Kg
				EPA 6010B	Manganese	5	260	3,200	mg/Kg
				EPA 6010B	Nickel	2.5	12	1,500	mg/Kg
				EPA 6010B	Zinc	2.5	15	23,000	mg/Kg
EW-26-(S/10)-(5-21-99)	Soil	10	05/21/99	EPA 8260B	1,2,4-Trimethylbenzene	120	370	-	ug/Kg
				EPA 8260B	1,3,5-Trimethylbenzene	120	140	-	ug/Kg

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B1-(GW/70)-(5-5-99)	Water	70	05/05/99	EPA 8260B	Chlorobenzene	2	5.6	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	2	7.1	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	2	29	70	ug/L
				EPA 8260B	Vinyl chloride	5	54	2	ug/L
				EPA 200.7	Arsenic	0.05	0.068	0.05	mg/L
				EPA 200.7	Barium	0.01	0.74	2	mg/L
				EPA 200.7	Cadmium	0.005	0.0076	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.25	0.1	mg/L
				EPA 200.7	Copper	0.02	1.5	1.3	mg/L
				EPA 200.7	Lead	0.05	0.076	0.05	mg/L
				EPA 200.7	Manganese	0.05	4.2	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00096	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.17	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.18	11*	mg/L
QST-B2-(GW/73)-(5/4/99)	Water	73	05/04/99	EPA 8260B	Acetone	50	110	610*	ug/L
				EPA 8260B	Chlorobenzene	10	21	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	10	20	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	10	84	70	ug/L
				EPA 8260B	Vinyl chloride	25	130	2	ug/L
				EPA 8270	1,2-Dichlorobenzene	10	12	75	ug/L
				EPA 200.7	Arsenic	0.05	0.098	0.05	mg/L
				EPA 200.7	Barium	0.01	1.1	2	mg/L
				EPA 200.7	Cadmium	0.005	0.022	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.31	0.1	mg/L
				EPA 200.7	Copper	0.02	1.7	1.3	mg/L
				EPA 200.7	Lead	0.05	0.11	0.05	mg/L
				EPA 200.7	Manganese	0.05	9.8	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0028	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.28	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.25	11*	mg/L
QST-B3-(GW/78)-(5/4/99)	Water	78	05/04/99	EPA 8260B	Acetone	10	15	610*	ug/L
				EPA 8260B	Chlorobenzene	2	7.5	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	2	7.6	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	2	41	70	ug/L
				EPA 8260B	Vinyl chloride	5	44	2	ug/L
				EPA 200.7	Barium	0.01	0.7	2	mg/L
				EPA 200.7	Chromium	0.01	0.073	0.1	mg/L
				EPA 200.7	Copper	0.02	0.18	1.3	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B3-(GW/78)-(5/4/99)	Water	78	05/04/99	EPA 200.7	Lead	0.05	0.14	0.05	mg/L
				EPA 200.7	Manganese	0.05	4.8	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00024	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.08	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.055	11*	mg/L
QST-B4(GW/78)-(5/5/99)	Water	78	05/05/99	EPA 8260B	Chlorobenzene	10	28	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	10	21	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	10	60	70	ug/L
				EPA 8260B	Vinyl chloride	25	120	2	ug/L
				EPA 8270	1,2-Dichlorobenzene	10	13	75	ug/L
				EPA 200.7	Arsenic	0.05	0.053	0.05	mg/L
				EPA 200.7	Barium	0.01	0.74	2	mg/L
				EPA 200.7	Cadmium	0.005	0.0058	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.22	0.1	mg/L
				EPA 200.7	Copper	0.02	0.25	1.3	mg/L
				EPA 200.7	Manganese	0.05	4.8	1.7	mg/L
				EPA 200.7	Nickel	0.05	0.14	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.13	11*	mg/L
QST-B5-(GW/60)-(5-6-99)	Water	60	05/06/99	EPA 8260B	Chlorobenzene	5	19	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	5	22	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	5	170	70	ug/L
				EPA 8260B	Vinyl chloride	13	230	2	ug/L
				EPA 8270	1,2-Dichlorobenzene	10	17	75	ug/L
				EPA 200.7	Arsenic	0.05	0.061	0.05	mg/L
				EPA 200.7	Barium	0.01	1.1	2	mg/L
				EPA 200.7	Cadmium	0.005	0.0088	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.22	0.1	mg/L
				EPA 200.7	Copper	0.02	0.31	1.3	mg/L
				EPA 200.7	Manganese	0.05	6	1.7	mg/L
				EPA 200.7	Nickel	0.05	0.17	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.17	11*	mg/L
QST-B6-(GW-70)-(5-6-99)	Water	70	05/06/99	EPA 8260B	Chlorobenzene	2	4.5	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	2	5.6	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	2	72	70	ug/L
				EPA 8260B	Trichloroethene	2	2.8	5	ug/L
				EPA 8260B	Vinyl chloride	5	60	2	ug/L
				EPA 200.7	Arsenic	0.05	0.17	0.05	mg/L
				EPA 200.7	Barium	0.01	1.9	2	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B6-(GW-70)-(5-6-99)	Water	70	05/06/99	EPA 200.7	Cadmium	0.005	0.015	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.36	0.1	mg/L
				EPA 200.7	Copper	0.02	0.49	1.3	mg/L
				EPA 200.7	Lead	0.05	0.12	0.05	mg/L
				EPA 200.7	Manganese	0.05	11	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00052	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.34	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.35	11*	mg/L
QST-B7-(GW/63)-(5-12-99)	Water	63	05/12/99	EPA 8260B	Chlorobenzene	10	24	100	ug/L
				EPA 8260B	1,2-Dichlorobenzene	10	29	75	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	10	16	70	ug/L
				EPA 8260B	Vinyl chloride	25	220	2	ug/L
				EPA 8270	1,2-Dichlorobenzene	10	24	75	ug/L
				EPA 200.7	Arsenic	0.05	0.059	0.05	mg/L
				EPA 200.7	Barium	0.01	0.9	2	mg/L
				EPA 200.7	Chromium	0.01	0.062	0.1	mg/L
				EPA 200.7	Copper	0.02	0.13	1.3	mg/L
				EPA 200.7	Manganese	0.05	4.8	1.7	mg/L
				EPA 200.7	Nickel	0.05	0.11	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.055	11*	mg/L
QST-B8-(GW/65)-(5-12-99)	Water	65	05/12/99	EPA 8260B	Chlorobenzene	2	3	100	ug/L
				EPA 8260B	cis-1,2-Dichloroethene	2	8.2	70	ug/L
				EPA 8260B	Vinyl chloride	5	37	2	ug/L
				EPA 200.7	Arsenic	0.05	0.43	0.05	mg/L
				EPA 200.7	Barium	0.01	2.7	2	mg/L
				EPA 200.7	Cadmium	0.005	0.017	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.49	0.1	mg/L
				EPA 200.7	Copper	0.02	0.49	1.3	mg/L
				EPA 200.7	Lead	0.05	0.14	0.05	mg/L
				EPA 200.7	Manganese	0.05	13	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00094	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.59	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.053	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.34	11*	mg/L
QST-B9-(GW/50)- (5/12/99)	Water	50	05/12/99	EPA 200.7	Barium	0.01	0.75	2	mg/L
				EPA 200.7	Chromium	0.01	0.034	0.1	mg/L
				EPA 200.7	Copper	0.02	0.081	1.3	mg/L
				EPA 200.7	Manganese	0.05	4.1	1.7	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B9-(GW/50)(5-12-99)	Water	50	05/12/99	EPA 200.7	Nickel	0.05	0.13	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.052	11*	mg/L
QST-B10-(GW/50)(5-12-99)	Water	50	05/12/99	EPA 200.7	Arsenic	0.05	0.065	0.05	mg/L
				EPA 200.7	Barium	0.01	2.6	2	mg/L
				EPA 200.7	Cadmium	0.005	0.006	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.32	0.1	mg/L
				EPA 200.7	Copper	0.02	0.22	1.3	mg/L
				EPA 200.7	Manganese	0.05	11	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0004	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.39	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.092	11*	mg/L
QST-B11-(GW/75)(5-19-99)	Water	75	05/19/99	EPA 200.7	Arsenic	0.05	0.16	0.05	mg/L
				EPA 200.7	Barium	0.01	1.5	2	mg/L
				EPA 200.7	Cadmium	0.005	0.0099	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.43	0.1	mg/L
				EPA 200.7	Copper	0.02	0.25	1.3	mg/L
				EPA 200.7	Lead	0.05	0.11	0.05	mg/L
				EPA 200.7	Manganese	0.05	9.8	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00046	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.38	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.26	11*	mg/L
QST-B12-(GW/55)(5-20-99)	Water	55	05/20/99	EPA 8260B	Chlorobenzene	2	15	100	ug/L
				EPA 8260B	1,4-Dichlorobenzene	2	3.9	80	ug/L
				EPA 200.7	Arsenic	0.05	0.4	0.05	mg/L
				EPA 200.7	Barium	0.01	4.8	2	mg/L
				EPA 200.7	Cadmium	0.005	0.017	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.4	0.1	mg/L
				EPA 200.7	Copper	0.02	1.9	1.3	mg/L
				EPA 200.7	Lead	0.05	0.39	0.05	mg/L
				EPA 200.7	Manganese	0.05	32	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0012	0.002	mg/L
				EPA 200.7	Nickel	0.05	1.8	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.1	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.52	11*	mg/L
QST-B13-(GW/60)(5-20-99)	Water	60	05/20/99	EPA 8260B	Acetone	20	130	610*	ug/L
				EPA 200.7	Arsenic	0.05	0.074	0.05	mg/L
				EPA 200.7	Barium	0.01	2.3	2	mg/L
				EPA 200.7	Chromium	0.01	0.46	0.1	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B13-(GW/60)(5-20-99)	Water	60	05/20/99	EPA 200.7	Copper	0.02	0.21	1.3	mg/L
				EPA 200.7	Manganese	0.05	8.6	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00041	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.22	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.13	11*	mg/L
QST-B14-(GW/80)-(5-6-99)	Water	80	05/06/99	EPA 8260B	Chlorobenzene	2	4.5	100	ug/L
				EPA 200.7	Arsenic	0.05	0.27	0.05	mg/L
				EPA 200.7	Barium	0.01	3.9	2	mg/L
				EPA 200.7	Chromium	0.01	0.056	0.1	mg/L
				EPA 200.7	Copper	0.02	0.41	1.3	mg/L
				EPA 200.7	Manganese	0.05	4.3	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00022	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.2	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.067	11*	mg/L
QST-B15-(GW/85)-(5-6-99)	Water	85	05/06/99	EPA 8260B	Chlorobenzene	2	5.4	100	ug/L
				EPA 8270	4-Methylphenol	10	13	180*	ug/L
				EPA 200.7	Arsenic	0.05	0.53	0.05	mg/L
				EPA 200.7	Barium	0.01	16	2	mg/L
				EPA 200.7	Cadmium	0.005	0.025	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.86	0.1	mg/L
				EPA 200.7	Copper	0.02	3.4	1.3	mg/L
				EPA 200.7	Lead	0.05	0.49	0.05	mg/L
				EPA 200.7	Manganese	0.05	23	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0025	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.86	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.092	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.69	11*	mg/L
QST-B16-(GW/80)-(5-7-99)	Water	80	05/07/99	EPA 8260B	Chlorobenzene	2	4.6	100	ug/L
				EPA 8260B	1,4-Dichlorobenzene	2	3.6	80	ug/L
				EPA 8270	4-Methylphenol	10	16	180*	ug/L
				EPA 200.7	Arsenic	0.05	0.24	0.05	mg/L
				EPA 200.7	Barium	0.01	5.7	2	mg/L
				EPA 200.7	Cadmium	0.005	0.016	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.4	0.1	mg/L
				EPA 200.7	Copper	0.02	0.75	1.3	mg/L
				EPA 200.7	Lead	0.05	0.17	0.05	mg/L
				EPA 200.7	Manganese	0.05	14	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00057	0.002	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B16-(GW/80)-(5-7-99)	Water	80	05/07/99	EPA 200.7	Nickel	0.05	0.51	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.053	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.4	11*	mg/L
QST-B17-(GW/80)-(5-7-99)	Water	80		EPA 8260B	Chlorobenzene	2	4.8	100	ug/L
				EPA 200.7	Barium	0.01	0.68	2	mg/L
				EPA 200.7	Chromium	0.01	0.043	0.1	mg/L
				EPA 200.7	Copper	0.02	0.068	1.3	mg/L
				EPA 200.7	Manganese	0.05	3.2	1.7	mg/L
QST-B17-(GW/80)-(DUP)	Water	80	05/07/99	EPA 8260B	Chlorobenzene	2	4.8	100	ug/L
				EPA 200.7	Arsenic	0.05	0.099	0.05	mg/L
				EPA 200.7	Barium	0.01	0.69	2	mg/L
				EPA 200.7	Chromium	0.01	0.051	0.1	mg/L
				EPA 200.7	Copper	0.02	0.08	1.3	mg/L
				EPA 200.7	Manganese	0.05	3.4	1.7	mg/L
QST-B18-(GW/85)(5-10-99)	Water	85	05/10/99	EPA 8260B	Chlorobenzene	2	5.8	100	ug/L
				EPA 8270	4-Methylphenol	10	21	180*	ug/L
				EPA 8151	2,4-D	0.5	1.1	70	ug/L
				EPA 200.7	Arsenic	0.05	0.59	0.05	mg/L
				EPA 200.7	Barium	0.01	9.4	2	mg/L
				EPA 200.7	Cadmium	0.005	0.042	0.005	mg/L
				EPA 200.7	Chromium	0.01	1.7	0.1	mg/L
				EPA 200.7	Copper	0.1	2.1	1.3	mg/L
				EPA 200.7	Lead	0.05	0.32	0.05	mg/L
				EPA 200.7	Manganese	0.05	47	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0044	0.002	mg/L
				EPA 200.7	Nickel	0.05	1.1	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.13	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.85	11*	mg/L
QST-B19-(GW/80)(5-10-99)	Water	80	05/10/99	EPA 8260B	Chlorobenzene	2	7.9	100	ug/L
				EPA 200.7	Arsenic	0.05	0.25	0.05	mg/L
				EPA 200.7	Barium	0.01	8.4	2	mg/L
				EPA 200.7	Cadmium	0.005	0.013	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.31	0.1	mg/L
				EPA 200.7	Copper	0.02	1.1	1.3	mg/L
				EPA 200.7	Lead	0.05	0.087	0.05	mg/L
				EPA 200.7	Manganese	0.05	26	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00097	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.72	0.1	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B19-(GW/80)(5-10-99)	Water	80	05/10/99	EPA 200.7	Thallium	0.05	0.072	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.34	11*	mg/L
QST-B20-(GW/80)(5-11-99)	Water	80	05/11/99	EPA 8260B	Acetone	50	57	610*	ug/L
				EPA 8260B	Chlorobenzene	5	20	100	ug/L
				EPA 8270	4-Methylphenol	10	19	180*	ug/L
				EPA 8151	2,4-D	0.5	2.4 Y	70	ug/L
				EPA 200.7	Arsenic	0.05	0.2	0.05	mg/L
				EPA 200.7	Barium	0.01	9.2	2	mg/L
				EPA 200.7	Chromium	0.01	0.18	0.1	mg/L
				EPA 200.7	Copper	0.02	0.83	1.3	mg/L
				EPA 200.7	Lead	0.05	0.097	0.05	mg/L
				EPA 200.7	Manganese	0.05	17	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00031	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.46	0.1	mg/L
				EPA 200.7	Zinc	0.05	0.19	11*	mg/L
QST-B20-(GW/80)-(DUP)	Water	80	05/11/99	EPA 8260B	Acetone	20	41	610*	ug/L
				EPA 8260B	Chlorobenzene	2	18	100	ug/L
				EPA 8270	4-Methylphenol	10	18	180*	ug/L
				EPA 200.7	Arsenic	0.05	0.2	0.05	mg/L
				EPA 200.7	Barium	0.01	11	2	mg/L
				EPA 200.7	Cadmium	0.005	0.0093	0.005	mg/L
				EPA 200.7	Chromium	0.01	0.19	0.1	mg/L
				EPA 200.7	Copper	0.02	1.1	1.3	mg/L
				EPA 200.7	Lead	0.05	0.14	0.05	mg/L
				EPA 200.7	Manganese	0.05	21	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.00048	0.002	mg/L
				EPA 200.7	Nickel	0.05	0.6	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.073	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.23	11*	mg/L
QST-B21-(GW/80)(5-11-99)	Water	80	05/11/99	EPA 8260B	Chlorobenzene	2	4.9	100	ug/L
				EPA 200.7	Arsenic	0.25	0.41	0.05	mg/L
				EPA 200.7	Barium	0.01	6.8	2	mg/L
				EPA 200.7	Beryllium	0.005	0.0084	0.004	mg/L
				EPA 200.7	Chromium	0.01	0.5	0.1	mg/L
				EPA 200.7	Copper	0.1	0.94	1.3	mg/L
				EPA 200.7	Lead	0.05	0.29	0.05	mg/L
				EPA 200.7	Manganese	0.05	22	1.7	mg/L
				EPA 245.1	Mercury	0.0002	0.0022	0.002	mg/L

TABLE 6.7 SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER GRAB SAMPLES, ESTES LANDFILL, PHOENIX, ARIZONA

SAMPLE IDENTIFICATION	SAMPLE MATRIX	WATER DEPTH (ft)	COLLECTION DATE	ANALYTICAL METHODS	ANALYTE	DETECTION LIMIT	SAMPLE RESULTS	ACTION LEVELS	UNITS
QST-B21-(GW/80)(5-11-99)	Water		05/11/99	EPA 200.7	Nickel	0.05	0.65	0.1	mg/L
				EPA 200.7	Thallium	0.05	0.06	0.002	mg/L
				EPA 200.7	Zinc	0.05	0.42	11*	mg/L

TABLE 6.8
SUMMARY OF SOIL GAS ANALYTICAL DATA

Sample ID	Sample Depth (feet)	Date Sampled	Methylene Chloride	Freon 11	1,1-DCE	1,1-DCA	1,2-DCE (Total)	Chloroform	Freon 113	1,2-DCA	1,1,1-TCA	Carbon Tetrachloride	TCE	PCE	Benzene	Toluene	Chloro-benzene	Ethyl-benzene	Total Xylenes	TVHC	1,3-DCB/ 1,4-DCB	1,2-DCB	Vinyl Chloride	Methane
101	10	8/8/94	<0.02	0.001	<0.01	<0.1	<0.1	<0.0005	0.001	<0.05	<0.0002	<0.00007	0.001	0.0008	14	9	<0.3	20	66	1300	10	<0.8	<0.02	61000
-102	10	8/8/94	<0.02	0.0006	<0.01	<0.1	<0.1	<0.0005	<0.0005	<0.05	<0.0002	<0.00007	0.009	0.004	2	2	<0.3	1	14	28	<1	<0.8	<0.02	120000
SG-103	10	8/8/94	<1	0.001	0.1	<0.1	2	<0.0005	<0.0005	<0.05	<0.0002	<0.00007	0.2	0.002	0.08	0.2	<0.3	0.8	<0.1	25	<1	<0.8	2	<1000
SG-104	10	8/8/94	<0.02	0.0004	0.01	0.5	0.2	<0.0005	<0.0005	<0.05	<0.0002	<0.00007	0.008	0.002	3	0.9	<0.3	5	3	30	<1	<0.8	0.6	42000
SG-105	10	8/8/94	<0.02	0.1	<0.01	0.5	0.1	<0.0005	0.3	<0.05	<0.0002	<0.00007	0.04	0.02	16	1	2	22	10	73	<1	<0.8	0.3	44000
SG-106	10	8/8/94	<0.02	0.003	<0.01	38	0.1	<0.0005	<0.0005	<0.05	0.05	<0.00007	0.02	0.08	0.5	2	<0.3	1	41	1600	INT	<0.8	2	<1000
SG-107	10	8/9/94	<0.05	0.2	<0.02	0.4	2	<0.001	0.04	<0.1	0.02	<0.0002	0.9	0.3	2	2	<0.8	3	5	25	<3	<2	0.6	26000
SG-107A	10	8/11/94	<0.01	0.005	<0.2	0.2	<0.5	0.1	<0.002	<0.07	<0.003	<0.0004	0.8	0.01	<0.1	0.8	<1	<2	18	90	<0.3	<0.2	0.6	49000
SG-107B	10	9/2/94	<0.1	<0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	2	1	<0.1	<0.1	2	<0.1	<0.1	<0.1	<0.1	NA
SG-108	10	8/9/94	<0.05	0.002	<0.02	<0.3	<0.3	<0.001	<0.001	<0.1	<0.0005	<0.0002	<0.001	0.002	0.4	0.5	<0.3	2	2	15	<1	<2	<0.02	32000
SG-108A	10	8/10/94	<0.2	<0.0003	<0.06	<0.5	<0.4	<0.002	<0.02	<2	<0.02	<0.004	0.02	0.002	<3	0.3	<3	<0.2	5	84	INT	<0.2	1	29000
SG-109	10	8/9/94	<0.05	0.002	<0.02	<0.3	<0.3	<0.001	<0.001	<0.1	<0.0005	<0.0002	<0.001	0.001	<0.7	<1	<5	<1	<2	1	<20	<25	<0.02	<2600
SG-109A	10	8/10/94	<0.2	<0.0003	<0.06	<2	<2	<0.007	<0.006	<0.6	<0.004	<0.001	0.01	0.03	<0.1	0.2	<0.3	0.5	11	15	0.6	<7	0.3	22000
SG-109B	10	8/10/94	<0.07	0.003	<0.02	<0.8	<0.6	<0.003	<0.002	<0.2	<0.002	<0.0004	<0.0006	0.02	<0.1	<0.2	<0.3	<0.2	<0.2	<0.2	<0.3	<0.2	<0.02	<2600
SG-110	10	8/9/94	<0.02	0.0005	<0.01	<0.1	<0.1	<0.0005	<0.0005	<0.04	<0.0002	<0.00007	0.01	0.0003	<0.04	<0.08	<0.3	<0.07	5	21	<1	<2	0.06	43000
SG-111	10	8/10/94	<0.07	<0.0005	<0.02	<0.8	<0.6	<0.003	<0.002	<0.2	<0.002	<0.0004	0.007	0.008	<0.1	<0.2	<0.3	<0.2	<0.2	<0.2	<1	<0.2	<0.02	<2600
SG-112	10	8/10/94	<0.3	<0.0005	<0.1	<0.8	<0.6	<0.003	<0.002	<0.2	<0.002	<0.0004	0.07	<0.003	<0.1	<0.2	<0.3	2	<0.2	6	INT	<0.2	NA	NA
SG-113	10	8/14/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.1	0.008	1	<0.2	<3	<0.2	6	10	<0.3	<0.2	0.4	46000
SG-114	10	8/14/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.02	0.003	0.8	<0.2	<3	<0.2	12	16	<0.3	<0.2	0.2	46000
SG-115	10	8/14/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.07	0.004	INT	INT	INT	INT	INT	INT	<0.3	<0.2	<0.02	47000
SG-116	10	8/11/94	<0.01	<0.0006	<0.1	<0.2	<0.5	<0.0003	<0.002	<0.06	<0.003	<0.0004	0.1	<0.001	<0.1	<0.2	<0.3	<0.2	1	3	<0.3	<0.2	<0.02	<2600
SG-117	10	8/11/94	0.3	<0.001	<0.2	<0.2	<1	<0.0006	<0.004	<0.1	<0.005	<0.001	0.5	<0.003	<0.1	0.4	<0.3	2	0.9	14	<0.3	<0.6	<0.02	120000
SG-118	10	8/11/94	0.3	0.0003	<0.1	<0.1	<0.2	<0.0001	<0.001	<0.03	<0.001	<0.0002	0.6	0.008	<0.1	INT	<0.3	2	0.9	17	3	0.8	<0.02	47000
SG-119	10	8/11/94	<0.01	<0.0006	<0.2	<0.2	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	<0.1	<0.001	<0.1	<0.2	<0.3	<0.2	<0.2	<0.4	<0.3	<0.2	<0.02	<2600
SG-120	10	8/11/94	<0.01	<0.0006	<0.2	<0.2	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	5	0.03	<0.1	<0.2	<0.3	<4	2	9	<6	<0.4	<0.02	20000
SG-121	10	8/11/94	<0.01	0.001	<0.2	<0.2	<0.5	<0.0003	0.008	<0.07	<0.003	0.0005	<0.1	<0.001	<0.1	<0.2	<0.3	<0.2	<0.2	<0.4	<0.3	<0.2	<0.02	<2600
122	30	8/11/94	0.2	<0.0006	<0.1	<0.1	<0.2	<0.0001	<0.001	<0.03	<0.001	<0.0002	0.4	0.001	<0.1	<0.2	<0.3	<0.2	<0.2	2	<0.3	<0.2	0.07	64000
-123	30	8/11/94	<0.01	<0.0006	<0.2	<0.2	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	<0.1	<0.001	4	<0.2	<0.3	<0.2	20	64	<0.3	<0.2	0.2	66000
SG-124	30	8/12/94	0.1	0.002	<0.1	<0.1	<0.5	<0.0003	<0.002	0.07	0.04	<0.0004	0.02	0.01	<0.05	<0.8	<2	<1	<1	<1	<1	<1	0.04	50000
SG-125	30	8/12/94	0.2	0.0008	<0.05	<0.06	<0.2	<0.0001	<0.001	<0.03	<0.001	<0.0002	0.02	0.002	4	<0.2	14	<0.2	<0.2	6	34	48	0.1	32000
SG-126	30	8/12/94	0.2	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	0.02	0.004	9	<0.2	11	<0.2	2	20	<0.3	14	0.2	65000
SG-127	30	8/12/94	0.4	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	0.02	0.005	9	<0.2	21	<0.2	14	25	72	<0.2	0.04	57000
SG-128	25	8/12/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	<0.003	<0.001	<0.1	<0.2	<0.3	<0.2	<0.2	<0.2	<0.3	<0.2	<0.02	<2600
SG-129	30	8/12/94	0.2	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	0.02	0.01	3	<0.2	<4	1	3	13	20	17	0.2	73000
SG-130	25	8/12/94	0.2	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	<0.003	<0.001	13	<0.2	20	<0.2	10	21	<3	<2	<0.02	61000
SG-131	25	8/12/94	0.01	<0.0006	<0.1	<0.1	<0.5	<0.0003	<0.002	<0.07	<0.003	<0.0004	0.01	0.01	8	<0.2	26	<0.2	6	13	1	51	<0.02	50000
SG-132	25	8/13/94	<0.006	<0.0003	<0.05	<0.06	<0.2	<0.001	<0.001	<0.03	<0.001	<0.0002	0.007	0.003	29	<0.2	59	<0.2	5	24	<0.3	51	<0.02	37000
SG-133	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.03	0.01	2	<0.2	6	0.5	12	22	<0.3	<0.2	<0.02	37000
SG-134	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.01	0.005	0.7	<0.2	1	0.5	3	4	<0.3	34	<0.02	190000
SG-135	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.02	0.004	0.9	<0.2	0.6	<0.2	<0.7	1	<0.3	7	<0.02	62000
SG-136	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.04	0.01	3	<0.2	4	3	10	21	INT	INT	0.2	62000
SG-137	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.01	0.004	0.8	<0.2	8	3	15	23	<12	<8	0.1	44000
SG-138	20	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	<0.003	<0.001	1	<0.2	INT	<0.2	2	4	INT	<0.2	<0.02	58000
SG-139	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0005	0.02	0.005	1	<0.2	<0.3	<0.2	6	20	<12	<8	0.2	64000
SG-140	25	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	0.02	0.02	0.4	<0.2	<0.3	<0.2	<0.2	24	<0.3	<0.2	0.6	51000
SG-141	19	8/13/94	<0.01	<0.0006	<0.1	<0.1	<0.5	<0.003	<0.002	<0.07	<0.003	<0.0004	<0.003	<0.001	<0.1	<0.2	<0.3	<0.2	<0.2	<0.2	<0.3	<0.2	<0.2	<2600
FB11MAR	0	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
FB12MAR	0	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
FB13MAR	0	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
FB14MAR	0	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG01-05	5	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.49	NA	<0.01	NA	NA	NA	NA	<0.01	INT	NA
SG01-10	10	3/11/91	NA	NA	0.13	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	1.6	NA	0.72	NA	NA	NA	NA	0.22	4.76	NA

See Figures 6.5 and 6.6 for soil gas sample locations
All concentrations reported in micrograms per liter (µg/l)
INT=Interference NA=Not Analyzed
Table reproduced from draft RI Report (HLA, 9/97)

TABLE 6.8
SUMMARY OF SOIL GAS ANALYTICAL DATA

Sample ID	Sample Depth (feet)	Date Sampled	Methylene Chloride	Freon 11	1,1-DCE	1,1-DCA	1,2-DCE (Total)	Chloroform	Freon 113	1,2-DCA	1,1,1-TCA	Carbon Tetrachloride	TCE	PCE	Benzene	Toluene	Chloro-benzene	Ethyl-benzene	Total Xylenes	TVHC	1,3-DCB/ 1,4-DCB	1,2-DCB	Vinyl Chloride	Methane
G01-15	15	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.84	NA	0.06	NA	NA	NA	NA	<0.01	1.73	NA
G01-20	20	3/11/91	NA	NA	0.2	NA	0.1	NA	NA	NA	NA	NA	<0.01	<0.01	0.98	NA	1.03	NA	NA	NA	NA	0.56	8.1	NA
SG02-05	5	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.75	NA	0.81	NA	NA	NA	NA	<0.01	0.1	NA
SG02-10a	10	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	2.59	NA	11.7	NA	NA	NA	NA	0.09	0.5	NA
SG02-10b	10	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	2.36	NA	7.23	NA	NA	NA	NA	<0.01	<0.01	NA
SG02-15	15	3/11/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	3.18	NA	9.77	NA	NA	NA	NA	<0.01	INT	NA
SG02-20	20	3/11/91	NA	NA	<0.01	NA	0.05	NA	NA	NA	NA	NA	0.03	<0.01	2.27	NA	3.29	NA	NA	NA	NA	0.35	0.78	NA
SG03-10	10	3/11/91	NA	NA	<0.01	NA	0.03	NA	NA	NA	NA	NA	<0.01	<0.01	0.57	NA	4.43	NA	NA	NA	NA	0.59	0.69	NA
SG04-10	10	3/12/91	NA	NA	1.22	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	6.6	NA	21.3	NA	NA	NA	NA	1.39	0.79	NA
SG05-10	10	3/12/91	NA	NA	11.2	NA	0.07	NA	NA	NA	NA	NA	<0.01	0.07	6.36	NA	13.4	NA	NA	NA	NA	0.81	10.11	NA
SG06-10	10	3/12/91	NA	NA	1.35	NA	8.36	NA	NA	NA	NA	NA	0.27	0.22	0.87	NA	0.72	NA	NA	NA	NA	<0.01	3.85	NA
SG07-10	10	3/12/91	NA	NA	<0.01	NA	0.77	NA	NA	NA	NA	NA	<0.01	<0.01	1.6	NA	5.36	NA	NA	NA	NA	0.06	2.26	NA
SG08-10	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.45	NA	4.53	NA	NA	NA	NA	<0.01	0.36	NA
SG09-10a	10	3/12/91	NA	NA	INT	NA	0.2	NA	NA	NA	NA	NA	0.04	0.03	1.42	NA	0.41	NA	NA	NA	NA	<0.01	9.04	NA
SG09-10b	10	3/12/91	NA	NA	2.31	NA	0.08	NA	NA	NA	NA	NA	0.04	0.03	1.27	NA	0.42	NA	NA	NA	NA	<0.01	7.12	NA
SG10-10	10	3/12/91	NA	NA	<0.01	NA	0.74	NA	NA	NA	NA	NA	0.06	<0.01	1.19	NA	0.08	NA	NA	NA	NA	<0.01	7.87	NA
SG11-10	10	3/12/91	NA	NA	0.37	NA	4.57	NA	NA	NA	NA	NA	0.14	<0.01	0.27	NA	<0.01	NA	NA	NA	NA	<0.01	7.16	NA
SG12-10	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.05	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG13-10	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.37	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG14-10a	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.1	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG14-10b	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.17	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG15-10a	10	3/12/91	NA	NA	<0.01	NA	0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.33	NA	0.04	NA	NA	NA	NA	<0.01	<0.01	NA
SG15-10b	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	NA	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG16-10a	10	3/12/91	NA	NA	<0.01	NA	0.03	NA	NA	NA	NA	NA	0.01	<0.01	0.86	NA	0.43	NA	NA	NA	NA	0.24	INT	NA
SG16-10b	10	3/12/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	0.77	NA	NA	2.82	NA	NA	NA	NA	<0.01	<0.01	NA
SG17-10	10	3/13/91	NA	NA	<0.01	NA	0.01	NA	NA	NA	NA	NA	<0.01	0.04	1.34	NA	2.9	NA	NA	NA	NA	0.03	<0.01	NA
G18-10	10	3/13/91	NA	NA	0.07	NA	0.64	NA	NA	NA	NA	NA	<0.01	<0.01	1.12	NA	4	NA	NA	NA	NA	0.12	2.13	NA
G19-10	10	3/13/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	0.01	<0.01	0.22	NA	0.09	NA	NA	NA	NA	0.15	0.11	NA
SG20-10a	10	3/13/91	NA	NA	<0.01	NA	0.02	NA	NA	NA	NA	NA	<0.01	<0.01	0.9	NA	0.75	NA	NA	NA	NA	0.04	<0.01	NA
SG20-10b	10	3/13/91	NA	NA	<0.01	NA	0.02	NA	NA	NA	NA	NA	<0.01	<0.01	0.74	NA	<0.01	NA	NA	NA	NA	0.05	<0.01	NA
SG21-10a	10	3/13/91	NA	NA	0.04	NA	1.51	NA	NA	NA	NA	NA	0.35	<0.01	0.51	NA	0.61	NA	NA	NA	NA	<0.01	0.64	NA
SG21-10b	10	3/13/91	NA	NA	0.04	NA	1.58	NA	NA	NA	NA	NA	0.34	<0.01	0.48	NA	0.47	NA	NA	NA	NA	<0.01	0.62	NA
SG22-10	10	3/13/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.14	NA	0.13	NA	NA	NA	NA	0.1	<0.01	NA
SG23-10	10	3/13/91	NA	NA	<0.01	NA	0.06	NA	NA	NA	NA	NA	<0.01	<0.01	6.9	NA	13.2	NA	NA	NA	NA	0.54	<0.01	NA
SG24-10	10	3/13/91	NA	NA	<0.01	NA	0.03	NA	NA	NA	NA	NA	0.02	<0.01	0.51	NA	0.06	NA	NA	NA	NA	<0.01	<0.01	NA
SG25-10	10	3/13/91	NA	NA	<0.01	NA	0.11	NA	NA	NA	NA	NA	0.03	<0.01	0.37	NA	0.08	NA	NA	NA	NA	<0.01	1.45	NA
SG26-10	10	3/13/91	NA	NA	0.04	NA	1.14	NA	NA	NA	NA	NA	0.18	<0.01	0.09	NA	0.03	NA	NA	NA	NA	<0.01	0.12	NA
SG27-10	10	3/13/91	NA	NA	<0.01	NA	0.08	NA	NA	NA	NA	NA	0.02	0.02	0.54	NA	0.12	NA	NA	NA	NA	0.33	1.19	NA
SG28-10	10	3/13/91	NA	NA	<0.01	NA	0.03	NA	NA	NA	NA	NA	<0.01	<0.01	13.5	NA	21.6	NA	NA	NA	NA	1.03	0.97	NA
SG29-10	10	3/13/91	NA	NA	0.17	NA	0.01	NA	NA	NA	NA	NA	<0.01	<0.01	0.58	NA	6.23	NA	NA	NA	NA	1.24	0.89	NA
SG30-10	10	3/13/91	NA	NA	<0.01	NA	0.12	NA	NA	NA	NA	NA	0.02	<0.01	1.81	NA	12.8	NA	NA	NA	NA	4.18	0.84	NA
SG31-10	10	3/13/91	NA	NA	0.02	NA	0.22	NA	NA	NA	NA	NA	0.2	<0.01	8.97	NA	2.58	NA	NA	NA	NA	0.32	1.06	NA
SG32-10	10	3/14/91	NA	NA	<0.01	NA	0.07	NA	NA	NA	NA	NA	0.01	<0.01	0.93	NA	4.27	NA	NA	NA	NA	0.36	0.25	NA
SG33-10	10	3/14/91	NA	NA	<0.01	NA	0.21	NA	NA	NA	NA	NA	0.09	<0.01	3.09	NA	1.28	NA	NA	NA	NA	0.08	0.47	NA
SG34-10a	10	3/14/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG34-10b	10	3/14/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG35-10	10	3/14/91	NA	NA	<0.01	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG36-10	10	3/14/91	NA	NA	0.03	NA	<0.01	NA	NA	NA	NA	NA	<0.01	<0.01	<0.01	NA	<0.01	NA	NA	NA	NA	<0.01	<0.01	NA
SG37-10	10	3/14/91	NA	NA	<0.01	NA	0.21	NA	NA	NA	NA	NA	0.01	<0.01	1.44	NA	3.3	NA	NA	NA	NA	0.21	1.57	NA

See Figures 6.5 and 6.6 for soil gas sample locations
All concentrations reported in micrograms per liter (µg/l)
INT=Interference   NA=Not Analyzed
Table reproduced from draft RI Report (HLA, 9/97)

Table 6.9 Detected Compounds for Soil Gas Samples from Deep Probes

Constituent	Sampled Date	Probe Depth (Feet)	Soil Gas Sample Results (ug/l)		
			PP-4	PP-6	PP-7
Acetone	6/27/95	19	0.78	<0.05	<0.05
Benzene	"	"	1	7.3	0.35
Chlorobenzene	"	"	3.6	69	3.2
Chloroethene	"	"	<0.01	1.6	<0.01
Chloromethane	"	"	<0.01	0.2	<0.01
1,1-Dichloroethane	"	"	<0.005	1.3	<0.005
cis-1,2-Dichloroethene	"	"	<0.01	0.24	<0.01
trans-1,2-Dichloroethene	"	"	<0.01	0.39	<0.01
Ethylbenzene	"	"	<0.01	0.12	<0.01
Toluene	"	"	0.16	0.16	<0.01
Vinyl Chloride	"	"	0.46	1	0.32
Xylenes	"	"	0.4	<0.01	<0.01

TABLE 6.10 LANDFILL GAS MONITORING PROBE RESULTS 1994/1995

Probe	Probe Depth (Feet bgs)	Carbon Dioxide (%)	Oxygen (%)	Nitrogen (%)	Methane (%)	Carbon Monoxide (%)
PP-1	5	24	5.5	70	ND	ND
	19	26	2.6	71	ND	ND
PP-2	5	5.1	18	77	ND	ND
	19	28	1	69	3	ND
PP-3	5	38	3.6	23	35	ND
	19	33	2.3	39	26	ND
PP-4	5	47	0.4	23	30	ND
	19	43	0.6	36	20	ND
PP-5	5	36	2.1	51	11	ND
	19	24	12	46	18	ND
PP-6	5	49	0.2	12	39	ND
	19	48	0.4	8.7	43	ND
PP-7	5	33	2.8	53	11	ND
	19	36	4.2	39	21	ND
PP-8	5	34	1.0	55	9.5	ND
	19	50	0.6	3.3	46	ND
PP-9	5	37	2.2	30	31	ND
	19	13	16	60	12	ND
PP-10	5	32	1.1	41	26	ND
	19	32	1.4	41	26	ND
PP-11	5	19	5.7	44	31	ND
	19	47	0.4	4.8	48	ND
PP-12	5	32	0.6	7.4	60	ND
	19	35	1.2	4.6	59	ND
PP-13	5	7.2	15	64	14	ND
	17	36	0.3	1.8	62	ND
PP-14	5	0.98	8	91	ND	ND
	20	13	6.1	81	ND	ND
PP-15	5	1.0	21	78	ND	ND
	17	3.7	20	76	ND	ND
PP-16	5	7.6	14	78	ND	ND
	20	7.6	14	78	ND	ND
PP-17	5	0.75	22	77	ND	ND
	12	2.5	19	78	ND	ND

NOTES:

See Figure 6.16 for sample locations.

Probe samples PP-1 through PP-13 collected in September 1994.

Probe samples PP-14 through PP-17 collected in July 1995.

All concentrations in percent by volume.

bgs	below ground surface
%	percent
ND	Not detected

TABLE 6.11 LANDFILL GAS MONITORING PROBE RESULTS, JULY 1997

Probe	Probe Depth (Feet bgs)	Carbon Dioxide (%)	Oxygen (%)	Nitrogen (%)	Methane (%)	Pressure (inches H20)
PP-1	5	ND	22.3	NA	ND	0
	19	1.7	19.8	NA	ND	0.005
PP-2	5	0.5	20.1	NA	ND	0.005
	19	3.7	16.5	NA	ND	0.01
PP-3	5	7	17.2	NA	8.3	0.03
	19	4.6	17.5	NA	3.7	0.03
PP-4	5	9.2	15.6	NA	6.5	0.02
	19	8	15.4	NA	2.8	0.025
PP-5	5	5.2	16.5	NA	0.6	0
	19	0	21.9	NA	ND	0
PP-6	5	10.7	15.3	NA	13.2	0.5
	19	7.5	16.7	NA	11.5	0.5
PP-7	5	5	17.3	NA	2	0.045
	19	6.9	16.9	NA	5.8	0.05
PP-8	5	2	19.7	NA	ND	0.005
	19	4.8	18.9	NA	6.8	0.025
PP-9	5	3.7	18.3	NA	0.7	0.01
	19	ND	22.1	NA	ND	0
PP-10	5	ND	21.9	NA	ND	0
	19	4.7	17.5	NA	4.2	0.025
PP-11	5	ND	21.1	NA	ND	0.01
	19	8.1	16.6	NA	12.5	0.05
PP-12	5	0.4	21.6	NA	1.1	0.055
	19	10.3	14.6	NA	23.7	0.14
PP-13	5	ND	22.2	NA	ND	0
	17	5	17.8	NA	12.4	0.15
PP-14	5	0.7	21	NA	ND	0
	20	1.2	19.7	NA	ND	0
PP-15	5	ND	21.9	NA	ND	0.02
	17	0.1	21.6	NA	ND	0.01
PP-16	5	0.6	20.7	NA	ND	0
	20	1	20.1	NA	ND	0
PP-17	5	0.2	21.5	NA	ND	0
	12	ND	21.9	NA	ND	0

NOTES:

Probe samples PP-1 through PP-17 collected in July 23, 1997
All concentrations in percent by volume.

bgs	below ground surface
%	percent
ND	Not detected
NA	Not Analyze

TABLE 6.12 LANDFILL GAS MONITORING PROBE RESULTS, MAY 1999

Probe	Probe Depth (Feet bgs)	Carbon Dioxide (%)	Oxygen (%)	Methane CGI (%)	Methane Lab (%)	Pressure (inches H20)
PP-1	5	NA	15.2	ND	NA	NA
	19	NA	11.5	ND	ND	NA
PP-2	5	NA	3.7	ND	ND	NA
	19	NA	3.4	ND	NA	NA
PP-3	5	NA	0.3	22	33	NA
	19	NA	0.4	10	NA	NA
PP-4	5	NA	0.4	1.06	24	NA
	19	NA	NA	NA	NA	NA
PP-5	5	NA	0.5	0.06	2.3	NA
	19	NA	NA	NA	NA	NA
PP-6	5	NA	0.3	24	NA	NA
	19	NA	0.4	28	40	NA
PP-7	5	NA	0.2	15	NA	NA
	19	NA	0.4	18	27	NA
PP-8	5	NA	0.5	1	NA	NA
	19	NA	0.3	36	54	NA
PP-9	5	NA	1.6	3	6.4	NA
	19	NA	19.5	1	NA	NA
PP-10	5	NA	0.2	14	21	NA
	19	NA	0.1	15	NA	NA
PP-11	5	NA	0.9	23	NA	NA
	19	NA	0.4	44	52	NA
PP-12	5	NA	0.5	44	NA	NA
	19	NA	0.5	46	64	NA
PP-13	5	NA	20.8	1	NA	NA
	17	NA	0.6	47	68	NA
PP-14	5	NA	16.9	ND	ND	NA
	20	NA	10.4	ND	NA	NA
PP-15	5	NA	NA	ND	NA	NA
	17	NA	NA	ND	ND	NA
PP-16	5	NA	NA	ND	NA	NA
	20	NA	16.9	ND	ND	NA
PP-17	5	NA	NA	ND	NA	NA
	12	NA	17.9	ND	ND	NA

NOTES:

Probe samples PP-1 through PP-17 collected in May 1999
All concentrations in percent by volume.

bgs	below ground surface
%	percent
ND	Not detected
NA	Not Analyze
CGI	Combustible Gas Indicator

TABLE 6.13 COMPARISON OF LANDFILL METHANE GAS RESULTS

Probe	Probe Depth (Feet bgs)	Methane 1994/95 (%)	Methane 7/1997 (%)	Methane 5/1999 (%)
PP-1	5	ND	ND	ND
	19	ND	ND	ND
PP-2	5	ND	ND	ND
	19	3	ND	ND
PP-3	5	35	8.3	33
	19	26	3.7	10
PP-4	5	30	6.5	24
	19	20	2.8	NA
PP-5	5	11	0.6	2.3
	19	18	ND	NA
PP-6	5	39	13.2	NA
	19	43	11.5	40
PP-7	5	11	2	15
	19	21	5.8	27
PP-8	5	9.5	ND	1
	19	46	6.8	54
PP-9	5	31	0.7	6.4
	19	12	ND	1
PP-10	5	26	ND	21
	19	26	4.2	15
PP-11	5	31	ND	23
	19	48	12.5	52
PP-12	5	60	1.1	44
	19	59	23.7	64
PP-13	5	14	ND	1
	17	62	12.4	68
PP-14	5	ND	ND	ND
	20	ND	ND	ND
PP-15	5	ND	ND	ND
	17	ND	ND	ND
PP-16	5	ND	ND	ND
	20	ND	ND	ND
PP-17	5	ND	ND	ND
	12	ND	ND	ND

NOTES:

Probe samples PP-1 through PP-17
All concentrations in percent by volume.

bgs	below ground surface
%	percent
ND	Not detected
NA	Not Analyze

TABLE 6.14
WELL CONSTRUCTION INFORMATION

ELL NAME	ADWR 55 Reg. No.	DATE CONSTRUCTED	WELL OWNER	REFERENCE ELEVATION (Feet AMSL)	REFERENCE POINT	WELL DEPTH (Feet bgs)	TOP OF PERFORATIONS (Feet bgs)	BOTTOM OF PERFORATIONS (Feet bgs)	CASING DIAMETER (Inches)	CASING TYPE	SCREEN TYPE	SLOT INFORMATION (Inches)	PUMP DEPTH (Feet bgs)	PUMP TYPE	NOTES
ADC-1	524958	6/30/89	ESTES DEVELOPMENT CO	0.00		69	0	0	4	PVC	PVC	UNKNOWN	NA	NONE	Arizona Design Center Well
ADC-2	524957	6/30/89	ESTES DEVELOPMENT CO	0.00		77	0	0	2	PVC	PVC	UNKNOWN	NA	NONE	Arizona Design Center Well
ADC-3	525471	8/12/89	ESTES DEVELOPMENT CO	0.00		76	0	0	4	PVC	PVC	UNKNOWN	NA	NONE	Arizona Design Center Well
ADC-4	524956	6/30/89	ESTES DEVELOPMENT CO	0.00		69	0	0	4	PVC	PVC	UNKNOWN	NA	NONE	Arizona Design Center Well
BW-NES	514071	5/20/86	BRADLEY INVESTMENT	1133.09	TOV	99	61	66	2	PVC	PVC	0.05	66	BLADDER	Well is nested with BW-NED
BW-NED	514071	5/20/86	BRADLEY INVESTMENT	1133.09	TOV	99	94	99	2	PVC	PVC	0.05	99	BLADDER	Well is nested with BW-NES
BW-SS	504638	1982	BRADLEY INVESTMENT	1122.26	TOV	99	61	66	2	PVC	PVC	0.05	66	BLADDER	Well is nested with BW-SD
BW-SD	504638	1982	BRADLEY INVESTMENT	1122.26	TOV	99	94	99	2	PVC	PVC	0.05	99	BLADDER	Well is nested with BW-SS
BW-SES	504636	1982	BRADLEY INVESTMENT	1122.93	TOV	99	61	66	2	PVC	PVC	0.05	66	BLADDER	Well is nested with BW-SED
BW-SED	504636	1982	BRADLEY INVESTMENT	1122.93	TOV	99	94	99	2	PVC	PVC	0.05	99	BLADDER	Well is nested with BW-SES
BW-WS	514074	5/20/86	BRADLEY INVESTMENT	1125.61	TOV	99	61	66	2	PVC	PVC	0.05	66	BLADDER	Well is nested with BW-WD
BW-WD	514074	5/20/86	BRADLEY INVESTMENT	1125.61	TOV	99	94	99	2	PVC	PVC	0.05	99	BLADDER	Well is nested with BW-WS
BW-P	800536	Unknown	BRADLEY INVESTMENT	0.00	MP	200	0	0	0	STEEL	STEEL	UNKNOWN	UNKNOWN	TURBINE	Depth is approximate
EW-1	523016	2/17/89	PHOENIX, CITY OF	1120.47	TOS	103	73	103	4.5	PVC	PVC	0.02	93	4" SUBMER	
EW-2	523019	2/17/89	PHOENIX, CITY OF	1107.96	TOS	102	72	102	4.5	PVC	PVC	0.02	90	4" SUBMER	
EW-3	523020	2/17/89	PHOENIX, CITY OF	1128.07	TOS	140	50	140	4.5	PVC	PVC	0.02	130	4" SUBMER	Well has core available
EW-4	523017	2/17/89	PHOENIX, CITY OF	1118.04	TOS	100	70	100	4.5	PVC	PVC	0.02	90	4" SUBMER	
EW-5	523021	2/17/89	PHOENIX, CITY OF	1124.41	TOS	150	120	150	4.5	PVC	PVC	0.02	140	4" SUBMER	
EW-6	523018	2/17/89	PHOENIX, CITY OF	1124.17	TOS	110	100	110	4.5	PVC	PVC	0.02	100	4" SUBMER	
EW-7	529441	1/05/91	PHOENIX, CITY OF	1117.54	TOS	159	129	159	4.5	STEEL	PVC	0.02	150	4" SUBMER	Well has core available
EW-8	529447	12/10/90	PHOENIX, CITY OF	1123.64	TOS	201	181	201	4.5	STEEL	PVC	0.02	190	4" SUBMER	
EW-9	529445	1/09/91	PHOENIX, CITY OF	1108.17	TOC	90	60	90	4.5	STEEL	PVC	0.02	80	4" SUBMER	
EW-10	529443	12/15/90	PHOENIX, CITY OF	1123.18	TOS	101	71	101	4.5	STEEL	PVC	0.02	90	4" SUBMER	
EW-11	529442	1/19/91	PHOENIX, CITY OF	1104.01	TOS	90	60	90	4.5	STEEL	PVC	0.02	80	4" SUBMER	
EW-12	529440	1/20/91	PHOENIX, CITY OF	1110.44	TOS	100	70	100	4.5	STEEL	PVC	0.02	90	4" SUBMER	
EW-13	529444	1/21/91	PHOENIX, CITY OF	1124.94	TOS	100	70	100	4.5	STEEL	PVC	0.02	90	4" SUBMER	
EW-14	529446	1/27/91	PHOENIX, CITY OF	1117.81	TOS	100	70	100	4.5	STEEL	PVC	0.02	90	4" SUBMER	
EW-15	540704	11/24/93	PHOENIX, CITY OF	1126.06	TOS	160	140	160	4.5	STEEL	PVC	0.02	150	4" SUBMER	
EW-16	540703	11/17/93	PHOENIX, CITY OF	1109.11	TOC	65	45	65	4.5	STEEL	PVC	0.02	55	4" SUBMER	Well is nested with EW-PZ4
EW-17	540709	11/20/93	PHOENIX, CITY OF	1121.04	TOS	100	70	100	4.5	STEEL	PVC	0.02	90	4" SUBMER	
W-18	540710	11/30/93	PHOENIX, CITY OF	1125.95	TOS	95	65	95	4.5	STEEL	PVC	0.02	85	4" SUBMER	
EW-19	556063	6/03/96	PHOENIX, CITY OF	1123.94	TOS	112.5	92	112	4.5	STEEL	PVC	0.02	102	3" SUBMER	
EW-22	548691	4/22/95	PHOENIX, CITY OF	1121.00	TOS	160	120	150	4	STEEL	PVC	0.01	140	4" SUBMER	Well was logged by Earth Tech
EW-23	574838	5/28/99	ADEQ	1121.28	TOS	148	118	148	5	PVC	PVC	0.02	143	4" SUBMER	Well was logged by ESE
EW-24	574839	5/26/99	ADEQ	1098.72	TOS	62	25	55	5	PVC	PVC	0.02	57	4" SUBMER	Well was logged by ESE
EW-25	574840	5/25/99	ADEQ	1106.82	TOS	60	30	60	5	PVC	PVC	0.02	55	4" SUBMER	Well was logged by ESE
EW-26	574841	6/4/99	ADEQ	1125.35	TOS	260	240	260	5	PVC	PVC	0.02	255	4" SUBMER	Well was logged by ESE
EW-PZ1	540705	11/29/93	PHOENIX, CITY OF	1125.12	TOC	80	75	80	4	STEEL	PVC	0.02	NA	NONE	
EW-PZ2	540706	10/20/93	PHOENIX, CITY OF	1124.42	TOC	47	42	47	2	STEEL	PVC	0.02	NA	NONE	Well is nested with EW-PZ3
EW-PZ3	540706	10/20/93	PHOENIX, CITY OF	1124.79	TOC	100.5	95.5	100.5	4	STEEL	PVC	0.02	NA	NONE	Well is nested with EW-PZ2
EW-PZ4	540703	11/17/93	PHOENIX, CITY OF	1108.08	TOC	35	30	35	2	STEEL	PVC	0.02	NA	NONE	Well is nested with EW-16
EW-PZ5	540701	10/05/93	PHOENIX, CITY OF	1129.03	TOC	91	86	91	4	STEEL	PVC	0.02	NA	NONE	
EW-PZ6	540711	10/14/93	PHOENIX, CITY OF	1127.97	TOC	70.4	65.4	70.4	4	STEEL	PVC	0.02	NA	NONE	
EW-PZ7	556065	5/29/96	PHOENIX, CITY OF	1122.15	TOC	55	25	55	2	STEEL	PVC	0.02	NA	NONE	Well is nested with EW-PZ8 in Boring B-2
EW-PZ8	556065	5/29/96	PHOENIX, CITY OF	1122.14	TOC	85	65	85	2	STEEL	PVC	0.02	NA	NONE	Well is nested with EW-PZ7 in Boring B-2
EW-PZ9	556064	5/23/96	PHOENIX, CITY OF	1121.46	TOC	80	65	80	2	STEEL	PVC, VWIRE	0.02	NA	NONE	Well is nested with EW-PZ10 in Boring B-1
EW-PZ10	556064	5/23/96	PHOENIX, CITY OF	1121.46	TOC	120	100	120	2	STEEL	VWIRE	0.02	NA	NONE	Well is nested with EW-PZ9 in Boring B-1
EW-E	502226	5/82	PHOENIX, CITY OF	1125.44	TOS	100	80	100	4	STEEL	STEEL	0.06	90	3" SUBMER	Wells have outer casing perf. from 20-100.
EW-NE	502415	6/82	PHOENIX, CITY OF	1131.48	TOS	100	80	100	4	STEEL	STEEL	0.06	90	3" SUBMER	Wells have outer casing perf. from 20-100.
EW-NW	502980	5/82	PHOENIX, CITY OF	1125.21	TOS	100	80	100	4	STEEL	STEEL	0.06	90	3" SUBMER	Wells have outer casing perf. from 20-100.
EW-W	502416	6/82	PHOENIX, CITY OF	1128.50	TOS	100	80	100	4	STEEL	STEEL	0.06	90	3" SUBMER	Wells have outer casing perf. from 20-100.
EW-0E		1950	PHOENIX, CITY OF	1129.13	TOC	125	40	100	16	STEEL	STEEL	0.06	NA	NONE	Well is not currently registered with ADWR.
EW-RW1	529347	2/10/91	PHOENIX, CITY OF	1124.94	TOC	113.5	53.5	113.5	10	STEEL	JOHNSON	0.035	105	NONE	
EW-RW2	533343	11/11/91	PHOENIX, CITY OF	1121.39	TOC	153.5	51.5	153.5	8	STEEL	JOHNSON	0.03	147	NONE	
SB-1	526743	2/19/90	DENRO LTD	1103.74	TOS	105	50	100	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well
SB-2	526744	2/19/90	TEACHERS INS &ANN A	1103.74	NONE	106	51	101	6	STEEL	STEEL	VERT	85	ABANDONED	Southbank Well
SB-3	526976	3/07/90	DENRO LTD	1105.93	TOS	105	60	100	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well
SB-4	526977	3/10/90	DENRO LTD	1117.77	TOS	106	61	101	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well
SB-5	526974	4/13/90	DENRO LTD	1115.15	TOS	116	71	111	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well
SB-6	526975	4/13/90	DENRO LTD	1117.92	TOS	116	71	111	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well
SB-7	527296	3/21/90	DENRO LTD	1111.74	TOS	115	70	110	6	STEEL	STEEL	VERT	85	SUBMER	Southbank Well

S:
information in feet below land surface.
and slot size in inches.

Top of Vault	MP	Measurement Port
Top of Well Seal	TOC	Top of Casing
Top of Plate		

TABLE 6.14
WELL CONSTRUCTION INFORMATION

TW-1	529690	11/17/90	TANNER LAND COMPANY	1119.52	TOC	80	50	80	4	PVC	PVC	UNKNOWN	NA	ABANDONED	Tanner Well
W-3	529692	11/17/90	TANNER LAND COMPANY	1120.56	TOC	80	50	80	4	PVC	PVC	UNKNOWN	NA	ABANDONED	Tanner Well
-4	529693	11/17/90	TANNER LAND COMPANY	1118.52	TOC	80	50	80	4	PVC	PVC	UNKNOWN	NA	ABANDONED	Tanner Well
TW-5	537210	12/01/92	TANNER COMPANIES.THE	1115.63	NONE	80	50	80	4	PVC	PVC	UNKNOWN	NA	ABANDONED	Tanner Well
TW-P	605122	9/01/61	TANNER CO	0.00	NONE	291	160	280	16	STEEL	STEEL	UNKNOWN	UNKNOWN	ABANDONED	Tanner Well
TW-USGS				1131.50	TOP	200	50	122	24	STEEL	STEEL	UNKNOWN	NA	NONE	Tovrea Well. not currently reg'd with ADWR.

S:

nformation in feet below land surface.

and slot size in inches.

	Top of Vault	MP	Measurement Port
	Top of Well Seal	TOC	Top of Casing

Table 6.15 Statistical Summary of Organic Compounds

Compound Name	Number of Samples	Number of Detections	Frequency of Detections	AWQS or MCL	Mean Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentrations
1,2-DICHLOROETHENE (CIS)	637	476	0.75	70	238.29	12000.00	936.45
VINYL CHLORIDE	731	416	0.57	2	353.32	10000.00	942.39
TRICHLOROETHENE	731	394	0.54	5	11.75	120.00	16.22
1,2-DICHLOROBENZENE	1061	509	0.48	600	60.37	2500.00	185.16
CHLOROBENZENE	1137	478	0.42		28.26	290.00	46.43
1,1-DICHLOROETHANE	729	292	0.40		2.27	17.00	2.28
BIS(2-ETHYLHEXYL)PHTHALATE	14	5	0.36	6	39.40	87.00	24.05
1,1-DICHLOROETHENE	731	236	0.32	7	3.01	18.00	2.91
1,2-DICHLOROETHENE (TRANS)	637	198	0.31	100	7.38	100.00	13.09
PHENOL	14	4	0.29		47.00	74.00	15.64
CHLOROFORM	731	190	0.26		3.43	210.00	20.39
TOTAL THM	291	75	0.26	100	1.08	4.10	0.63
1,4-DICHLOROBENZENE	1061	230	0.22	75	20.24	1900.00	162.78
TETRACHLOROETHENE	731	158	0.22	5	1.11	6.70	1.03
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	545	116	0.21		2.57	14.00	2.51
TRICHLOROFLUOROMETHANE	637	125	0.20		3.26	29.00	4.67
1,1,1-TRICHLOROETHANE	729	114	0.16	200	1.98	50.00	4.81
2-CHLOROETHYL VINYL ETHER	649	101	0.16		0.01	0.60	0.06
ORTHO-XYLENE	122	18	0.15	10000	1.38	5.30	1.15
DICHLORODIFLUOROMETHANE	637	93	0.15		2.62	83.00	8.55
BENZENE	730	94	0.13	5	4.37	93.00	9.87
METHYLENE CHLORIDE	729	89	0.12		19.63	450.00	66.64
TOLUENE	729	78	0.11	1000	4.06	65.00	10.46
TOTAL XYLENES	630	66	0.10	10000	35.85	1000.00	131.98
TRICHLOROTRIFLUOROETHANE	169	13	0.08		3.58	6.00	1.12
CHLOROETHANE	728	48	0.07		3.02	14.00	3.27
1,3-DICHLOROBENZENE	1061	58	0.05		60.47	1900.00	312.06
META- & PARA-XYLENE	122	6	0.05	10000	0.80	1.20	0.21
ETHYLBENZENE	729	35	0.05	700	46.31	330.00	81.03
1,2-DICHLOROETHANE	731	34	0.05	5	0.76	6.40	1.09
CHLOROMETHANE	729	32	0.04		1.09	7.70	1.46
BROMODICHLOROMETHANE	728	27	0.04		1.30	10.00	1.84
BROMOMETHANE	728	4	0.01		3.22	6.60	2.12
DIBROMOCHLOROMETHANE	729	4	0.01		0.28	0.34	0.05
CARBON TETRACHLORIDE	730	4	0.01	5	5.98	9.10	3.36
1,2-DICHLOROPROPANE	715	3	0.00	5	0.47	0.72	0.18
1,1,2,2-TETRACHLOROETHANE	729	3	0.00		2.00	4.40	1.71
TRANS-1,3-DICHLOROPROPENE	607	1	0.00		0.60	0.60	0.00

See Page 4 for Notes

Table 6.15 Statistical Summary of Organic Compounds

Compound Name	Number of Samples	Number of Detections	Frequency of Detections	AWQS or MCL	Mean Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentrations
CIS-1,3-DICHLOROPROPENE	729	1	0.00		0.50	0.50	0.00
1,1,2-TRICHLOROETHANE	729	0	0.00	5	0.00	0.00	0.00
1,2,4-TRICHLOROBENZENE	14	0	0.00	70	0.00	0.00	0.00
1,2-DICHLOROPROPENE	14	0	0.00		0.00	0.00	0.00
2,4,5-TRICHLOROPHENOL	14	0	0.00	50	0.00	0.00	0.00
2,4,6-TRICHLOROPHENOL	14	0	0.00		0.00	0.00	0.00
2,4-DICHLOROPHENOL	14	0	0.00		0.00	0.00	0.00
2,4-DIMETHYLPHENOL	14	0	0.00		0.00	0.00	0.00
2,4-DINITROPHENOL	14	0	0.00		0.00	0.00	0.00
2,4-DINITROTOLUENE	14	0	0.00		0.00	0.00	0.00
2,6-DINITROTOLUENE	14	0	0.00		0.00	0.00	0.00
2-BUTANONE	14	0	0.00		0.00	0.00	0.00
2-CHLORONAPHTHALENE	14	0	0.00		0.00	0.00	0.00
2-CHLOROPHENOL	14	0	0.00		0.00	0.00	0.00
2-HEXANONE	14	0	0.00		0.00	0.00	0.00
2-METHYLNAPHTHALENE	14	0	0.00		0.00	0.00	0.00
2-METHYLPHENOL	14	0	0.00		0.00	0.00	0.00
2-NITROANILINE	14	0	0.00		0.00	0.00	0.00
2-NITROPHENOL	14	0	0.00		0.00	0.00	0.00
3,3-DICHLOROBENZIDINE	14	0	0.00		0.00	0.00	0.00
3-NITROANILINE	14	0	0.00		0.00	0.00	0.00
4,4-DDD	9	0	0.00		0.00	0.00	0.00
4,4-DDE	9	0	0.00		0.00	0.00	0.00
4,4-DDT	9	0	0.00		0.00	0.00	0.00
4,6-DINITRO-2-METHYLPHENOL	14	0	0.00		0.00	0.00	0.00
4-BROMOPHENYL PHENYL ETHER	14	0	0.00		0.00	0.00	0.00
4-CHLORO-3-METHYLPHENOL	14	0	0.00		0.00	0.00	0.00
4-CHLOROANILINE	14	0	0.00		0.00	0.00	0.00
4-CHLOROPHENYL PHENYL ETHER	14	0	0.00		0.00	0.00	0.00
4-METHYL-2-PENTANONE	14	0	0.00		0.00	0.00	0.00
4-METHYLPHENOL	14	0	0.00		0.00	0.00	0.00
4-NITROANILINE	14	0	0.00		0.00	0.00	0.00
4-NITROPHENOL	14	0	0.00		0.00	0.00	0.00
ACENAPHTHENE	14	0	0.00		0.00	0.00	0.00
ACENAPHTHYLENE	14	0	0.00		0.00	0.00	0.00
ACETONE	183	0	0.00		0.00	0.00	0.00
ACETONE/1,1-DCE	122	0	0.00		0.00	0.00	0.00
ALDRIN	9	0	0.00		0.00	0.00	0.00

See page 4 for Notes

Table 6.15 Statistical Summary of Organic Compounds

Compound Name	Number of Samples	Number of Detections	Frequency of Detections	AWQS or MCL	Mean Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentrations
ALPHA-BHC	9	0	0.00		0.00	0.00	0.00
ANTHRACENE	14	0	0.00		0.00	0.00	0.00
AROCHLOR-1016	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1221	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1232	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1242	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1248	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1254	9	0	0.00	1	0.00	0.00	0.00
AROCHLOR-1260	9	0	0.00	1	0.00	0.00	0.00
BENZO(A)ANTHARACENE	14	0	0.00		0.00	0.00	0.00
BENZO(A)PYRENE	14	0	0.00	0.2	0.00	0.00	0.00
BENZO(B)FLUORANTHENE	14	0	0.00		0.00	0.00	0.00
BENZO(G,H,I)PERYLENE	14	0	0.00		0.00	0.00	0.00
BENZO(K)FLUORANTHENE	14	0	0.00		0.00	0.00	0.00
BENZOIC ACID	14	0	0.00		0.00	0.00	0.00
BENZYL ALCOHOL	14	0	0.00		0.00	0.00	0.00
BETA-BHC	9	0	0.00		0.00	0.00	0.00
BIS(2-CHLOROETHOXY)METHANE	14	0	0.00		0.00	0.00	0.00
BIS(2-CHLOROISOPROPYL)ETHER	14	0	0.00		0.00	0.00	0.00
BIS-(2-CHLOROETHYL)ETHER	14	0	0.00		0.00	0.00	0.00
BROMOFORM	728	0	0.00		0.00	0.00	0.00
BUTYL BENZYL PHTHALATE	14	0	0.00		0.00	0.00	0.00
CARBON DISULFIDE	14	0	0.00		0.00	0.00	0.00
CHLORDANE	9	0	0.00	2	0.00	0.00	0.00
CHRYSENE	14	0	0.00		0.00	0.00	0.00
DELTA-BHC	9	0	0.00		0.00	0.00	0.00
DI-N-BUTL PHTHALATE	14	0	0.00		0.00	0.00	0.00
DI-N-OCTYL PHTHALATE	14	0	0.00		0.00	0.00	0.00
DIBENZO(A,H)ANTHRACENE	14	0	0.00		0.00	0.00	0.00
DIBENZOFURAN	14	0	0.00		0.00	0.00	0.00
DIELDRIN	9	0	0.00		0.00	0.00	0.00
DIETHYL PHTHALATE	14	0	0.00		0.00	0.00	0.00
DIMETHYL PHTHALATE	14	0	0.00		0.00	0.00	0.00
EDB (1,2-DIBROMOETHANE)	79	0	0.00		0.00	0.00	0.00
ENDOSULFAN I	9	0	0.00		0.00	0.00	0.00
ENDOSULFAN II	9	0	0.00		0.00	0.00	0.00
ENDOSULFAN SULFATE	9	0	0.00		0.00	0.00	0.00

See page 4 for Notes

Table 6.15 Statistical Summary of Organic Compounds

Compound Name	Number of Samples	Number of Detections	Frequency of Detections	AWQS or MCL	Mean Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentrations
ENDRIN	9	0	0.00	2	0.00	0.00	0.00
ENDRIN KETONE	9	0	0.00		0.00	0.00	0.00
FLUORANTHENE	14	0	0.00		0.00	0.00	0.00
FLUORENE	14	0	0.00		0.00	0.00	0.00
GAMMA-BHC(LINDANE)	9	0	0.00	0.2	0.00	0.00	0.00
HEPTACHLOR	9	0	0.00	0.4	0.00	0.00	0.00
HEPTACHLOR EPOXIDE	9	0	0.00	0.2	0.00	0.00	0.00
HEXACHLOROBENZENE	14	0	0.00	1	0.00	0.00	0.00
HEXACHLOROBUTADIENE	14	0	0.00		0.00	0.00	0.00
HEXACHLOROCYCLOPENTADIENE	14	0	0.00	50	0.00	0.00	0.00
HEXACHLOROETHANE	14	0	0.00		0.00	0.00	0.00
INDENO(1,2,3-C,D)PYRENE	14	0	0.00		0.00	0.00	0.00
ISOPHORONE	14	0	0.00		0.00	0.00	0.00
METHOXYCHLOR	9	0	0.00	40	0.00	0.00	0.00
N-NITROSO-DI-N-PROPYLAMINE	14	0	0.00		0.00	0.00	0.00
N-NITROSODIPHENYLAMINE	14	0	0.00		0.00	0.00	0.00
NAPHTHALENE	14	0	0.00		0.00	0.00	0.00
NITROBENZENE	14	0	0.00		0.00	0.00	0.00
PENTACHLOROPHENOL	14	0	0.00	1	0.00	0.00	0.00
PHENANTHRENE	14	0	0.00		0.00	0.00	0.00
PYRENE	14	0	0.00		0.00	0.00	0.00
STYRENE	14	0	0.00	100	0.00	0.00	0.00
TOXAPHENE	9	0	0.00	3	0.00	0.00	0.00
VINYL ACETATE	14	0	0.00		0.00	0.00	0.00

Notes:

All concentrations are in micrograms per liter (ug/l)

Statistical summary based on data collected through the December 1996 sampling round

Table 6.16 STATISTICAL SUMMARY OF INORGANIC COMPOUNDS

Compound Name	Number of Samples	Number of Detections	Frequency of Detections	AWQS or MCL	Mean Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
SODIUM	444	444	1.00		164.0387	270.0000	38.7385
CALCIUM	444	444	1.00		52.3125	130.0000	19.0905
MAGNESIUM	444	433	0.98		24.8132	69.0000	9.4476
BORON	436	429	0.98		0.3985	1.1000	0.1737
POTASSIUM	444	403	0.91		8.0240	59.0000	6.7759
NITRATE	737	372	0.50	10	1.3800	9.7000	2.4251
ZINC	461	392	0.85		0.1189	4.6000	0.2830
ARSENIC	461	375	0.81	0.05	0.0179	0.1400	0.0198
MANGANESE	469	372	0.79		1.6836	8.6000	1.6019
BARIUM	447	283	0.63	2	0.3718	3.3800	0.4989
IRON	430	236	0.55		1.1552	15.6000	2.1277
LEAD	461	104	0.23	0.05	0.0072	0.1100	0.0126
NICKEL	461	78	0.17	0.1	0.0580	0.4800	0.0697
COPPER	444	48	0.11		0.1214	5.1000	0.7263
CHROMIUM	461	27	0.06	0.1	0.0632	0.1200	0.0382
CADMIUM	444	25	0.06	0.005	0.0051	0.0350	0.0072
MERCURY	461	24	0.05	0.002	0.0002	0.0021	0.0004
BERYLLIUM	444	9	0.02	0.004	0.0015	0.0030	0.0013
ANTIMONY	444	4	0.01	0.006	0.0153	0.0500	0.0202
THALLIUM	444	2	0.00	0.002	0.0012	0.0024	0.0012
SELENIUM	461	2	0.00	0.05	0.0030	0.0060	0.0030
SILVER	461	1	0.00		0.0000	0.0000	0.0000

Notes:

All concentrations are in milligrams per liter (mg/l)

Statistical summary includes data collected through the December 1996 sampling round

TABLE 6.17
ESTES LANDFILL REMEDIAL INVESTIGATION
EPA 8260B VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

SAMPLE IDENTIFICATION	COLLECTION DATE	ANALYTE	DETECTION LIMIT	RESULT (ug/L)	DATA QUALIFIER	ADEQ ACTION LEVEL (ug/L)
EW-E-GW-(6-22-99)	6/22/99	cis-1,2-Dichloroethene	2	110		70
		Vinyl chloride	2	38		2
EW-W-GW-(6-16-99)	06/16/99	Benzene	2	2.5		5
		Chlorobenzene	2	26		100
		1,2-Dichlorobenzene	2	26		75
		cis-1,2-Dichloroethene	2	120		70
		trans-1,2-Dichloroethene	2	2.9		10
		Vinyl chloride	10	230	D	2
EW-PZ1-GW-(6-22-99)	6/22/99	cis-1,2-Dichloroethene	2	240		70
		Vinyl chloride	2	46		2
		Bromodichloromethane	2	8.3		100
		Chloroform	2	8.1		100
		Dibromochloromethane	2	6.7		100
EW-4-GW-(6-15-99)	06/15/99	cis-1,2-Dichloroethene	2	5.3		70
		Vinyl chloride	2	2.2		2
EW-9-GW-(6-14-99)	06/14/99	Chlorobenzene	2	8.7		100
		1,2-Dichlorobenzene	2	5.5		75
		cis-1,2-Dichloroethene	2	40		70
		Trichloroethene	2	3.3		5
		Vinyl chloride	2	51		2
EW-11-GW-(6-14-99)	06/14/99	cis-1,2-Dichloroethene	2	5.9		70
		Vinyl chloride	2	12		2
EW-15-GW-(6-17-99)	06/17/99	Chlorobenzene	2	5.6		100
		1,2-Dichlorobenzene	2	16		75
		cis-1,2-Dichloroethene	2	120		70
		trans-1,2-Dichloroethene	2	2.8		100
		Vinyl chloride	2	100		2
EW-18-GW-(6-14-99)	06/14/99	cis-1,2-Dichloroethene	2	15		70
		Vinyl chloride	2	8.5		2
EW-19-GW-(6-16-99)	06/16/99	cis-1,2-Dichloroethene	2	31		70
		Trichloroethene	2	11		5
EW-22-GW-(6-15-99)	06/15/99	cis-1,2-Dichloroethene	2	4.8		70
		Vinyl chloride	2	2.7		2
EW-23-GW-(6-10-99)	06/10/99	cis-1,2-Dichloroethene	2	6.7		70
		Vinyl chloride	2	12		2
EW-26-GW-(6-16-99)	06/16/99	cis-1,2-Dichloroethene	2	15		70

NOTES: 1) All results in micrograms per liter (ug/L) unless otherwise specified.
2) Only positive detections are shown.
3) Samples are undiluted unless otherwise noted.
D=Diluted sample.
shading=exceeds action level

file: 99wellgw.xls (8260)

TABLE 6.18
ESTES LANDFILL REMEDIAL INVESTIGATION
GROUNDWATER VOCS VERTICAL PROFILE AT WELL EW-26

SAMPLE IDENTIFICATION	DEPTH (Feet)	COLLECTION DATE	C-benzene	1,2-DCB	cis-1,2-DCE	trans-1,2-DCE	Vinyl chloride	TCE	Toluene
EW-26-GW/180(5-26-99)	180	5/26/99	2.7	2.5	28	<1.0	10	<1.0	3.6
EW-26-GW/200(5-27-99)	200	5/27/99	<2.0	<2.0	20	<2.0	6.9	<2.0	<4.0
EW-26-GW/220(5-27-99)	220	5/27/99	<0.50	<0.50	22	1.7	<1.0	1.4	<0.50
EW-26-GW/240(5-27-99)	240	5/27/99	<0.50	<0.50	8.0	<0.50	<1.0	<0.50	0.56
EW-26-GW/260(5-28-99)	260	5/28/99	<0.50	<0.50	8.4	1.2	<1.0	0.82	<0.50

NOTES: 1) All results in micrograms per liter (ug/L) unless otherwise specified.

C-benzene - Chlorobenzene
1,2-DCB - 1,2-Dichlorobenzene
cis-1,2-DCE - cis-1,2-Dichloroethene

file: EW26_VP.xls

TABLE 6.19
ESTES LANDFILL REMEDIAL INVESTIGATION
EPA 200.7 TOTAL AND DISSOLVED METALS IN GROUNDWATER

SAMPLE IDENTIFICATION	COLLECTION DATE	ANALYTE	DETECTION LIMIT	RESULT (mg/L)	DATA QUALIFIER	DILUTION FACTOR	ADEQ ACTION LEVEL (mg/L)
EW-15-GW-(6-17-99)	06/17/99	Barium	0.01	0.058		1	2
		Barium, Dissolved	0.01	0.059		1	2
		Manganese	0.05	0.051		1	1.7
		Manganese, Dissolved	0.05	0.053		1	1.7
EW-26-GW-(6-16-99)	06/16/99	Barium	0.01	0.12		1	2
		Chromium	0.01	0.017		1	0.1
		Iron	0.5	0.85		1	
		Manganese	0.05	0.06		1	1.7
		Barium, Dissolved	0.01	0.082		1	2
		Chromium, Dissolved	0.01	0.11		1	0.1
EW-19-GW-(6-16-99)	06/16/99	Barium	0.01	0.067		1	2
		Manganese	0.05	0.064		1	1.7
		Barium, Dissolved	0.01	0.083		1	2
		Manganese, Dissolved	0.05	0.08		1	1.7
EW-W-GW-(6-16-99)	06/16/99	Barium	0.01	0.61		1	2
		Barium, Dissolved	0.01	0.61		1	2
		Copper, Dissolved	0.02	0.029		1	1.3
		Manganese	0.05	3.3		1	1.7
EW-PZ1-GW-(6-17-99)	6/17/99	Barium	0.01	0.16		1	2
		Copper	0.02	0.51		1	1.3
		Iron	0.5	4.1		1	
		Manganese	0.05	0.38		1	1.7
		Nickel	0.05	0.44		1	0.1
		Barium, Dissolved	0.01	0.13		1	2
		Manganese, Dissolved	0.05	0.17		1	1.7
EW-4-GW-(6-15-99)	06/15/99	Barium	0.01	0.13		1	2
		Manganese	0.05	1.1		1	1.7
		Barium, Dissolved	0.01	0.13		1	2
		Manganese, Dissolved	0.05	1.1		1	1.7
EW-22-GW-(6-15-99)	06/15/99	Barium	0.01	0.054		1	2
		Barium, Dissolved	0.01	0.054		1	2
		Iron	0.5	0.6		1	
		Manganese	0.05	0.053		1	1.7
		Manganese, Dissolved	0.05	0.06		1	1.7
EW-8-GW-(6-15-99)	06/15/99	Barium	0.01	0.016		1	2
		Chromium	0.01	0.092		1	0.1
		Iron	0.5	1.5		1	
		Barium, Dissolved	0.01	0.013		1	2
		Chromium, Dissolved	0.01	0.079		1	0.1
EW-18-GW-(6-14-99)	06/14/99	Barium	0.01	0.46		1	2
		Manganese	0.05	2.6		1	1.7
		Barium, Dissolved	0.01	0.05		1	2
		Manganese, Dissolved	0.05	0.09		1	1.7
EW-9-GW-(6-14-99)	06/14/99	Barium	0.01	0.39		1	2
		Iron	0.5	2.9		1	
		Manganese	0.05	3.5		1	1.7
		Barium, Dissolved	0.01	0.37		1	2
		Manganese, Dissolved	0.05	3.4		1	1.7
EW-11-GW-(6-14-99)	06/14/99	Barium	0.01	0.12		1	2
		Iron	0.5	2.2		1	
		Manganese	0.05	0.99		1	1.7
		Barium, Dissolved	0.01	0.061		1	2
		Manganese, Dissolved	0.05	0.21		1	1.7
EW-24-GW-(6-14-99)	06/14/99	Barium	0.01	0.39		1	2
		Iron	0.5	1.1		1	
		Manganese	0.05	3.1		1	1.7
		Barium, Dissolved	0.01	0.39		1	2
		Manganese, Dissolved	0.05	3.5		1	1.7
EW-25-GW-(6-11-99)	06/11/99	Barium	0.01	0.26		1	2
		Chromium	0.01	0.15		1	0.1
		Copper	0.02	0.046		1	1.3
		Iron	0.5	20		1	
		Manganese	0.05	1.9		1	1.7
		Nickel	0.05	0.052		1	0.1
		Barium, Dissolved	0.01	0.082		1	2
		Manganese, Dissolved	0.05	0.34		1	1.7

TABLE 6.19
ESTES LANDFILL REMEDIAL INVESTIGATION
EPA 200.7 TOTAL AND DISSOLVED METALS IN GROUNDWATER

EW-1-GW-(6-11-99)	06/11/99	Barium	0.01	0.059		1	2
		Barium, Dissolved	0.01	0.067		1	2
EW-23-GW-(6-10-99)	06/10/99	Barium	0.01	0.045		1	2
		Manganese	0.05	0.087		1	1.7
		Barium, Dissolved	0.01	0.055		1	2
		Manganese, Dissolved	0.05	0.1		1	1.7
EW-NE-GW-(6-9-99)	06/09/99	Barium	0.01	0.047		1	2
		Chromium	0.01	0.064		1	0.1
		Iron	0.5	0.61		1	
		Barium, Dissolved	0.01	0.043		1	2
EW-E-GW-(6-22-99)	06/22/99	Barium	0.01	0.28		1	2
		Barium, Dissolved	0.01	0.28		1	2
		Iron	0.5	1.5		1	
		Manganese	0.05	1.4		1	1.7
		Manganese, Dissolved	0.05	1.5		1	1.7

NOTES: 1) All results in milligrams per liter (mg/L) unless otherwise specified.
2) Only positive detections are shown.
3) Samples are undiluted unless otherwise noted.
shading=exceeds action levels

file: 99wellgw.xls (200-245)

TABLE 7.1
RESULTS OF ADDITIONAL GROUNDWATER SAMPLING PARAMETERS

Sample ID	Date	pH	Cond	Redox	DO	Methane	Ethene	Ethane	Propane	Propene	i-Butane	n-Butane	O-Phosphate	Fe (Total)	Fe +2 (Dissolved)	Sulfide	Sulfate	Manganese (Total)	Manganese (Dissolved)	COD	BOD	TOC	TKN	Nitrate/Nitrite-N	Nitrate-N	Carbon Dioxide	Chloride
			uS	mV	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppb	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
EW-1	06/26/1995	6.93	639	90	2.36	1.26	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.2	< 1.0	NA	NA	NA	< 5.0	< 2.0	< 0.5	0.2	NA	NA	NA	NA
	06/11/1999	7.08	1114	25.1	0.44*	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	82	<0.05	<0.05	NA	NA	ND	2.8	5.4	ND	130	ND
EW-4	06/26/1995	6.7	948	11	3	70.65	0.33	0.76	0.14	0.08	0.14	0.1	< 0.05	< 0.05	< 0.2	< 1.0	NA	NA	NA	NA	< 2.0	< 0.5	0.6	NA	NA	NA	NA
	06/15/1999	7.04	1332	-360	0.24*	5.2	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	100	1.1	1.1	NA	NA	1.3	1.8	4.2	4.2	51	170
EW-5	06/27/1995	7.11	806	8	0.24	4.72	0.31	0.4	<0.02	0.06	0.05	< 0.02	< 0.05	< 0.05	< 0.2	< 1.0	NA	NA	NA	NA	< 2.0	< 0.5	1	NA	NA	NA	NA
EW-6	06/28/1995	6.77	796	-106	0.1	1713	29.46	4.94	0.24	0.62	0.08	< 0.02	< 0.05	0.824	< 0.2	< 1.0	NA	NA	NA	NA	< 2.0	6.4	2.7	NA	NA	NA	NA
EW-8	06/27/1995	8.95	500	-30	0.2	14.81	< 0.02	0.04	> 0.02	< 0.02	< 0.02	0.04	< 0.05	< 0.05	< 0.2	< 1.0	NA	NA	NA	NA	3	7.7	0.2	NA	NA	NA	NA
	06/15/1999	8.46	525	207.2	NA	4.5	<2.1	<2.5	NA	NA	NA	NA	NA	1.5	<0.5	ND	28	<0.05	0.06	NA	NA	ND	1.7	0.38	0.38	ND	98
EW-9	06/26/1995	6.8	889	82	0.37	459	1.26	1.12	0.06	0.1	0.04	0.03	< 0.05	0.08	< 0.2	< 1.0	NA	NA	NA	NA	< 2.0	< 0.5	5.2	NA	NA	NA	NA
	06/14/1999	7.04	1097	-19.4	0.29*	79	<2.1	<2.5	NA	NA	NA	NA	NA	2.9	<0.5	ND	59	2.9	<0.05	NA	NA	6.3	8.1	0.78	0.78	38	130
EW-11	06/14/1999	7.06	774	68.5	0.71*	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	2.2	< 0.2	ND	76	0.99	0.21	NA	NA	1.8	5	0.98	0.98	22	96
EW-15	06/28/1995	7.22	851	-76	0.1	564	9.53	1.69	0.17	0.3	0.06	0.02	< 0.05	0.268	0.6	< 1.0	NA	NA	NA	22	10	19.1	0.5	NA	NA	NA	NA
	06/17/1999	6.96	1323	-63.4	0.41*	41	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	73	0.051	0.053	NA	NA	ND	2.2	1.1	1.1	9.7	210
EW-18	06/26/1995	6.77	1310	24	0.32	1046	1.86	2.37	0.27	0.21	0.2	0.09	< 0.05	0.109	< 0.2	< 1.0	NA	NA	NA	25	< 2.0	2.5	2	NA	NA	NA	NA
	06/14/1999	6.92	1328	-23.2	0.34*	5.1	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	96	2.5	0.09	NA	NA	22	2.5	1.8	1.8	62	160
EW-19	06/20/1996	7.28	610	82	0.19	0.55	0.21	0.17	0.07	0.06	0.03	0.03	0.019	2.8	0.1	NA	NA	NA	NA	24.4	< 2	3.04	< 0.8	NA	NA	NA	NA
	06/16/1999	7.1	1129	8.2	0.62*	6.5	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	86	0.064	0.08	NA	NA	ND	3.9	5.4	5.4	31	160
EW-22	06/15/1999	7.18	996	-64.3	0.5*	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	0.6	<0.5	ND	86	0.053	1.1	NA	NA	1.6	22	2.1	2.1	24	130
EW-23	06/10/1999	7.18	896	4.8	0.34*	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	<0.5	<0.5	ND	69	0.081	0.1	NA	NA	1.1	2.8	1.5	1.5	23	100
EW-24	06/14/1999	7.03	893	36.8	0.32*	18	<2.1	<2.5	NA	NA	NA	NA	NA	1.1	<0.5	ND	62	3.1	3.5	NA	NA	7.1	3.6	0.49	0.49	38	90
EW-25	06/11/1999	7.1	843	37.6	NA	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	20	<0.5	ND	51	1.9	0.34	NA	NA	3.2	5	4.2	4.2	ND	120
EW-26	06/16/1999	8.24	1318	184.2	0.38*	4.7	<2.1	<2.5	NA	NA	NA	NA	NA	0.85	<0.5	ND	76	0.06	<0.05	NA	NA	ND	2.8	4.2	4.2	3.9	230
EW-E	06/22/1999	6.17	1100	79	NA	7.8	<2.1	<2.5	NA	NA	NA	NA	NA	1.5	<0.5	ND	61	1.4	1.5	NA	NA	4.8	3.4	0.75	0.75	44	150
EW-NE	06/26/1995	6.94	671	-3	0.24	0.57	< 0.02	0.02	0.03	< 0.02	< 0.02	0.06	< 0.05	0.576	0.9	< 1.0	NA	NA	NA	< 5.0	< 2.0	0.6	< 0.2	NA	NA	NA	NA
	06/09/1999	6.93	886	73.3	3.08*	<1.2	<2.1	<2.5	NA	NA	NA	NA	NA	0.61	<0.5	ND	85	<0.05	<0.05	NA	NA	ND	2.2	3.7	3.7	27	110
EW-W	06/16/1999	6.74	1305	-31.2	NA	240	<2.1	11	NA	NA	NA	NA	NA	<0.5	<0.5	ND	70	3.3	3.4	NA	NA	4.2	6.7	ND	ND	55	140
EW-PZ1	06/28/1995	7.03	777	-62	0.27	747	29.66	1.59	0.43	0.5	0.05	< 0.02	< 0.05	0.098	< 0.2	< 1.0	NA	NA	NA	11	< 2.0	8.4	1.5	NA	NA	NA	NA
	06/19/1996	7.31	560	-2	0.37	316.74	10.68	0.36	0.06	0.24	0.09	0	0.007	6.3	0.7	NA	NA	NA	NA	19.6	< 2	3.85	0.8	NA	NA	NA	NA
	06/17/1999	7.12	1167	198	0.4*	14	<2.1	<2.5	NA	NA	NA	NA	NA							NA	NA						
EW-PZ2	06/28/1995	6.9	915	-104	0.3	2125	18.4	9.46	0.16	0.66	0.06	0.03	0.07	7.81	4.6	< 1.0	NA	NA	NA	38	4	10.8	3.4	NA	NA	NA	NA
EW-PZ3	06/28/1995	6.67	765	-74	0.19	276	17.65	0.89	< 0.02	0.32	0.02	< 0.02	< 0.05	1.83	< 0.2	< 1.0	NA	NA	NA	19	3	11.2	2.9	NA	NA	NA	NA
	06/19/1996	7.04	37	-68	0.2	43.42	1	0.38	0.13	0.1	0.06	0.03	0.008	2.9	0.7	NA	NA	NA	NA	16.5	< 2	4.19	1.2	NA	NA	NA	NA
EW-PZ5	06/27/1995	6.75	777	-98	0.34	2377	7.78	64.93	0.28	0.1	0.09	0.2	< 0.05	6.92	4.8	< 1.0	NA	NA	NA	31	3	5.5	7.3	NA	NA	NA	NA
EW-PZ6	06/27/1995	6.59	853	-47	0.13	2000	10.67	3.96	0.84	0.4	0.85	1.01	< 0.05	1.12	1.4	< 1.0	NA	NA	NA	61	4	13.3	11	NA	NA	NA	NA
EW-PZ7	06/19/1996	6.78	723	-43	0.27	2948.7	24.46	5.65	0.11	0.3	0.09	0.09	0.039	5	3.7	NA	NA	NA	NA	46.6	< 2	7.37	11.4	NA	NA	NA	NA
EW-PZ8	06/19/1996	7.27	695	-57	0.38	1793.23	14.88	3.12	0.05	0.17	0.08	0.05	0.011	> 10	2.5	NA	NA	NA	NA	48.8	7	7.69	9.1	NA	NA	NA	NA
EW-PZ9	06/19/1996	6.94	620	-54	0.26	735.07	11.73	2.82	0.06	0.23	0.1	0	0.007	10	4.9	NA	NA	NA	NA	69	16	17.2	7.2	NA	NA	NA	NA
EW-PZ10	06/19/1996	7.6	699	-49	1.01	9	0.1	0.04	0.01	0.02	0.01	0.01	< 0.05	7.6	1.5	NA	NA	NA	NA	22	< 2	1.36	< 0.8	NA	NA	NA	NA

NOTES:
Cond - Conductivity
NA - Not analyzed
uS - microsiemens
mV - millivolts
ppm - parts per million
ppb - parts per billion
ug/l - micrograms per liter
mg/l - milligrams per liter
BOD - biological oxygen demand
COD - chemical oxygen demand
TOC - total organic carbon
TKN - total Kjeldahl nitrogen
DO - dissolved oxygen
* - DO measurements were collected on July 7 or 8, 1999, upon full evacuation and stabilization of wells

TABLE 7.2
ANALYTICAL PARAMETERS AND WEIGHTING FACTORS FOR PRELIMINARY SCREENING FOR ANAEROBIC BIODEGRADATION PROCESSES
Estes Landfill WQARF Site
Phoenix, Arizona

Analyte	Concentration in Most Contaminated Zone	Interpretation	Points Awarded
Chloride[a]	>2x background	Daughter product of organic chlorine	2
Hydrogen	>1 nM	Reductive pathway possible; vinyl chloride may accumulate	3
Hydrogen	<1 nM	Vinyl chloride oxidized	0
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of more complex compounds; carbon and energy source	2
BTEX[a]	>0.1 mg/L	Carbon and energy source; drives dechlorination	2
Tetrachloroethene (PCE)		Material released	0
Trichloroethene[a] (TCE)		Material released Daughter product of PCE	0 2[b]
Dichloroethene[a] (DCE)		Material released Daughter product of TCE If cis is >80% of total DCE it is likely a daughter product 1,1-DCE can be a chemical reaction product of TCA	0 2[b]
Vinyl Chloride[a] (VC)		Material released Daughter product of DCE	0 2[b]
1,1,1-Trichloroethane[a] (TCA)		Material released	0
Dichloroethane (DCA)		Daughter product of TCA under reducing conditions	2
Ethene/Ethane	>0.01 mg/L >0.1 mg/L	Daughter product of vinyl chloride/ethene	2 3

[a] Required analysis.

[b] Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).
(After EPA, 1998 Table 2.3)

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TABLE 7.2
ANALYTICAL PARAMETERS AND WEIGHTING FACTORS FOR PRELIMINARY SCREENING FOR ANAEROBIC BIODEGRADATION PROCESSES
Estes Landfill WQARF Site
Phoenix, Arizona

Analyte	Concentration in Most Contaminated Zone	Interpretation	Points Awarded
Oxygen[a]	<0.5 mg/L	Tolerated; suppresses reductive (dechlorination) pathway at higher concentrations	3
Oxygen[a]	>5 mg/L	Not tolerated; however, vinyl chloride may be oxidized aerobically	-3
Nitrate[a]	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Iron (II)[a]	>1 mg/L	Reductive pathway possible; vinyl chloride may be oxidized under Fe(III)-reducing conditions	3
Sulfate[a]	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfide[a]	>1 mg/L	Reductive pathway possible	3
Methane[a]	<0.5 mg/L >0.5 mg/L	Vinyl chloride oxidizes Ultimate reductive daughter product, Vinyl chloride accumulates	0 3
Oxidation Reduction Potential[a] (ORP) against Ag/AgCI electrode	<50 millivolts (mV) <-100 mV	Reductive pathway possible Reductive pathway likely	1 2
pH[a]	5<pH<9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
Temperature[a]	>20°C (68°F)	At T>20°C, biochemical process is accelerated	1
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1
Alkalinity	>2x background	Results from interaction of carbon dioxide with aquifer minerals	1

[a] Required analysis.

[b] Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).

(After EPA, 1998 Table 2.3)

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Table 7.3
Evaluation of Existing Data in Support of Natural Attenuation at Estes Landfill
June 1999 Groundwater Sampling Data

PARAMETER	UNITS	WELL DESIGNATION AND LOCATION WITHIN PLUME												
		background	source		source		downgradient of source		downgradient		leading edge of plume		leading edge of plume	
		EW-NE	EW-PZ1	score	EW-E	score	EW-4	score	EW-9	score	EW-1	score	EW-22	score
pH		6.93	7.12	0	6.17	0	7.04	0	7.04	0	7.08	0	7.18	0
ORP	mV	73.3	198	0	79	0	-360	2	-19.4	1	25.1	1	-64.3	1
DO	mg/l	3.08	0.27	3	<1	3	0.24	3	0.29	3	0.44	3	0.5	3
Alkalinity, bicarbonate	mg/l	180	310	0	350	0	370	1	350	0	330	0	290	0
Sulfate	mg/l	85	88	0	61	0	100	0	59	0	82	0	86	0
Sulfide	mg/l	ND	0.13	0	ND	0	ND	0	ND	0	ND	0	ND	0
Chloride	mg/l	110	150	0	150	0	170	0	130	0	ND	0	130	0
Carbon Dioxide	mg/l	27	26	0	44	0	51	0	38	0	130	1	24	0
Nitrate	mg/l	3.7	3	0	0.75	0	4.2	0	0.78	2	5.4	0	2.1	0
Fe (II)	mg/l	ND	ND	0	ND	0	ND	0	2.9	3	ND	0	ND	0
Total Organic Carbon	mg/l	ND	1	0	4.8	0	1.3	0	6.3	0	ND	0	1.6	0
Methane	ug/l	ND	14	0	7.8	0	5.2	0	79	0	ND	0	ND	0
Ethene	ug/l	ND	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0
Ethane	ug/l	ND	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0
TCE	ug/l	0	ND	0	ND	0	ND	0	3.3	0	ND	0	ND	0
cis-1,2-DCE	ug/l	0	240	2	110	2	5.3	2	40	2	ND	0	4.8	2
VC	ug/l	0	45	2	38	2	2.2	2	51	2	ND	0	2.7	2
Total Score				7		7		10		13		5		8
Evidence of CAH Biodegradation			LIMITED		LIMITED		LIMITED		LIMITED		INADEQUATE		LIMITED	

Interpretation of Biodegradation Scores:

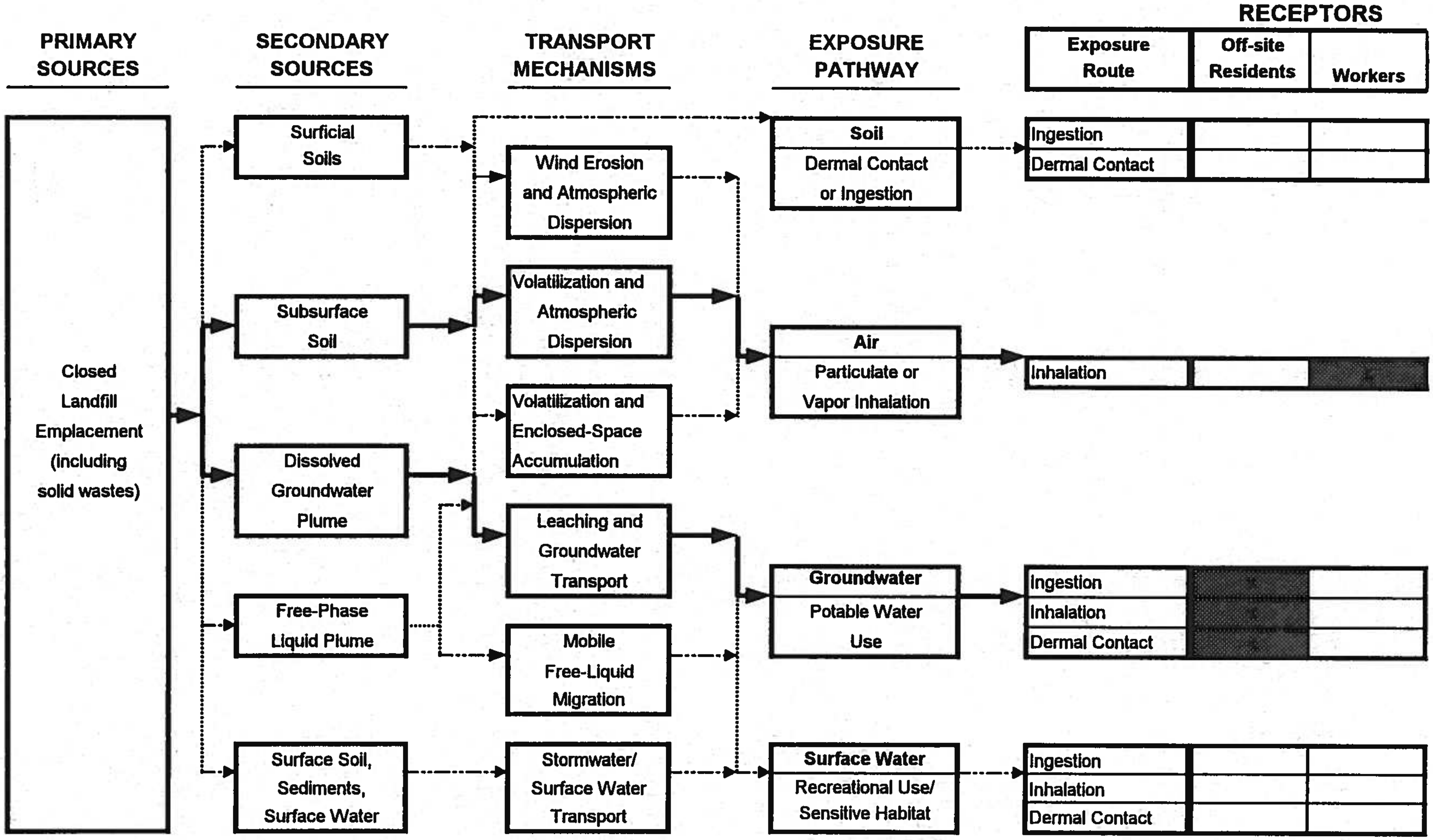
Point Score	Evidence of Biodegradation
0-5	inadequate
6-14	limited
15-20	adequate
>20	strong

Natural Attenuation of Chlorinated Solvents in Groundwater", United States Environmental Protection Agency, Office of Research and Development, EPA/600/R-98/128.

Notes:
(1) Concentration data from June 1999 groundwater sampling.
(2) CAH = chlorinated aliphatic hydrocarbons
(3) TCE = trichloroethene
(4) DCE = dichloroethene
(5) VC = vinyl chloride

file: n:/data/common/tricia/estes/bio_eval.wk4

Table 8.1 - Conceptual Site Model
Estes Landfill
Phoenix, Arizona
ESE Project No. 6699030



Dotted or dashed arrows indicate incomplete/broken pathways or insignificant risk/exposure.
Receptors: Off-site residents are part of the current and future land use scenario; workers are part of the future land use scenario.

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-KED 09/21/88 FQ	BW-P 09/08/89 FQ	BW-P 09/08/89 FQ	BW-P 12/06/89 FQ	BW-P 03/07/90 FQ	BW-P 06/07/90 FQ	BW-P 09/12/90 FQ	BW-P 12/05/90 FQ	BW-P 03/08/91 FQ	BW-P 06/20/91 FQ	BW-P 09/11/91 FQ	BW-P 12/10/91 FQ
DATE ANALYZED	10/14/88	9/19/89	9/19/89	12/13/89	3/17/90	6/13/90	9/18/90	12/11/90	3/09/91	6/21/91	9/12/91	12/11/91
1,1,1-TRICHLOROETHANE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<1	<1	<1	<1	<1	<0.2	0.41	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<5	<0.5	3.2	1.6	1.6	1.5	2.9	1.6	0.67	2.8	1.2	<0.2
1,1-DICHLOROETHENE	<5	<0.5	<0.5	<0.5	0.56	0.68	0.81	0.44	0.2	0.65	<0.2	<0.2
1,2-DICHLOROBENZENE	<20	7.3	7.3	4.5	2.8	3.2	19	7.2	2.7	17	6.9	<1.0
1,2-DICHLOROETHANE	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)							33	21	9	40	46	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)	<5	18	20	13	14	17						
1,2-DICHLOROETHENE (TRANS)							1.7	0.67	<0.2	0.81	0.3	<0.2
1,2-DICHLOROPROPANE		<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<20	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<20	1.1	1	<1	<1	<1	1.6	<1	<1.0	1.7	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<10						<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE	<25											
ACETONE/1,1-DCE												
BENZENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<5	<5	<10	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<10	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<5	1.3	1.5	0.88	<2	0.66	4.6	2.2	0.69	5.5	2.2	<0.5
CHLOROETHANE	<10	<5	<5	<5	<5	<5	4.7	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.56	1	<0.2	<0.2	<0.2
CHLOROMETHANE	<10	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<5	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<5	<1	<5	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE							2	<0.2	<0.2	4	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)		<2	<2	<2	<2	<2						
ETHYLBENZENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<25	<5	<5	<5	<5	<5	<2	<2	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	0.3	0.34	<0.2	<0.2	<0.2	<0.2
TOLUENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	0.51	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM												
TOTAL XYLENES	<5	<1	<1	<1	<1	<1						
TRANS-1,3-DICHLOROPROPENE	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<5	4.2	3.9	2.7	2.9	4.9	5.1	5.4	4.4	5.3	6.3	<0.2
TRICHLOROFLUOROMETHANE							1.3	1	0.23	2.3	0.77	<0.2
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	<10	31	23	20	13	13	110	36	6.9	63	22	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-P 03/13/92 FD	BW-P 04/02/92 FO	BW-P 06/08/92 FO	BW-P 09/10/92 FO	BW-P 12/10/92 FO	BW-P 03/04/93 FO	BW-SD 09/21/88 FO	BW-SD 04/04/89 FO	BW-SD 06/06/89 FO	BW-SD 09/12/90 FO	BW-SD 09/11/91 FO	BW-SD 12/10/91 FO
DATE ANALYZED	3/23/92	4/08/92	6/10/92	9/22/92	12/20/92	3/10/93	10/14/88	4/12/89	6/14/89	9/18/90	9/12/91	12/17/91
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<1	<1	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20		<1	<1	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<1	<1	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	1.6	1.2	1	1.4	3.3	<20	<5	<0.5	<0.5	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	9.3	11	7.1	25	110	58	<20	<1	<1	<1	<1.0	<1.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<1	<1	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	18	11	6	93	570	210				0.7	<0.2	0.4
1,2-DICHLOROETHENE (CIS/TRANS)							<5	0.6	<0.5			
1,2-DICHLOROETHENE (TRANS)	<0.2	0.22	<0.2	0.97	6.1	<20				<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20		<1	<1	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<10	<40	<20	<1	<1	<1	<1.0	<1.0
1,4-DICHLOROBENZENE	1.9	1.8	1.6	2.4	<10	<40	<20	<1	<1	<1	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<2.0	<40	<10			<0.2	<0.2	<0.2
ACETONE							<25					
ACETONE/1,1-DCE												
BENZENE	<0.5	0.54	<0.5	<0.5	<5.0	<20	<5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<1	<1	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<5	<5	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<40	<10	<5	<5	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROBENZENE	5.3	4.4	2.9	8.6	25	21	<5	<2	<2	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	1.1	<0.2	<2.0	<40	<10	<5	<5	<0.2	<0.2	<0.2
CHLOROFORM	<0.2	<0.2	0.22	<0.2	<2.0	<20	<5	<0.5	<0.5	0.29	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<40	<10	<5	<5	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<2.0	<40	<5	<2	<2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<2.0	<40	<5	<1	<1	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	0.25	0.51	2.3	<40				<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)								<2	<2			
ETHYLBENZENE	<0.5	<0.5	<0.5	0.76	<5.0	<20	<5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<20	<40	<25	<5	<5	<2	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.2	<0.2	<0.2
TOLUENE	<0.5	0.58	<0.5	<0.5	<5.0	<20	<5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM												
TOTAL XYLENES	<1.0	<1.0	<1.0	<1.0	<10	<40	<5	<1	<1			
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<2.0	<20	<5	<1	<1	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<0.2	0.22	0.23	4	<20	<5	1	0.7	1.3	<0.2	0.48
TRICHLOROFLUOROMETHANE	0.83	<0.2	0.21	0.5	2.7	<40				<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	29	22	18	51	270	280	<10	<1	<1	<0.2	<0.2	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-SD 03/18/92 FO	BW-SD 04/02/92 FO	BW-SD 06/09/92 FO	BW-SD 09/10/92 FO	BW-SD 12/10/92 FO	BW-SD 03/04/93 FO	BW-SD 09/14/93 FO	BW-SD 12/07/93 FO	BW-SD 03/15/94 FO	BW-SD 06/14/94 FO	BW-SD 09/14/94 FO	BW-SD 12/07/94 FO
DATE ANALYZED	3/24/92	4/14/92	6/10/92	9/22/92	12/20/92	3/09/93	9/24/93	12/19/93	3/23/94	6/23/94	9/20/94	12/09/94
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.27	<0.2	1.1	0.34	<0.2	<1.0	<1.0	1.7				
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.39	1.4	3.9	0.95	<0.2	3.1	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	0.42	1.1	1.7	0.51	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<1.0	1	4.8	2	<1.0	4.3	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	21	69	92	46	0.97	50	<1.0	1.1	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	0.28	0.48	0.74	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<1.0	1.1	<1.0	<1.0	2.3	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
ACETONE									<50	<50	<50	<50
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	3	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	0.53	2	0.45	<0.5	7.9	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	8.1	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	1.3	<0.2	<0.2	<0.2	0.3	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	0.72	4.5	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	2	1.4	<0.2	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	2.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	0.72	2.6	0.24	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
TOTAL THM									<0.2	<0.2	<0.2	<0.2
TOTAL XYLENES	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	5.3	13	13	3	0.23	1.5	1.6	<1.0	<0.2	<0.2	<0.2	0.2
TRICHLOROFLUOROMETHANE	<0.2	<0.2	0.92	0.4	<0.2	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE									<2.0	<2.0	<2.0	<2.0
VINYL CHLORIDE	<0.2	<0.2	10	2.2	<0.2	25	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-SG 06/23/95 FD	BW-SES 04/04/89 FO	BW-SES 06/06/89 FO	BW-SES 03/13/92 FO	BW-SES 04/02/92 FO	BW-SES 06/09/92 FO	BW-SES 09/10/92 FO	BW-SES 12/10/92 FO	BW-SES 03/04/93 FO	BW-SES 09/14/93 FO	BW-SES 12/07/93 FO	BW-SES 03/15/94 FO
DATE ANALYZED	7/05/95	4/11/89	6/14/89	3/24/92	4/15/92	6/10/92	9/23/92	12/20/92	3/11/93	9/24/93	12/19/93	3/23/94
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	
1,1,2-TRICHLOROETHANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,1-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.2	<0.2	0.46	0.4	0.53	<1.0	<1.0	<1.0	<0.2
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	0.27	0.34	<1.0	<1.0	<1.0	<0.2
1,2-DICHLOROBENZENE	<0.5	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	2.4	<2.0	<2.0	<0.5
1,2-DICHLOROETHANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,2-DICHLOROETHENE (CIS)	<0.5			<0.2	<0.2	0.97	0.89	<0.2	4.5	<1.0	1.3	0.2
1,2-DICHLOROETHENE (CIS/TRANS)		0.7	<0.5									
1,2-DICHLOROETHENE (TRANS)	<0.5			<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,2-DICHLOROPROPANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
1,3-DICHLOROBENZENE	<0.5	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<0.5
1,4-DICHLOROBENZENE	<0.5	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	7.9	<2.0	<2.0	<0.5
2-CHLOROETHYL VINYL ETHER	<0.5			<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.5
ACETONE	<50											<50
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.4	<1.0	<1.0	<0.5
BROMODICHLOROMETHANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
BROMOFORM	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
BROMOMETHANE	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
CHLOROBENZENE	<0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	8.5	<1.0	<1.0	<0.5
CHLOROETHANE	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2
CHLOROFORM	0.6	<0.5	<0.5	<0.2	<0.2	0.28	<0.2	0.24	<1.0	<1.0	<1.0	<0.2
CHLOROMETHANE	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	0.31	3.4	<2.0	<2.0	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2
DIBROMOCHLOROMETHANE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<0.2
DICHLORODIFLUOROMETHANE	<0.5			<0.2	<0.2	<0.2	0.55	<0.2	<2.0	<2.0	<2.0	<0.2
EDB (1,2-DIBROMOETHANE)		<2	<2									
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<5	<5	<2.0	2.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	0.21	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<0.5
TOTAL THM	0.6											<0.2
TOTAL XYLENES	<0.5	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<0.2
TRICHLOROETHENE	<0.5	1.5	1	<0.2	<0.2	0.87	0.64	0.7	<1.0	1.5	1.4	0.4
TRICHLOROFLUOROMETHANE	<0.5			<0.2	<0.2	<0.2	<0.2	0.48	<2.0	<2.0	<2.0	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0											<2.0
VINYL CHLORIDE	<0.5	<1	<1	<0.2	<0.2	<0.2	<0.2	1	<2.0	<1.0	<1.0	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-SEB 09/14/94 FO	BW-SEB 12/07/94 FO	BW-SEB 06/28/95 FO	BW-WB 09/21/88 FO	BW-WB 04/04/89 FD	BW-WB 06/06/89 FO	BW-WB 03/07/90 FO	BW-WB 06/07/90 FO	BW-WB 09/12/90 FO	BW-WB 12/06/90 FO	BW-WB 03/06/91 FO	BW-WB 06/20/91 FO
DATE ANALYZED	9/21/94	12/09/94	7/06/95	10/14/88	4/11/89	6/14/89	3/17/90	6/13/90	9/18/90	12/10/90	3/09/91	6/21/91
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE					1.4	1.3	<1	<1	0.66	0.66	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<0.2	<0.5	<5	3.2	4.4	3.3	2.6	2.7	2.1	2.1	2.4
1,1-DICHLOROETHENE	<0.2	0.2	<0.5	<5	1.4	1.7	1.2	0.92	1.8	0.66	0.95	0.71
1,2-DICHLOROBENZENE	<0.5	<0.5	<0.5	<20	2.9	1.5	1	1.5	2.5	3	1.5	12
1,2-DICHLOROETHANE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	0.4	0.4	<0.5						16	15	8	41
1,2-DICHLOROETHENE (CIS/TRANS)				26	14	17	9.8	6.9				
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.5						0.23	0.26	<0.2	0.78
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.5		<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<20	<1	<1	<1	<1	<1	<1	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<20	<1	<1	<1	<1	<1	<1	<1.0	1.2
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<10					<0.2	<0.2	<0.2	<0.2
ACETONE	<50	<50	<50	<25								
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.5	<10	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<5	0.8	<2	<2	<2	0.73	0.74	0.65	4
CHLOROETHANE	<0.2	<0.2	<0.5	<10	<5	<5	<5	<5	2.3	<0.2	<0.2	<0.2
CHLOROFORM	<0.2	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	0.71	0.46	0.68	<0.2
CHLOROMETHANE	<0.2	<0.4	<0.5	<10	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5	<5	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.4	<0.5						1.9	1.5	<0.2	4.9
EDB (1,2-DIBROMOETHANE)					<2	<2	<2	<2				
ETHYLBENZENE	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<25	<5	<5	<5	<5	2.2	<2	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	<0.2	<0.5	<5	0.7	<0.5	0.58	0.61	0.59	0.89	0.38	<0.2
TOLUENE	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.2	<0.2	<0.5									
TOTAL XYLENES	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1				
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5	<5	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	1.6	1.2	0.8	6.5	4.5	4.5	3.2	2.7	6.6	5.7	6.5	7.3
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5						1.5	1.2	0.91	2.2
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0	<2.0									
VINYL CHLORIDE	<0.2	<0.2	<0.5	26	17	27	9.3	11	15	13	6	66

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COMPOUND NAME	BW-WD 09/11/91 FQ	BW-WD 12/10/91 FQ	BW-WD 03/13/92 FQ	BW-WD 04/02/92 FQ	BW-WD 06/09/92 FQ	BW-WD 09/10/92 FQ	BW-WD 12/10/92 FQ	BW-WD 03/04/93 FQ	BW-WD 12/07/93 FQ	BW-WD 03/15/94 FQ	BW-WD 06/14/94 FQ	BW-WD 09/14/94 FQ
DATE ANALYZED	9/12/91	12/11/91	3/23/92	4/14/92	6/10/92	9/22/92	12/20/92	3/10/93	12/19/93	3/23/94	6/23/94	9/20/94
1,1,1-TRICHLOROETHANE	<0.2	<0.2	0.41	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	0.92	<2.0	<10	<1.0			
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,1-DICHLOROETHANE	2.6	2.1	1.7	0.99	1.8	2.5	3.6	<10	2.9	<1.0	<1.0	<1.0
1,1-DICHLOROETHENE	<0.2	<0.2	0.32	<0.2	0.37	0.73	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROBENZENE	7.6	5.5	8.7	9.5	13	30	41	66	34	8	15	7.5
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)	36	25	58	42	34	270	290	500	120	150	110	60
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	0.5	0.47	0.63	2.1	2.9	<10	4.1	<1.0	<1.0	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<10	<20	<2.0	<2.5	<2.5	<2.5
1,4-DICHLOROBENZENE	<1.0	<1.0	1.1	1.2	2	2.9	<10	<20	5.1	<2.5	<2.5	<2.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<20	<2.0	<2.5	<2.5	<2.5
ACETONE										<250	<250	<250
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<10	1.5	<2.5	<2.5	<2.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<20	<2.0	<1.0	<1.0	<1.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
CHLOROBENZENE	2.5	1.7	3.5	3.8	5.6	9.3	9.9	22	16	11	6.3	2.7
CHLOROETHANE	<0.2	<0.2	1.3	<0.2	0.34	<0.4	<2.0	<20	<2.0	<1.0	<1.0	<1.0
CHLOROFORM	<0.2	<0.2	<0.2	<0.2	0.69	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<20	<2.0	<1.0	<1.0	<1.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<20	<2.0	<1.0	<1.0	<1.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<20	<2.0	<1.0	<1.0	<1.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	1.2	<0.2	0.88	6.5	2.7	<20	<2.0	<1.0	<1.0	<1.0
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<10	<1.0	<2.5	<2.5	<2.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	2.2	<2.0	<4.0	<20	<20	<2.0	<10.0	<10.0	<10.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	0.29	<0.2	<0.2	<0.2	0.24	<2.0	<10	<1.0	<1.0	<1.0	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<10	<1.0	<2.5	<2.5	<2.5
TOTAL THM										<1.0	<1.0	<1.0
TOTAL XYLENES			<1.0	<1.0	<1.0	<2.0	<10	<20	<2.0	<2.5	<2.5	<2.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<2.0	<10	<1.0	<1.0	<1.0	<1.0
TRICHLOROETHENE	6.1	6.4	4.5	3.3	2	5.4	5.8	<10	3.5	<1.0	<1.0	<1.0
TRICHLOROFLUOROMETHANE	1.4	0.27	1.9	0.47	0.74	2.7	3.6	<20	<2.0	<2.5	8.1	<2.5
TRICHLOROTRIFLUOROETHANE										<10.0	<10.0	<10.0
VINYL CHLORIDE	26	12	33	27	43	85	110	340	200	110	82	33

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	BW-WD 12/07/94 FD	BW-WD 06/23/95 FD	EW-1 04/04/89 FD	EW-1 06/05/89 FD	EW-1 09/08/89 FD	EW-1 12/07/89 FD	EW-1 03/05/90 FD	EW-1 03/06/90 FD	EW-1 06/05/90 FD	EW-1 09/12/90 FD	EW-1 12/04/90 FD	EW-1 03/05/91 FD
DATE ANALYZED	12/09/94	7/05/95	4/11/89	6/23/89	9/13/89	12/14/89	3/13/90	3/13/90	6/07/90	9/19/90	12/08/90	3/07/91
1,1,1-TRICHLOROETHANE	<1.0	<0.5	<5	3.2	2.2	2.4	3.4	2.7	3.2	<0.2	<0.2	1.9
1,1,2,2-TETRACHLOROETHANE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				<1	1.1	<1	<1	<1	1.9	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<1.0	0.9	<5	2.9	2	1.5	2.6	2.4	2.1	<0.2	<0.2	3.5
1,1-DICHLOROETHENE	<1.0	<0.5	<5	3.2	2	2.5	5.2	4.9	4	<0.2	<0.2	7.4
1,2-DICHLOROBENZENE	4.8	17	<10	<1	<1	<1	<1	<1	<1	<1	<1	2.8
1,2-DICHLOROETHANE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	43	64								<0.2	<0.2	7.4
1,2-DICHLOROETHENE (CIS/TRANS)			13	9.2	5.1	3.5	4.4	4.6	4.1			
1,2-DICHLOROETHENE (TRANS)	<1.0	0.9								<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<1.0	<0.5		<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<2.5	<0.5	<10	<1	<2.5	<1	<1	<1	<1	<1	<1	<1.0
1,4-DICHLOROBENZENE	<2.5	2.3	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5	<0.5	<10							<0.2	<0.2	<0.2
ACETONE	<250	<50	<25									
ACETONE/1,1-DCE												
BENZENE	<2.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
BROMOFORM	<1.0	<0.5	<5	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
BROMOMETHANE	<1.0	<0.5	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<1.0	<0.5	<5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROBENZENE	<2.5	11	<5	<2	<2	<2	<2	<2	<2	<0.5	<0.5	1.1
CHLOROETHANE	<1.0	<0.5	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CHLOROFORM	<1.0	<0.5	<5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	1.3
CHLOROMETHANE	<2.0	<0.5	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<1.0	<0.5	<5	<2	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<2.0	1								<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)				<2	<2	<2	<2	<2	<2			
ETHYLBENZENE	<2.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<10.0	<2.0	<25	<5	<5	<5	<5	<5	<5	<2	<2	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<1.0	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.28	0.24
TOLUENE	<2.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<1.0	<0.5										
TOTAL XYLENES	<2.5	<0.5	<5	<1	<1	<1	<1	<1	<1			
TRANS-1,3-DICHLOROPROPENE	<1.0	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
TRICHLOROETHENE	1	1.6	9	7.6	4.4	5.3	7.7	9.5	9.1	1	0.57	18
TRICHLOROFLUOROMETHANE	<2.5	<0.5								<0.2	<0.2	0.31
TRICHLOROTRIFLUOROETHANE	<10.0	<2.0										
VINYL CHLORIDE	11	71	11	2.3	<1	<1	<1	<1	<1	<0.2	<0.2	7.4

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-1 06/17/91 FQ	EW-1 09/03/91 FQ	EW-1 12/06/91 FQ	EW-1 03/12/92 FQ	EW-1 06/02/92 FQ	EW-1 09/08/92 FQ	EW-1 12/03/92 FQ	EW-1 03/08/93 FQ	EW-1 09/16/93 FQ	EW-1 12/08/93 FQ	EW-1 03/14/94 FQ	EW-1 06/08/94 FQ
DATE ANALYZED	6/21/91	9/11/91	12/10/91	3/19/92	6/05/92	9/17/92	12/17/92	3/09/93	9/27/93	12/20/93	3/23/94*	6/15/94
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	0.57	<5	<1.0	<1.0	4.3		
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	0.31	1.1	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	0.2
1,1-DICHLOROETHENE	<0.2	<0.2	0.58	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,2-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<0.5	1.7
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.2	1.1	5.7	<0.2	<0.2	<0.2	1	<1.0	<1.0	<1.0	3.9	14
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0	<0.5	<0.5
ACETONE											<50	<50
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	0.26	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<0.2	<0.2
CHLOROFORM	<0.2	<0.2	0.27	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5	<2.0	<2.0	7.8	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	<0.2	0.27	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0	<0.5	<0.5
TOTAL THM											<0.2	<0.2
TOTAL XYLENES				<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
TRICHLOROETHENE	<0.2	0.51	3.8	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE											<2.0	<2.0
VINYL CHLORIDE	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<10	<2.0	<1.0	<1.0	<0.2	1.1

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-1 09/12/94 FO	EW-1 12/06/94 FO	EW-1 06/26/95 FO	EW-1 10/26/95 FO	EW-1 12/18/95 FO	EW-1 04/08/96 FO	EW-1 06/17/96 FO	EW-1 09/25/96 FO	EW-1 09/26/96 FO	EW-1 12/09/96 FO	EW-2 03/30/89 FO	EW-2 06/02/89 FO
DATE ANALYZED	9/21/94	12/13/94	7/07/95	11/04/95	12/30/95	4/19/96	06/25/96	9/29/96	9/29/96	12/20/96	4/06/89	6/23/89
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		<1
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1
1,1-DICHLOROETHANE	1.4	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	0.63	0.59	0.88	<5	<0.5
1,1-DICHLOROETHENE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5
1,2-DICHLOROBENZENE	3.4	3.2	<0.5	<0.5	<0.5	0.54	0.53	<0.5	<0.5	<0.50	<10	<1
1,2-DICHLOROETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1
1,2-DICHLOROETHENE (CIS)	17	17	<0.5	0.53	1.1	2.3	2.5	2.2	2.3	2		
1,2-DICHLOROETHENE (CIS/TRANS)											<5	<0.5
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50		
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50		<1
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<1
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<1
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<0.5	N/A	<0.5	N/A	N/A	N/A	N/A	<10	
ACETONE	<50	<50	<50								<25	
ACETONE/1,1-DCE				<50.0	<50	<50	<50	<50	<50	<50		
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1
BROMOFORM	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<5
BROMOMETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5
CARBON TETRACHLORIDE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5
CHLOROBENZENE	2.2	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<2
CHLOROETHANE	<0.2	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5
CHLOROFORM	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5
CHLOROMETHANE	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1
DICHLORODIFLUOROMETHANE	<0.2	0.7	<0.5	<0.5	<0.5	<0.5	0.57	<0.5	<0.5	0.76		
EDB (1,2-DIBROMOETHANE)												<2
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
META- & PARA-XYLENE				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	1.6	<0.5	0.53	<0.5	<0.5	0.85	0.57	<25	<5
ORTHO-XYLENE				<0.5	<0.5	3.1	<0.5	<0.5	<0.5	<0.5		
TETRACHLOROETHENE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
TOTAL THM	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50		
TOTAL XYLENES	<0.5	<0.5	<0.5	<0.5	<0.5	3.3	<0.5	<0.5	<0.5	<0.5	<5	<1
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5								<5	<1
TRICHLOROETHENE	1.1	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50		
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0	<2.0									
VINYL CHLORIDE	3.7	6.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<1

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Volatile Organic Compounds

COMPOUND NAME	EW-2 09/05/89 FG	EW-2 12/05/89 FG	EW-2 03/06/90 FG	EW-2 06/07/90 FG	EW-2 09/12/90 FG	EW-2 12/05/90 FG	EW-2 03/11/91 FG	EW-2 06/19/91 FG	EW-2 09/10/91 FG	EW-2 03/12/92 FG	EW-2 09/16/93 FG	EW-2 12/08/93 FG
DATE ANALYZED	9/14/89	12/13/89	3/15/90	6/13/90	9/19/90	12/10/90	3/12/91	6/20/91	9/12/91	3/18/92	9/24/93	12/20/93
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	3.4
1,1,2-TRICHLOROETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROBENZENE	<1	<1	<1	<1	1.1	<1	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,2-DICHLOROETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROETHENE (CIS/TRANS)	<0.5	<0.5	<0.5	<0.5								
1,2-DICHLOROETHENE (TRANS)					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROPROPANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,3-DICHLOROBENZENE	<2.5	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,4-DICHLOROBENZENE	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
2-CHLOROETHYL VINYL ETHER					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
ACETONE												
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
BROMODICHLOROMETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
BROMOFORM	<10	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
BROMOMETHANE	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
CHLOROBENZENE	<2.5	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
CHLOROETHANE	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CHLOROFORM	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
CHLOROMETHANE	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DIBROMOCHLOROMETHANE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DICHLORODIFLUOROMETHANE					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)	<2	<2	<2	<2								
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<1.0
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<5	<5	<5	<5	<2	<2	<2.0	<2.0	24	<2.0	<2.0	7.3
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.57	1.2	<1.0
TOTAL THM												
TOTAL XYLENES	<1	<1	<1	<1						<1.0	7.3	<2.0
TRANS-1,3-DICHLOROPROPENE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROFLUOROMETHANE					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0

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COMPOUND NAME	EW-2 03/17/94 FQ	EW-2 06/29/95 FQ	EW-3 03/29/89 FQ	EW-3 06/02/89 FQ	EW-3 09/05/89 FQ	EW-3 12/05/89 FQ	EW-3 03/06/90 FQ	EW-3 06/05/90 FQ	EW-3 09/11/90 FQ	EW-3 12/04/90 FQ	EW-3 03/05/91 FQ	EW-3 06/16/91 FQ
DATE ANALYZED	3/26/94*	7/02/95	4/06/89	6/23/89	9/13/89	12/13/89	3/14/90	6/07/90	9/17/90	12/10/90	3/07/91	6/19/91
1,1,1-TRICHLOROETHANE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				<1	<1	<1	<1	<1		<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<0.5	<0.5	<20	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0
1,2-DICHLOROETHANE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.2	<0.5							<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)			<5	<0.5	<0.5	<0.5	<0.5	<0.5				
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.5							<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.5		<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<20	<1	<2.5	<1	<1	<1	<1	<1	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<20	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<10						<0.2	<0.2	<0.2	<0.2
ACETONE	<50	<50	<25									
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	0.72	<0.2	<0.2
BROMOFORM	<0.2	<0.5	<5	<5	<10	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.5	<10	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<5	<2	<2.5	<2	<2	<2	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.5	<10	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.79	0.45	0.45
CHLOROMETHANE	<0.2	<0.5	<10	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.5	<5	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	0.34	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.5							<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)				<2	<2	<2	<2	<2				
ETHYLBENZENE	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<25	<5	<5	<5	<5	<5	<2	<2	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.2	<0.5										
TOTAL XYLENES	0.8	<0.5	<5	<1	<1	<1	<1	<1				
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.5	<5	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5							<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0										
VINYL CHLORIDE	<0.2	<0.5	<10	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2

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COMPOUND NAME	EW-3 03/10/92 FQ	EW-3 03/04/93 FQ	EW-3 09/08/93 FQ	EW-3 03/17/94 FQ	EW-4 04/03/89 FQ	EW-4 06/01/89 FQ	EW-4 09/07/89 FQ	EW-4 12/06/89 FQ	EW-4 03/06/90 FQ	EW-4 06/07/90 FQ	EW-4 09/12/90 FQ	EW-4 09/12/90 FD
DATE ANALYZED	3/18/92	3/09/93	9/22/93	3/29/94*	4/11/89	6/22/89	9/13/89	12/13/89	3/15/90	6/13/90	9/19/90	9/18/90
1,1,1-TRICHLOROETHANE	<0.2	<1.0	<1.0	0.3	<5	5.1	4.7	3.1	2.3	<0.5	<0.2	0.22
1,1,2,2-TETRACHLOROETHANE	<0.2	<1.0	<1.0	<0.2	<5	<1	<1	<1	<1	<1	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<1.0	<1.0			<2.5	<1	<1	<1	<1	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<1.0	<1.0	<0.2	<5	<1	<1	<1	<1	<1	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<1.0	<1.0	<0.2	<5	4.9	6.6	4.5	4.8	4.6	4	4.1
1,1-DICHLOROETHENE	<0.2	<1.0	<1.0	<0.2	<5	6.4	5	4.8	5.6	4.9	1.5	2.5
1,2-DICHLOROBENZENE	<1.0	<2.0	<2.0	<0.5	13	11	9.7	4.6	3.2	3.5	19	22
1,2-DICHLOROETHANE	<0.2	<1.0	<1.0	<0.2	<5	<1	<1	<1	<1	<1	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.2	<1.0	<1.0	<0.2							18	20
1,2-DICHLOROETHENE (CIS/TRANS)					33	18	17	15	14	10		
1,2-DICHLOROETHENE (TRANS)	<0.2	<1.0	<1.0	<0.2							1.3	1.5
1,2-DICHLOROPROPANE	<0.2	<1.0	<1.0	<0.2		<1	<1	<1	<1	<1	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<2.0	<2.0	<0.5	<10	<1	<1	<1	<1	<1	<1	<1
1,4-DICHLOROBENZENE	<1.0	<2.0	<2.0	<0.5	<10	1.3	1.3	<1	<1	<1	1.7	1.6
2-CHLOROETHYL VINYL ETHER	<0.2	<2.0	<2.0	<0.5	<10						<0.2	<0.2
ACETONE				<50	<25							
ACETONE/1,1-DCE												
BENZENE	<0.5	<1.0	<1.0	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<1.0	<1.0	<0.2	<5	<1	<1	<1	<1	<1	<0.2	<0.2
BROMOFORM	<0.2	<1.0	<1.0	<0.2	<5	<5	<10	<5	<5	<5	<0.2	<0.2
BROMOMETHANE	<0.2	<2.0	<2.0	<0.2	<10	<5	<5	<5	<5	<5	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<1.0	<1.0	<0.2	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
CHLOROBENZENE	<0.5	<1.0	<1.0	<0.5	<5	2.3	2.1	1.2	0.7	0.91	4.5	4.9
CHLOROETHANE	<0.2	<2.0	<2.0	<0.2	<10	<5	<5	<5	<5	<5	5.9	4.9
CHLOROFORM	<0.2	<1.0	<1.0	<0.2	<5	<0.5	<0.5	<0.5	<0.5	<5	0.25	<0.2
CHLOROMETHANE	<0.2	<2.0	<2.0	<0.2	<10	<5	<5	<5	<5	<5	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<2.0	<2.0	<0.2	<5	<2	<2	<2	<2	<2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<2.0	<2.0	<0.2	<5	<1	<5	<1	<1	<1	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<2.0	<2.0	<0.2							1.5	2.1
EDB (1,2-DIBROMOETHANE)						<2	<2	<2	<2	<2		
ETHYLBENZENE	<0.5	<1.0	<1.0	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<25	<5	<5	<5	<5	<5	<2	<2
ORTHO-XYLENE												
TETRACHLOROETHENE	<0.2	<1.0	<1.0	<0.2	<5	<0.5	<0.5	0.6	0.67	<0.5	<0.2	<0.2
TOLUENE	0.74	<1.0	<1.0	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM				<0.2								
TOTAL XYLENES	<1.0	<2.0	<2.0	<0.5	<5	<1	<1	<1	<1	<1		
TRANS-1,3-DICHLOROPROPENE	<0.2	<1.0	<1.0	<0.2	<5	<1	<1	<1	<1	<1	<0.2	<0.2
TRICHLOROETHENE	<0.2	<1.0	<1.0	<0.2	7.5	6.8	6.9	5.7	5.4	5.9	3.4	3.6
TRICHLOROFLUOROMETHANE	<0.2	<2.0	<2.0	<0.5							2	1.5
TRICHLOROTRIFLUOROETHANE				<2.0								
VINYL CHLORIDE	<0.2	<2.0	<1.0	<0.2	120	120	34	30	22	13	330	140

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COMPOUND NAME	EW-4 12/05/90 FO	EW-4 03/06/91 FO	EW-4 06/18/91 FO	EW-4 09/10/91 FO	EW-4 12/11/91 FO	EW-4 12/11/91 FO	EW-4 03/17/92 FO	EW-4 04/01/92 FO	EW-4 04/01/92 FO	EW-4 06/04/92 FO	EW-4 09/15/92 FO	EW-4 12/02/92 FO
DATE ANALYZED	12/11/90	3/08/91	6/20/91	9/12/91	12/27/91	12/13/91	3/25/92	4/07/92	4/07/92	6/08/92	9/22/92	12/16/92
1,1,1-TRICHLOROETHANE	0.35	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	0.59	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.51	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,1-DICHLOROETHANE	3.9	3.3	2.8	3.2	1.5	1.5	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,1-DICHLOROETHENE	3.5	1.2	1.8	1.4	<0.2	0.42	<0.2	<0.2	<0.2	<0.2	<0.2	1.6
1,2-DICHLOROBENZENE	7.1	7.7	12	8.4	7.7	9	1.3	1.6	1.5	<1.0	1.8	12
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,2-DICHLOROETHENE (CIS)	16	15	38	29	19	19	1.1	1.1	1	0.77	2	120
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	0.67	0.47	0.65	1.7	0.48	0.45	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
1,3-DICHLOROBENZENE	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5
1,4-DICHLOROBENZENE	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	1.1
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
ACETONE												
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
CHLOROBENZENE	2	2.2	4	2.8	2.7	3	<0.5	<0.5	<0.5	<0.5	<0.5	<5
CHLOROETHANE	<0.2	<0.2	2.4	<0.2	0.73	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10
CHLOROFORM	0.42	0.81	<0.2	<0.2	1.1	1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.24	<10
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
DICHLORODIFLUOROMETHANE	1.9	2.4	3.6	<0.2	0.61	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2	<2.0	<2.0	19	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5
ORTHO-XYLENE												
TETRACHLOROETHENE	0.67	0.53	3.2	1.3	0.28	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<5
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5
TOTAL THM												
TOTAL XYLENES							<1.0	<1.0	<1.0	<1.0	<1.0	<5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5
TRICHLOROETHENE	6.6	6	5.6	5.9	1.8	1.6	<0.2	<0.2	<0.2	<0.2	<0.2	1.4
TRICHLOROFLUOROMETHANE	4.2	0.92	2.6	1.3	0.41	0.56	<0.2	<0.2	<0.2	<0.2	<0.2	<5
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	69	28	62	35	36	43	2.5	2.5	1.2	2.3	5.4	65

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-4 03/02/93 FG	EW-4 09/09/93 FG	EW-4 12/09/93 FD	EW-4 12/09/93 FG	EW-4 03/16/94 FD	EW-4 03/16/94 FG	EW-4 06/10/94 FG	EW-4 09/14/94 FD	EW-4 09/14/94 FG	EW-4 12/06/94 FD	EW-4 06/28/95 FD	EW-4 06/28/95 FG
DATE ANALYZED	3/08/93	9/23/93	12/21/93	12/20/93	3/27/94*	3/27/94*	6/21/94	9/21/94	9/21/94	12/08/94	7/07/95	7/07/95
1,1,1-TRICHLOROETHANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	4.3	<0.2	<1.0	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<1.0	1	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0	<1.0	<1.0	1.8								
1,1,2-TRICHLOROETHANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
1,1-DICHLOROETHANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.9	<1.0	0.9	<1.0	0.6	0.6
1,1-DICHLOROETHENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	0.2	<1.0	<0.5	<0.5
1,2-DICHLOROBENZENE	<2.0	6.9	7.3	6.9	20	27	25	18	18	11	12	12
1,2-DICHLOROETHANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	2	<0.2	<1.0	<0.5	<0.5
1,2-DICHLOROETHENE (CIS)	3.2	34	35	30	120	130	120	86	83	62	30	29
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	<1.0	<1.0	<1.0	<1.0	2.2	2.2	1.5	<1.0	0.9	<1.0	0.7	0.7
1,2-DICHLOROPROPANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	0.4	<1.0	<0.5	<0.5
1,3-DICHLOROBENZENE	<2.0	<2.0	<2.0	<2.0	<2.5	<2.5	<0.5	<2.5	<0.5	<2.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<2.0	<2.0	<2.0	<2.0	2.9	3	2.7	<2.5	2.1	<2.5	1.6	1.6
2-CHLOROETHYL VINYL ETHER	<2.0	<2.0	<2.0	<2.0	<2.5	<2.5	<0.5	<2.5	<0.5	<2.5	<0.5	<0.5
ACETONE					<250	<250	<50	<250	<50	<250	<50	<50
ACETONE/1,1-DCE												
BENZENE	<1.0	<1.0	<1.0	<1.0	<2.5	<2.5	0.7	<2.5	0.6	<2.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
BROMOFORM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
BROMOMETHANE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
CARBON TETRACHLORIDE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	1.9	<0.2	<1.0	<0.5	<0.5
CHLOROBENZENE	<1.0	3.7	4.9	4.8	14	16	14	10	11	4.1	9.1	9
CHLOROETHANE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	0.3	<1.0	0.2	<1.0	<0.5	<0.5
CHLOROFORM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
CHLOROMETHANE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.2	<1.0	<0.2	<2.0	<0.5	<0.5
CIS-1,3-DICHLOROPROPENE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
DIBROMOCHLOROMETHANE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	1.7	<1.0	2.3	<2.0	<0.5	<0.5
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<1.0	<1.0	<1.0	<1.0	<2.5	<2.5	<0.5	<2.5	<0.5	<2.5	<0.5	<0.5
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	7.2	<10.0	<10.0	<2.0	<10.0	<2.0	<10.0	<2.0	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
TOLUENE	<1.0	<1.0	<1.0	<1.0	<2.5	<2.5	<0.5	<2.5	<0.5	<2.5	<0.5	<0.5
TOTAL THM					<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
TOTAL XYLENES	<2.0	<2.0	<2.0	2.3	<2.5	<2.5	<0.5	<2.5	<0.5	<2.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	<0.2	<1.0	<0.5	<0.5
TRICHLOROETHENE	<1.0	<1.0	<1.0	<1.0	2.4	2	1.1	<1.0	1.8	<1.0	0.5	0.5
TRICHLOROFLUOROMETHANE	<2.0	<2.0	<2.0	<2.0	<2.5	<2.5	0.8	<2.5	1.2	<2.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE					<10.0	<10.0	<2.0	<10.0	<2.0	<10.0	<2.0	<2.0
VINYL CHLORIDE	3.1	71	60	61	140	140	70	104	100	41	60	61

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-4 10/26/95 FO	EW-4 12/18/95 FO	EW-4 04/08/96 FO	EW-4 09/26/96 FO	EW-4 12/10/96 FO	EW-5 03/31/89 FO	EW-5 06/01/89 FO	EW-5 09/06/89 FO	EW-5 12/08/89 FO	EW-5 03/13/90 FO	EW-5 06/07/90 FO	EW-5 09/12/90 FO
DATE ANALYZED	11/04/95	12/30/95	4/19/96	9/28/96	12/20/96	4/11/89	6/23/89	9/13/89	12/14/89	3/19/90	6/12/90	9/18/90
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1	<1	<1	<1	<1	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<2.0	<2.0	<2.0	<2.0		1.7	1.4	<1	1	1.8	0.2
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1	<1	<1	<1	<1	<0.2
1,1-DICHLOROETHANE	<0.5	<0.5	<0.5	0.62	0.72	<5	<0.5	0.7	0.5	0.63	0.57	1.1
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5	0.5	<0.5	<0.5	<0.5	0.4
1,2-DICHLOROBENZENE	10	6.5	4	1.9	0.66	<10	2.3	1.4	<1	<1	<1	24
1,2-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1	<1	<1	<1	<1	<0.2
1,2-DICHLOROETHENE (CIS)	26	18	13	12	9.2							72
1,2-DICHLOROETHENE (CIS/TRANS)						31	19	26	18	19	18	
1,2-DICHLOROETHENE (TRANS)	0.54	<0.5	<0.5	<0.5	<0.50							2.5
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.5	<0.5	<0.50		<1	<1	<1	<1	<1	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<1	<2.5	<1	<1	<1	<1
1,4-DICHLOROBENZENE	1.3	1.1	0.67	0.59	<0.50	<10	<1	<1	<1	<1	<1	1.9
2-CHLOROETHYL VINYL ETHER	<0.5	N/A	<0.5	N/A	N/A	<10						<0.2
ACETONE						<25						
ACETONE/1,1-DCE	<50.0	<50	<50	<50	<50							
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1	<1	<1	<1	<1	<0.2
BROMOFORM	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<5	<10	<5	<5	<5	<0.2
BROMOMETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5	<5	<5	<5	<5	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
CHLOROBENZENE	12	6.4	3.4	<0.5	<0.50	<5	<2	<2.5	<2	<2	<2	5.6
CHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5	<5	<5	<5	<5	0.51
CHLOROFORM	<0.5	<0.5	0.62	<0.5	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
CHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<10	<5	<5	<5	<5	<5	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<2	<2	<2	<2	<2	<0.2
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.50	<5	<1	<1	<1	<1	<1	<0.2
DICHLORODIFLUOROMETHANE	0.74	0.73	<0.5	0.88	1.4							0.72
EDB (1,2-DIBROMOETHANE)							<2	<2	<2	<2	<2	
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<0.5	<0.5	<0.5	<0.5	<0.5							
METHYLENE CHLORIDE	1.8	<0.5	<0.5	<0.5	1.1	<25	<5	<5	<5	<5	<5	<2
ORTHO-XYLENE	<0.5	0.66	1.3	<0.5	<0.5							
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.5	<0.5	0.62	<0.5	<0.50							
TOTAL XYLENES	<0.5	0.7	1.3	<0.5	<0.5	<5	<1	<1	<1	<1	<1	
TRANS-1,3-DICHLOROPROPENE						<5	<1	<1	<1	<1	<1	<0.2
TRICHLOROETHENE	0.58	<0.5	<0.5	0.57	0.61	7.6	8.1	6.9	5.9	4.8	6.1	8.4
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.50							1.8
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	40	33	18	13	7	<10	20	6.9	4.6	2.8	<1	270

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Volatile Organic Compounds

COMPOUND NAME	EW-5 12/05/90 FO	EW-5 03/07/91 FO	EW-5 06/19/91 FO	EW-5 09/11/91 FO	EW-5 12/11/91 FO	EW-5 03/17/92 FO	EW-5 06/04/92 FO	EW-5 06/04/92 FO	EW-5 09/15/92 FO	EW-5 12/07/92 FO	EW-5 03/03/93 FO	EW-5 09/15/93 FO
DATE ANALYZED	12/11/90	3/08/91	6/20/91	9/12/91	12/13/91	3/25/92	6/08/92	6/09/92	9/24/92	12/18/92	3/10/93	9/27/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.66	1.4	0.93	<2.0	<2.0	<0.2	<0.2	<0.2	0.51	1.3	<10	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
1,1-DICHLOROETHANE	0.25	0.68	0.65	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	1.3	<10	1.9
1,1-DICHLOROETHENE	0.25	0.91	1.5	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	0.72	<10	<1.0
1,2-DICHLOROBENZENE	1.7	13	9.1	<10	15	4.1	4	4	14	44	34	58
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
1,2-DICHLOROETHENE (CIS)	23	57	490	190	120	26	25	29	180	390	220	230
1,2-DICHLOROETHENE (CIS/TRANS)												
1,2-DICHLOROETHENE (TRANS)	0.36	1.8	1.8	<2.0	<2.0	0.24	0.56	0.53	1.5	5.7	<10	9.1
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
1,3-DICHLOROBENZENE	<1	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0	<2.0	<1.0	<20	3.4
1,4-DICHLOROBENZENE	<1	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0	<2.0	2.4	<20	4.8
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
ACETONE												
ACETONE/1,1-DCE												
BENZENE	<0.5	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	0.62	<10	1.7
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
CHLOROBENZENE	0.6	2.7	1.8	<5.0	<5.0	2.2	2.3	2.5	4.8	7.1	14	27
CHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
CHLOROFORM	0.6	<0.2	<0.2	<2.0	<2.0	<0.2	0.52	0.53	<0.4	<0.2	<10	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	0.46	<20	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<20	<2.0
EDB (1,2-DIBROMOETHANE)												
ETHYLBENZENE	<0.5	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<0.5	<10	1.6
META- & PARA-XYLENE												
METHYLENE CHLORIDE	<2	<2.0	<2.0	<20	<20	<2.0	<2.0	<2.0	<4.0	<2.0	<20	<2.0
ORTHO-XYLENE												
TETRACHLOROETHENE	0.34	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	0.38	<10	<1.0
TOLUENE	<0.5	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5	<1.0	<0.5	<10	1.6
TOTAL THM												
TOTAL XYLENES						<1.0	<1.0	<1.0	<2.0	<1.0	<20	7.4
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.2	<10	<1.0
TRICHLOROETHENE	8.2	15	16	<2.0	3.1	0.66	1.6	2.1	3.3	8.7	<10	7.2
TRICHLOROFLUOROMETHANE	<0.2	2.3	1.8	<2.0	<2.0	0.61	0.21	<0.2	0.83	2.2	<20	<2.0
TRICHLOROTRIFLUOROETHANE												
VINYL CHLORIDE	2	140	55	<2.0	44	28	34	36	71	210	230	190

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Volatile Organic Compounds

COMPOUND NAME	EW-5 12/14/93 FQ	EW-5 03/28/94 FQ	EW-5 06/15/94 FQ	EW-5 09/19/94 FQ	EW-5 12/12/94 FQ	EW-5 06/27/95 FQ	EW-5 12/19/95 FQ	EW-5 12/11/96 FQ
DATE ANALYZED	12/27/93	4/05/94*	6/25/94	9/23/94	12/19/94	7/10/95	12/31/95	12/21/96
1,1,1-TRICHLOROETHANE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0						<2.0	<2.0
1,1,2-TRICHLOROETHANE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
1,1-DICHLOROETHANE	1.4	0.7	0.3	<0.4	<0.4	<0.5	<0.5	<0.50
1,1-DICHLOROETHENE	<1.0	0.4	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
1,2-DICHLOROBENZENE	45	15	4.9	2.7	2.9	16	3.9	1.3
1,2-DICHLOROETHANE	<1.0	<0.2	<0.5	<0.4	<0.4	<0.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	230	110	70	55	54	71	40	10
1,2-DICHLOROETHENE (CIS/TRANS)								
1,2-DICHLOROETHENE (TRANS)	6.2	2.2	0.5	0.4	0.4	1.9	1.2	<0.50
1,2-DICHLOROPROPANE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
1,3-DICHLOROBENZENE	<2.0	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.50
1,4-DICHLOROBENZENE	3.6	0.8	<0.5	<1.0	<1.0	0.9	<0.5	<0.50
2-CHLOROETHYL VINYL ETHER	<2.0	<0.5	<0.5	<1.0	<1.0	<0.5	N/A	N/A
ACETONE		<50	<50	<100	<100	<50		
ACETONE/1,1-DCE							<50	<50
BENZENE	1.2	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
BROMOFORM	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
BROMOMETHANE	<2.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
CARBON TETRACHLORIDE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
CHLOROBENZENE	20	4.5	1.1	<1.0	<1.0	6.4	3	<0.50
CHLOROETHANE	<2.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
CHLOROFORM	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5	0.96	<0.50
CHLOROMETHANE	<2.0	<0.2	0.3	<0.4	<0.8	<0.5	<0.5	0.51
CIS-1,3-DICHLOROPROPENE	<2.0	0.5	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
DIBROMOCHLOROMETHANE	<2.0	<0.2	<0.2	<0.4	<0.4	<0.5	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<2.0	0.9	<0.2	<0.4	<0.8	<0.5	<0.5	<0.50
EDB (1,2-DIBROMOETHANE)								
ETHYLBENZENE	<1.0	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5
META- & PARA-XYLENE							<0.5	<0.5
METHYLENE CHLORIDE	5.3	<2.0	<2.0	<4.0	<4.0	<2.0	<0.5	3.5
ORTHO-XYLENE							<0.5	<0.5
TETRACHLOROETHENE	<1.0	0.3	<0.2	<0.4	<0.4	<0.5	<0.5	<0.5
TOLUENE	<1.0	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	4.2
TOTAL THM		<0.2	<0.2	<0.4	<0.4	<0.5	0.96	<0.50
TOTAL XYLENES	<2.0	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<1.0	<0.2	<0.2	<0.4	<0.4	<0.5		
TRICHLOROETHENE	5.8	4.5	3	4.4	4.6	4.4	4.3	1.2
TRICHLOROFLUOROMETHANE	<2.0	1	0.9	<1.0	<1.0	<0.5	0.68	<0.50
TRICHLOROTRIFLUOROETHANE		<2.0	<2.0	<4.0	<4.0	<2.0		
VINYL CHLORIDE	910	88	21	12	11	76	18	0.97

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COMPOUND NAME	EW-6 03/30/89 FG	EW-6 06/01/89 FG	EW-6 08/08/89 FG	EW-6 12/07/89 FG	EW-6 03/13/90 FG	EW-6 06/07/90 FD	EW-6 06/07/90 FG	EW-6 09/13/90 FG	EW-6 12/06/90 FD	EW-6 12/06/90 FG
DATE ANALYZED	4/07/89	6/23/89	9/13/89	12/14/89	3/20/90	6/12/90	6/12/90	9/17/90	12/11/90	12/11/90
1,1,1-TRICHLOROETHANE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.26	<0.2
1,1,2,2-TETRACHLOROETHANE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		1.3	<1	<1	<1	1.6	1.2	<0.2	0.37	0.33
1,1,2-TRICHLOROETHANE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.39	0.3
1,1-DICHLOROETHENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.3	0.24
1,2-DICHLOROBENZENE	<10	7.1	7.6	6	7.9	7.1	6.6	6.7	6	6.2
1,2-DICHLOROETHANE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)								26	46	47
1,2-DICHLOROETHENE (CIS/TRANS)	36	28	32	24	22	20	21			
1,2-DICHLOROETHENE (TRANS)								1.1	1.3	1.4
1,2-DICHLOROPROPANE		<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-DICHLOROBENZENE	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-CHLOROETHYL VINYL ETHER	<10							<0.2	<0.2	<0.2
ACETONE	<25									
ACETONE/1,1-DCE										
BENZENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
BROMOFORM	<5	<5	<10	<5	<5	<5	<5	<0.2	<0.2	<0.2
BROMOMETHANE	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROBENZENE	<5	0.9	1.2	0.88	1.6	1.4	1.4	1.9	2.2	2.2
CHLOROETHANE	<10	<5	<5	<5	<5	<5	<5	<0.2	0.24	<0.2
CHLOROFORM	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.72	<0.2	<0.2
CHLOROMETHANE	<10	<5	<5	<5	<5	<5	<10	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<5	<2	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE								<0.2	0.33	<0.2
EDB (1,2-DIBROMOETHANE)		<2	<2	<2	<2	<2	<2			
ETHYLBENZENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<25	<5	<5	<5	<5	<5	<5	<2	<2	<2
ORTHO-XYLENE										
TETRACHLOROETHENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.2	0.27
TOLUENE	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM										
TOTAL XYLENES	<5	<1	<1	<1	<1	<1	<1			
TRANS-1,3-DICHLOROPROPENE	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
TRICHLOROETHENE	<5	2.5	1.1	2.1	1.8	1.3	2	3.2	4.4	4.5
TRICHLOROFLUOROMETHANE								0.77	1.3	1.8
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	110	170	64	51	110	87	83	74	88	84

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Volatile Organic Compounds

COMPOUND NAME	EW-6 03/07/91 FO	EW-6 06/17/91 FD	EW-6 06/17/91 FO	EW-6 09/13/91 FO	EW-6 12/10/91 FO	EW-6 03/10/92 FO	EW-6 04/01/92 FO	EW-6 06/02/92 FO	EW-6 09/08/92 FB	EW-6 09/09/92 FO
DATE ANALYZED	3/08/91	6/19/91	6/19/91	9/17/91	12/11/91	3/12/92	4/07/92	6/04/92	9/22/92	9/22/92
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	1.5	4.8	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,1-DICHLOROETHANE	<0.2	1.3	0.8	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,1-DICHLOROETHENE	<0.2	2.4	3.6	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,2-DICHLOROBENZENE	3.6	20	21	<10	<50	71	93	200	1200	970
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,2-DICHLOROETHENE (CIS)	16	1300	1400	530	490	1400	1400	1900	6800	6700
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	0.61	7.4	7.7	2.5	<10	6.8	5.6	24	71	75
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<10	<50	<10	<25	<25	<100	<100
1,4-DICHLOROBENZENE	<1.0	1.1	1.6	<10	<50	<10	<25	<25	<100	<100
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<5.0	<25	<5.0	<13	<13	<0.5	<50
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
BROMOFORM	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
BROMOMETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
CHLOROBENZENE	1.6	5.8	6.3	<5.0	29	25	40	62	150	130
CHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
CHLOROFORM	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
CHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
DICHLORODIFLUOROMETHANE	<0.2	1.8	3.1	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<5.0	<25	<5.0	<13	<13	250	210
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<20	<100	<20	70	150	<200	<200
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	2	1.7	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
TOLUENE	<0.5	<0.5	<0.5	<5.0	28	5.6	<13	<13	<0.5	<50
TOTAL THM										
TOTAL XYLENES						<10	<25	<25	200	170
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<10	<2.0	<5.0	<5.0	<20	<20
TRICHLOROETHENE	4.4	20	22	22	<10	<2.0	<5.0	<5.0	<20	<20
TRICHLOROFLUOROMETHANE	0.36	5.3	7.5	<2.0	<10	<2.0	<5.0	9.1	32	29
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	66	160	160	150	94	240	430	1300	3600	3600

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Volatile Organic Compounds

COMPOUND NAME	EW-6 12/07/92 FO	EW-6 12/10/92 FO	EW-6 09/09/93 FO	EW-6 12/14/93 FO	EW-6 03/18/94 FO	EW-6 06/13/94 FO	EW-6 09/19/94 FO	EW-6 12/12/94 FO	EW-6 06/28/95 FO	EW-6 12/20/95 FO
DATE ANALYZED	12/19/92	12/27/92	9/23/93	12/26/93	3/30/94	6/22/94	9/23/94	12/16/94	7/12/95	01/03/96
1,1,1-TRICHLOROETHANE	<10		<25	<1.0	<5.0	50	14	<4.0	<0.5	<5.0
1,1,2,2-TETRACHLOROETHANE	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<10		<25	<1.0						<20.0
1,1,2-TRICHLOROETHANE	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
1,1-DICHLOROETHANE	<10		<25	5.4	<5.0	<10.0	<4.0	<4.0	2.6	<5.0
1,1-DICHLOROETHENE	<10	<25	<25	<1.0	<5.0	<10.0	<4.0	<4.0	1	<5.0
1,2-DICHLOROBENZENE	230		2500	800	150	58	38	22	200	52
1,2-DICHLOROETHANE	<10	<25	<25	<1.0	<5.0	<10.0	6.4	<4.0	<0.5	<5.0
1,2-DICHLOROETHENE (CIS)	1100		1200	470	110	64	80	90	420	170
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	47		29	34	14	<10.0	<4.0	<4.0	18	7.2
1,2-DICHLOROPROPANE	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
1,3-DICHLOROBENZENE	<50		1900	5.2	<12.5	<25.0	<10.0	<10.0	1.8	<5.0
1,4-DICHLOROBENZENE	<50		1900	25	<12.5	<25.0	<10.0	<10.0	11	<5.0
2-CHLOROETHYL VINYL ETHER	<10		<50	<2.0	<12.5	<25.0	<10.0	<10.0	<0.5	N/A
ACETONE					<1250	<2500	<1000	<1000	<50	
ACETONE/1,1-DCE										<500
BENZENE	<25	<25	<25	12	<12.5	<25.0	<10.0	<10.0	4.6	<5.0
BROMODICHLOROMETHANE	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
BROMOFORM	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
BROMOMETHANE	<10		<50	<2.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
CARBON TETRACHLORIDE	<10	<25	<25	<1.0	<5.0	<10.0	6	<4.0	<0.5	<5.0
CHLOROBENZENE	31	20	150	280	88	30	14	<10.0	86	46
CHLOROETHANE	<10		<50	<2.0	<5.0	<10.0	<4.0	<4.0	3.3	<5.0
CHLOROFORM	<10	<25	<25	<1.0	<5.0	<10.0	6.4	<4.0	<0.5	<5.0
CHLOROMETHANE	7.7		<50	<2.0	<5.0	<10.0	<4.0	<8.0	<0.5	<5.0
CIS-1,3-DICHLOROPROPENE	<10		<50	<2.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
DIBROMOCHLOROMETHANE	<10		<50	<2.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
DICHLORODIFLUOROMETHANE	<10		<50	<2.0	<5.0	<10.0	<4.0	<8.0	<0.5	<5.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<25		89	68	<12.5	<25.0	<10.0	<10.0	1.7	<5.0
META- & PARA-XYLENE										<5.0
METHYLENE CHLORIDE	<100		<50	<2.0	<50.0	<100.0	<40.0	<40.0	<2.0	<5.0
ORTHO-XYLENE										<5.0
TETRACHLOROETHENE	<10	<25	<25	<1.0	<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
TOLUENE	<25		<25	6.8	<12.5	<25.0	<10.0	<10.0	1.2	<5.0
TOTAL THM					<5.0	<10.0	<4.0	<4.0	<0.5	<5.0
TOTAL XYLENES	<50		150	33	<12.5	<25.0	<10.0	<10.0	4.2	<5.0
TRANS-1,3-DICHLOROPROPENE	<10		<25	<1.0	<5.0	<10.0	<4.0	<4.0	0.6	
TRICHLOROETHENE	<10	<25	<25	<1.0	<5.0	<10.0	<4.0	<4.0	2.2	<5.0
TRICHLOROFLUOROMETHANE	<10		<50	<2.0	<12.5	<25.0	<10.0	<10.0	<0.5	<5.0
TRICHLOROTRIFLUOROETHANE					<50.0	<100.0	<40.0	<40.0	<2.0	
VINYL CHLORIDE	1000	770	2700	7600	1200	480	310	240	1500	490

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Volatile Organic Compounds

COMPOUND NAME	EW-6 12/20/95 FO	EW-6 06/28/96 FO	EW-6 12/10/96 FO	EW-7 03/05/91 FO	EW-7 06/17/91 FO	EW-7 09/09/91 FO	EW-7 12/06/91 FO	EW-7 03/10/92 FO	EW-7 06/02/92 FO	EW-7 09/08/92 FO
DATE ANALYZED	01/02/96	07/03/96	12/21/96	3/07/91	6/19/91	9/11/91	12/10/91	3/12/92	6/04/92	9/17/92
1,1,1-TRICHLOROETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<20.0	<20.0	<2.0	0.84	<0.2	0.67	1.2	<0.2	0.63	1.1
1,1,2-TRICHLOROETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<5.0	<5.0	0.61	<0.2	<0.2	<0.2	<0.2	<0.2	0.82	0.55
1,1-DICHLOROETHENE	<5.0	<5.0	0.6	0.32	0.49	0.28	0.4	<0.2	0.7	0.6
1,2-DICHLOROBENZENE	53	22	18	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	180	82	<2.5	<0.2	<0.2	<0.2	<0.2	2.9	7.3	7.8
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	7.5	<5.0	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<5.0	<5.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<5.0	<5.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE										
ACETONE/1,1-DCE	<500	<500	<50							
BENZENE	<5.0	<5.0	0.56	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<5.0	<5.0	0.77	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	46	15	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<5.0	<5.0	0.92	<0.2	<0.2	<0.2	<0.2	<0.2	0.26	0.33
CHLOROMETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<5.0	<5.0	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<5.0	<5.0	0.81	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<5.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<5.0	<5.0	<0.5							
METHYLENE CHLORIDE	<5.0	8.3	1.7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE	<5.0	<5.0	<0.5							
TETRACHLOROETHENE	<5.0	<5.0	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	0.27	0.29
TOLUENE	<5.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5	0.51	<0.5	<0.5
TOTAL THM	<5.0	<5.0	0.99							
TOTAL XYLENES	<5.0	<5.0	<0.5					<1.0	<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<5.0	<5.0	4.3	3.5	2.8	1	1.8	0.76	2.4	2.4
TRICHLOROFLUOROMETHANE	<5.0	<5.0	1.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.37	0.32
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	490	190	54	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.86

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COMPOUND NAME	EW-7 09/08/92 FQ	EW-7 12/02/92 FQ	EW-7 03/02/93 FQ	EW-7 09/15/93 FD	EW-7 09/15/93 FQ	EW-7 12/09/93 FQ	EW-7 03/16/94 FQ	EW-7 06/18/94 FQ	EW-7 09/22/94 FQ	EW-7 12/12/94 FQ
DATE ANALYZED	9/17/92	12/16/92	3/08/93	9/27/93	9/27/93	12/20/93	3/27/94*	6/21/94	9/24/94	12/16/94
1,1,1-TRICHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	1.2	<5	<1.0	<1.0	<1.0	2.9				
1,1,2-TRICHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.59	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	0.62	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	0.4
1,2-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	8.2	<5	8.3	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
ACETONE							<50	<50	<50	<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	0.31	<5	<1.0	<1.0	<1.0	<1.0	0.4	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4
CIS-1,3-DICHLOROPROPENE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<5	<2.0	<2.0	<2.0	7.5	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	0.26	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5
TOTAL THM							0.4	<0.2	<0.2	<0.2
TOTAL XYLENES	<1.0	<5	<2.0	4.3	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	2.6	1	1.2	1.1	1.2	1	0.7	0.6	1	1
TRICHLOROFLUOROMETHANE	0.32	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE							<2.0	<2.0	<2.0	<2.0
VINYL CHLORIDE	2.3	<10	<2.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2

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COMPOUND NAME	EW-7 06/21/95 FD	EW-8 03/06/91 FD	EW-8 03/08/91 FD	EW-8 06/19/91 FD	EW-8 09/10/91 FD	EW-8 12/09/91 FD	EW-8 03/03/92 FD	EW-8 06/03/92 FD	EW-8 09/10/92 FD	EW-8 12/08/92 FD
DATE ANALYZED	6/30/95	3/08/91	3/08/91	6/20/91	9/12/91	12/11/91	3/24/92	6/05/92	9/23/92	12/20/92
1,1,1-TRICHLOROETHANE	<0.5	<0.2	0.92	6.2	3.5	0.94	<0.2	0.84	0.36	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.5	<0.2	<0.2	0.89	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.5	<0.2	<0.2	0.23	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.5	<0.2	<0.2	0.76	<0.2	<0.2	<0.2	<0.2	0.22	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE	<50									
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.7
CIS-1,3-DICHLOROPROPENE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	2.4	<0.5	0.56	<0.5	0.89	<0.5	<0.5
TOTAL THM	0.6									
TOTAL XYLENES	<0.5						<1.0	<1.0	<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2									
VINYL CHLORIDE	<0.5	<0.2	<0.2	5.5	<0.2	<0.2	<0.2	0.26	1.4	<0.2

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COMPOUND NAME	EW-8 12/08/92 FO	EW-8 03/08/93 FD	EW-8 03/05/93 FO	EW-8 09/16/93 FO	EW-8 12/10/93 FO	EW-8 03/22/94 FO	EW-8 06/13/94 FO	EW-8 09/14/94 FO	EW-8 12/06/94 FO	EW-8 06/27/95 FO
DATE ANALYZED	12/19/92	3/11/93	3/11/93	9/24/93	12/24/93	3/30/94*	6/22/94	9/21/94	12/08/94	7/11/95
1,1,1-TRICHLOROETHANE	0.43	<1.0	<1.0	<1.0	<1.0	<0.2	<0.5	<0.2	<0.2	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<1.0	<1.0	<1.0	<1.0					
1,1,2-TRICHLOROETHANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,1-DICHLOROETHANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,1-DICHLOROETHENE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,2-DICHLOROBENZENE	<1.0	<2.0	<2.0	2.8	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,2-DICHLOROETHENE (CIS)	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	0.24	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,2-DICHLOROPROPANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
1,3-DICHLOROBENZENE	<1.0	<2.0	<2.0	3.1	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
ACETONE						<50	<50	<50	<50	<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
BROMOFORM	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
BROMOMETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5
CARBON TETRACHLORIDE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
CHLOROBENZENE	0.27	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5
CHLOROFORM	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
CHLOROMETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5
CIS-1,3-DICHLOROPROPENE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5
DIBROMOCHLOROMETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5
DICHLORODIFLUOROMETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
TOLUENE	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM						<0.2	<0.2	<0.2	<0.2	<0.5
TOTAL XYLENES	<1.0	<2.0	<2.0	4.4	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
TRICHLOROETHENE	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5
TRICHLOROFLUOROMETHANE	<0.2	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE						<2.0	<2.0	<2.0	<2.0	<2.0
VINYL CHLORIDE	<0.2	<2.0	<2.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5

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COMPOUND NAME	EW-8 12/19/95 FO	EW-8 06/18/96 FO	EW-8 12/11/96 FO	EW-9 03/08/91 FO	EW-9 06/18/91 FO	EW-9 09/12/91 FO	EW-9 09/12/91 FO	EW-9 12/12/91 FO	EW-9 03/16/92 FO	EW-9 06/05/92 FO
DATE ANALYZED	12/31/95	06/26/96	12/22/96	3/09/91	6/20/91	9/17/91	9/16/91	12/13/91	3/25/92	6/09/92
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.5	<0.5	<0.50	0.24	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<0.5	<0.5	<0.50	1.5	1.4	1.9	1.8	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.5	<0.5	<0.50	3.3	5.9	17	17	4	<0.2	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE										
ACETONE/1,1-DCE	<50	<50	<50							
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.50	1.3	1.4	1.7	1.8	<0.5	<0.5	<0.5
CHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.5	<0.5	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<0.5	<0.5	<0.5							
METHYLENE CHLORIDE	<0.5	<0.5	2.9	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE	0.91	<0.5	<0.5							
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.5	<0.5	<0.50							
TOTAL XYLENES	0.96	<0.5	<0.5						<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.5	<0.5	<0.50	1.5	0.58	4.4	4.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	<0.5	<0.5	<0.50	11	7.9	9	7.3	0.58	<0.2	<0.2

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COMPOUND NAME	EW-9 09/14/92 FD	EW-9 12/03/92 FD	EW-9 03/08/93 FD	EW-9 09/09/93 FD	EW-9 12/10/93 FD	EW-9 03/17/94 FD	EW-9 03/17/94 FD	EW-9 06/13/94 FD	EW-9 09/13/94 FD	EW-9 12/07/94 FD
DATE ANALYZED	9/23/92	12/17/92	3/11/93	9/23/93	12/24/93	3/28/94*	3/29/94*	6/22/94	9/22/94	12/10/94
1,1,1-TRICHLOROETHANE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	2.9	<1.0	<5.0	<1.0					
1,1,2-TRICHLOROETHANE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,1-DICHLOROETHANE	<0.2	<5	<1.0	<5.0	<1.0	0.4	<1.0	<1.0	<2.0	<2.0
1,1-DICHLOROETHENE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,2-DICHLOROBENZENE	<1.0	3.9	<2.0	7.9	14	29	20	33	45	38
1,2-DICHLOROETHANE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,2-DICHLOROETHENE (CIS)	0.45	41	4.7	7.9	12	51	53	58	35	49
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<5	<1.0	<5.0	1.6	2.9	3.2	1	6	3
1,2-DICHLOROPROPANE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
1,3-DICHLOROBENZENE	<1.0		<2.0	<10	<2.0	<0.5	<2.5	<2.5	<5.0	<5.0
1,4-DICHLOROBENZENE	<1.0		<2.0	<10	2.5	3.8	3.1	3	<5.0	<5.0
2-CHLOROETHYL VINYL ETHER	<0.2		<2.0	<10	<2.0	<0.5	<2.5	<2.5	<5.0	<5.0
ACETONE						<50	<250	<250	<500	<500
ACETONE/1,1-DCE										
BENZENE	<0.5		<1.0	<5.0	<1.0	0.8	<2.5	<2.5	<5.0	<5.0
BROMODICHLOROMETHANE	<0.2		<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
BROMOFORM	<0.2		<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
BROMOMETHANE	<0.2		<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2		<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
CHLOROBENZENE	<0.5		1.4	13	18	27	26	34	53	42
CHLOROETHANE	<0.2		<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<2.0
CHLOROFORM	<0.2	2.8	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
CHLOROMETHANE	<0.2	<10	<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<4.0
CIS-1,3-DICHLOROPROPENE	<0.2	<10	<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<5	<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<10	<2.0	<10	<2.0	<0.2	<1.0	<1.0	<2.0	<4.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<5	<1.0	<5.0	<1.0	<0.5	<2.5	<2.5	<0.5	<5.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<5	<2.0	<10	<2.0	<2.0	<10.0	<10.0	<20.0	<20.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
TOLUENE	<0.5	<5	<1.0	<5.0	<1.0	<0.5	<2.5	<2.5	<5.0	<5.0
TOTAL THM						<0.2	<1.0	<1.0	<2.0	<2.0
TOTAL XYLENES	<1.0	<5	<2.0	<10	<2.0	<0.5	<2.5	<2.5	<5.0	<5.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<5	<1.0	<5.0	<1.0	<0.2	<1.0	<1.0	<2.0	<2.0
TRICHLOROETHENE	<0.2	4.8	<1.0	<5.0	<1.0	7.5	8.5	6.5	3	8.5
TRICHLOROFLUOROMETHANE	<0.2	<5	<2.0	<10	<2.0	1	<2.5	<2.5	<5.0	<5.0
TRICHLOROTRIFLUOROETHANE						<2.0	<10.0	<10.0	<20.0	<20.0
VINYL CHLORIDE	0.44	44	13	120	200	240	250	200	340	240

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-9 06/26/95 FO	EW-9 10/27/95 FO	EW-9 12/19/95 FO	EW-9 04/09/96 FO	EW-9 09/26/96 FO	EW-9 12/10/96 FO	EW-10 03/06/91 FO	EW-10 06/17/91 FO	EW-10 09/07/91 FO	EW-10 12/06/91 FO
DATE ANALYZED	7/07/95	11/04/95	12/30/95	4/20/96	9/28/96	12/20/96	3/08/91	6/19/91	9/11/91	12/10/91
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	0.56	<0.2	<0.2	0.43
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<2.0	<2.0	<2.0	<10.0	<10	9.9	8.8	4.4	6.3
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.5	<0.5	<0.5	0.88	<2.5	<2.5	0.58	<0.2	0.51	0.66
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	8.3	7.6	4	3.9
1,2-DICHLOROBENZENE	12	15	14	14	32	17	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	22	20	27	33	42	48	0.69	0.56	0.69	0.87
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	1	1.5	1.6	2	3.7	2.7	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	1.8	2.7	2.8	2.6	5.4	3.4	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	N/A	<0.5	N/A	N/A	<0.2	<0.2	<0.2	<0.2
ACETONE	<50									
ACETONE/1,1-DCE		<50.0	<50	<50	<250	<250				
BENZENE	<0.5	0.66	0.79	0.83	<2.5	<2.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	1.1	1.3	0.71	1
BROMOFORM	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	17	32	27	31	66	38	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	1.6	1.9	2	2.1
CHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE		0.6	<0.5	<0.5	<2.5	<2.5				
METHYLENE CHLORIDE	<2.0	2	<0.5	0.58	<2.5	12	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE		0.54	0.71	1.2	<2.5	<2.5				
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	0.57	0.46	<0.2	0.34
TOLUENE	<0.5	<0.5	<0.5	0.71	<2.5	<2.5	<0.5	2.3	<0.5	<0.5
TOTAL THM	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5				
TOTAL XYLENES	<0.5	1.1	1.1	1.6	<2.5	<2.5				
TRANS-1,3-DICHLOROPROPENE	<0.5						<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	4.8	2.3	4.7	6.4	<2.5	8.6	72	43	43	50
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<2.5	<2.5	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2.0									
VINYL CHLORIDE	69	100	98	91	210	100	<0.2	<0.2	<0.2	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-10 03/10/92 FD	EW-10 03/10/92 FD	EW-10 06/02/92 FD	EW-10 09/08/92 FD	EW-10 12/02/92 FD	EW-10 12/02/92 FD	EW-10 03/02/93 FD	EW-10 09/08/93 FD	EW-10 12/08/93 FD	EW-10 03/14/94 FD
DATE ANALYZED	3/17/92	3/12/92	6/03/92	9/16/92	12/16/92	12/16/92	3/07/93	9/22/93	12/20/93	3/22/94*
1,1,1-TRICHLOROETHANE	<0.2	<0.2	0.62	0.61	<5	<5	<1.0	<1.0	<1.0	0.4
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	2.2	1.5	3.9	6.7	2.4	1.7	2.7	6.6	4.2	
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
1,1-DICHLOROETHANE	<0.2	<0.2	0.73	0.66	<5	<5	<1.0	<1.0	<1.0	0.9
1,1-DICHLOROETHENE	2.4	1.9	3.7	2.6	1.8	2	2.3	2.5	4.1	4.8
1,2-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	1.4	2.2	<2.0	<2.0	<2.0	<0.5
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	0.4
1,2-DICHLOROETHENE (CIS)	<0.2	<0.2	0.78	<0.2	<5	<5	<1.0	<1.0	<1.0	0.7
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	1.3	1.9	<2.0	<2.0	<2.0	<0.5
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	1.3	1.9	<2.0	<2.0	<2.0	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<5	<5	<2.0	<2.0	<2.0	<0.5
ACETONE										<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<5	<5	<1.0	<1.0	<1.0	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<2.0	<2.0	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<5	<5	<1.0	<1.0	<1.0	<0.5
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<2.0	<2.0	<0.2
CHLOROFORM	0.59	0.46	0.91	0.85	1.2	1.2	<1.0	1.4	1.3	1.9
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<2.0	<2.0	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<2.0	<2.0	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<2.0	<2.0	<2.0	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<2.0	<2.0	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<5	<5	<1.0	<1.0	<1.0	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<5	<5	<2.0	<2.0	4.1	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<0.2	0.45	0.32	<5	<5	<1.0	<1.0	<1.0	0.6
TOLUENE	<0.5	0.53	<0.5	<0.5	<5	<5	<1.0	<1.0	<1.0	<0.5
TOTAL THM										1.9
TOTAL XYLENES	<1.0	<1.0	<1.0	<1.0	<5	<5	<2.0	<2.0	<2.0	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<5	<5	<1.0	<1.0	<1.0	<0.2
TRICHLOROETHENE	12	13	14	15	20	21	11	23	21	30
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<5	<5	<2.0	<2.0	<2.0	<0.5
TRICHLOROTRIFLUOROETHANE										2.6
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<10	<10	<2.0	<1.0	<1.0	<0.2

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COMPOUND NAME	EW-10 03/14/94 FO	EW-10 06/08/94 FO	EW-10 09/12/94 FD	EW-10 09/12/94 FO	EW-10 12/05/94 FO	EW-10 06/21/95 FO	EW-10 04/08/96 FO	EW-11 03/08/91 FO	EW-11 06/18/91 FO	EW-11 09/09/91 FO
DATE ANALYZED	3/26/94	6/15/94	9/21/94	9/21/94	12/07/94	6/30/95	4/19/96	3/09/91	6/20/91	9/11/91
1,1,1-TRICHLOROETHANE	0.2	0.8	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE							2.3	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.9	0.4	1.2	1.1	<0.4	0.5	0.52	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	2.9	2.9	3.2	3.3	3	1.9	2.6	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	0.3	0.3	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	0.5	0.4	0.3	0.3	<0.4	<0.5	<0.5	<0.2	2	1
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.2	<0.2	<0.2
ACETONE	<50	<50	<50	<50	<100	<50				
ACETONE/1,1-DCE							<50			
BENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROFORM	1	0.9	0.8	0.8	0.6	1.5	1.1	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.8	<0.5	<0.5	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.8	<0.5	<0.5	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE							<0.5			
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<0.5	<2.0	<2.0	<2.0
ORTHO-XYLENE							<0.5			
TETRACHLOROETHENE	0.4	0.3	0.4	0.5	<0.4	<0.5	<0.5	<0.2	0.25	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	1	0.9	0.8	0.8	0.6	1.5	1.6			
TOTAL XYLENES	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5			
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5		<0.2	<0.2	<0.2
TRICHLOROETHENE	28	29	24	26	26	22	21	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2.0	2.8	4.2	4.5	4.6	3.8				
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.2	0.99	<0.2

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COMPOUND NAME	EW-11 12/06/91 FD	EW-11 06/24/92 FD	EW-11 09/15/92 FD	EW-11 09/15/93 FD	EW-11 12/09/93 FD	EW-11 03/14/94 FD	EW-11 06/08/94 FD	EW-11 06/08/94 FD	EW-11 09/13/94 FD	EW-11 09/13/94 FD
DATE ANALYZED	12/10/91	6/30/92	9/24/92	9/27/93	12/20/93	3/23/94	6/16/94	6/16/94	9/21/94	9/21/94
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0					
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<1.0	<1.0	1.8	<2.0	<2.0	<0.5	1.4	1.6	4.8	5.3
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	<0.2	<0.2	1.4	<1.0	<1.0	2.8	5.9	6.8	7	6.9
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	0.4	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	1.6
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<2.0	<2.0	<0.5	<0.5	<0.5	0.7	0.9
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
ACETONE						<50	<50	<50	<50	<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	0.7	0.7
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	3.2	3.5
CHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	5.5	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM						<0.2	<0.2	<0.2	<0.2	<0.2
TOTAL XYLENES		<1.0	<1.0	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	0.9	0.6
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE						<2.0	<2.0	<2.0	<2.0	<2.0
VINYL CHLORIDE	<0.2	<0.2	<0.2	<1.0	6.3	14	22	22	46	49

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-11 12/13/94 FO	EW-11 06/28/95 FO	EW-11 12/19/95 FO	EW-11 04/09/96 FO	EW-11 06/18/96 FO	EW-11 09/26/96 FO	EW-11 12/10/96 FO	EW-12 03/05/91 FO	EW-12 06/18/91 FO	EW-12 09/09/91 FO
DATE ANALYZED	12/16/94	7/05/95	12/30/95	4/19/96	06/26/96	9/28/96	12/20/96	3/07/91	6/19/91	9/12/91
1,1,1-TRICHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	2	1.7	1.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE			<2.0	<2.0	<2.0	<2.0	<2.0	1.4	0.46	0.57
1,1,2-TRICHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	3.1	2.6	2.8
1,1-DICHLOROETHENE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	5.4	5.5	3.9
1,2-DICHLOROBENZENE	1.9	1.8	2.5	4.3	4.9	4.2	3	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	3.2	4.4	6.9	9.2	12	13	12	2.7	5.3	4.7
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	0.63	0.77	0.64	0.57	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	N/A	<0.5	N/A	N/A	N/A	<0.2	<0.2	<0.2
ACETONE	<50	<50								
ACETONE/1,1-DCE			<50	<50	<50	<50	<50			
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
CHLOROBENZENE	0.7	0.5	1.3	2.8	3.5	2	1.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
CHLOROFORM	0.2	<0.5	<0.5	0.52	<0.5	<0.5	<0.50	1.5	0.85	1.4
CHLOROMETHANE	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	0.61	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE			<0.5	<0.5	<0.5	<0.5	<0.5			
METHYLENE CHLORIDE	<2.0	<2.0	<0.5	0.54	<0.5	<0.5	1.6	<2.0	<2.0	<2.0
ORTHO-XYLENE			<0.5	1.9	<0.5	<0.5	<0.5			
TETRACHLOROETHENE	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.25	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	0.55	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	0.2	<0.5	<0.5	0.52	<0.5	<0.5	<0.50			
TOTAL XYLENES	<0.5	<0.5	0.5	1.9	<0.5	<0.5	<0.5			
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.5						<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<0.5	<0.5	0.6	0.78	0.55	0.53	31	21	21
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.50	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0								
VINYL CHLORIDE	20	17	26	27	36	37	30	<0.2	<0.2	<0.2

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Volatile Organic Compounds

COMPOUND NAME	EW-12 09/09/91 FQ	EW-12 12/06/91 FQ	EW-12 03/12/92 FQ	EW-19 06/03/92 FD	EW-12 06/03/92 FQ	EW-12 09/09/92 FQ	EW-12 12/02/92 FQ	EW-12 03/02/93 FQ	EW-12 09/08/93 FD	EW-12 09/08/93 FQ
DATE ANALYZED	9/11/91	12/10/91	3/23/92	6/04/92	6/04/92	9/21/92	12/16/92	3/08/93	9/22/93	9/22/93
1,1,1-TRICHLOROETHANE	1.2	1.3	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	1	2.4	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,1-DICHLOROETHANE	3	3.4	0.69	0.26	0.26	0.46	<5	<1.0	1.7	2.3
1,1-DICHLOROETHENE	3.6	4.7	0.87	<0.2	<0.2	0.5	<5	<1.0	<1.0	<1.0
1,2-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)	4.4	5.3	1.8	0.42	0.6	0.79	1.6	<1.0	4.4	4.9
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0
CHLOROFORM	1	1.2	0.27	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	0.38	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0
TOTAL THM										
TOTAL XYLENES			<1.0	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0
TRICHLOROETHENE	21	26	4.8	1.2	1.2	1.8	4.1	<1.0	4.9	5.5
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0	<1.0	<1.0

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COMPOUND NAME	EW-12 12/08/93 FD	EW-12 03/14/94 FD	EW-12 06/08/94 FD	EW-12 06/08/94 FD	EW-12 09/12/94 FD	EW-12 12/05/94 FD	EW-12 06/21/95 FD	EW-12 10/26/95 FD	EW-12 12/18/95 FD	EW-12 04/08/96 FD
DATE ANALYZED	12/20/93	3/25/94	6/15/94	6/15/94	9/21/94	12/07/94	6/30/95	11/03/95	12/30/95	4/19/96
1,1,1-TRICHLOROETHANE	<1.0	0.8	1.3	1.4	0.5	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0							<2.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,1-DICHLOROETHANE	2.9	3.1	2.1	2.1	2.1	1	1.9	1.7	1.7	1.1
1,1-DICHLOROETHENE	1.5	2.2	2.2	2.2	2.3	2.1	1	1.2	1.5	1.4
1,2-DICHLOROBENZENE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<1.0	<0.2	0.3	0.3	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHENE (CIS)	9.6	7.3	5.4	5.5	3	1.8	5.7	4.5	3.6	1.8
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<1.0	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROPROPANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,3-DICHLOROBENZENE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	<0.5
ACETONE		<50	<50	<50	<50	<50	<50			
ACETONE/1,1-DCE								<50.0	<50	<50
BENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOFORM	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CARBON TETRACHLORIDE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CHLOROFORM	<1.0	1	1.1	1.1	0.8	0.9	0.8	0.94	1.2	1.2
CHLOROMETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.4	<0.5	1.1	0.63	<0.5
CIS-1,3-DICHLOROPROPENE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
DIBROMOCHLOROMETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<2.0	0.9	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE								<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	3.1	<0.5	<0.5
ORTHO-XYLENE								<0.5	0.69	2
TETRACHLOROETHENE	1.2	1.8	2	2	1.6	0.8	0.9	1.2	1.2	1.1
TOLUENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM		1	1.1	1.1	0.8	0.9	0.8	0.94	1.3	1.4
TOTAL XYLENES	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.73	2.1
TRANS-1,3-DICHLOROPROPENE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5			
TRICHLOROETHENE	8.4	11	16	17	13	13	7.4	8.9	7.6	8.4
TRICHLOROFLUOROMETHANE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0			
VINYL CHLORIDE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5

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Volatile Organic Compounds

COMPOUND NAME	EW-12 06/17/96 FQ	EW-12 09/25/96 FQ	EW-12 12/09/96 FQ	EW-13 03/06/91 FQ	EW-13 03/06/91 FQ	EW-13 06/17/91 FQ	EW-13 09/07/91 FQ	EW-13 12/06/91 FQ	EW-13 03/10/92 FQ	EW-13 06/02/92 FQ
DATE ANALYZED	06/25/96	9/29/96	12/20/96	3/08/91	3/08/91	6/19/91	9/10/91	12/10/91	3/12/92	6/03/92
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.50	0.28	<0.2	<0.2	<0.2	<0.2	<0.2	0.24
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	2.6	3.6	<2.0	7.2	6.9	<0.2	2.5	5.2	2.9	7.3
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.94	0.71	0.8	<0.2	<0.2	<0.2	0.65	0.58	<0.2	0.33
1,1-DICHLOROETHENE	2	1.8	1.9	4.5	2.2	1.5	3.9	3.1	3.4	3.4
1,2-DICHLOROBENZENE	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	1.2	0.82	0.71	0.28	0.38	0.31	1.1	1.1	<0.2	0.56
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE										
ACETONE/1,1-DCE	<50	<50	<50							
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.5	<0.5	<0.50	2.8	3.2	10	1.6	1.4	<0.2	<0.2
BROMOFORM	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.50	<0.5	<0.5	<0.5	<0.5	0.22	<0.5	<0.5
CHLOROETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	1.3	1.5	1.5	4	4.3	22	6.2	7.4	0.96	1.5
CHLOROMETHANE	0.82	<0.5	0.65	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<0.5	<0.5	<0.5							
METHYLENE CHLORIDE	<0.5	<0.5	0.58	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE	<0.5	<0.5	<0.5							
TETRACHLOROETHENE	1.2	0.95	0.72	<0.2	<0.2	<0.2	<0.2	0.26	<0.2	0.24
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.51	<0.5	<0.5
TOTAL THM	1.4	1.7	1.8							
TOTAL XYLENES	<0.5	<0.5	<0.5						<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	9.7	9.5	9.2	37	38	33	56	56	25	25
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	<0.5	<0.5	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

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COMPOUND NAME	EW-13 09/08/92 FG	EW-13 12/02/92 FG	EW-13 03/02/93 FB	EW-13 03/02/92 FG	EW-13 09/08/93 FG	EW-13 12/08/93 FB	EW-13 12/08/93 FG	EW-13 03/14/94 FG	EW-13 06/08/94 FG	EW-13 09/12/94 FG
DATE ANALYZED	9/16/92	12/16/92	3/07/93	3/07/93	9/22/93	12/20/93	12/20/93	3/27/94	6/15/94	9/21/94
1,1,1-TRICHLOROETHANE	0.32	<5	<1.0	<1.0	<1.0	<1.0	<1.0	0.6	1.1	0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	7.7	1.8	3.8	4	7.6	3.9	1.3			
1,1,2-TRICHLOROETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.59	1.4	<1.0	<1.0	1.1	1.1	<1.0	1.1	0.8	1.4
1,1-DICHLOROETHENE	3.1	4.5	2.1	2.3	5.3	5	4.2	3.4	5.5	4.5
1,2-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.2	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	0.3	<0.2
1,2-DICHLOROETHENE (CIS)	1.2	1	<1.0	<1.0	1	1.6	1.3	1.1	1	0.8
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
ACETONE								<50	<50	<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CHLOROFORM	1.4	2.3	<1.0	<1.0	1.7	1.6	2.2	1.8	1.3	0.9
CHLOROMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<5	<2.0	<2.0	<2.0	3.8	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	0.3	<5	<1.0	<1.0	<1.0	<1.0	<1.0	0.4	0.5	0.6
TOLUENE	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
TOTAL THM								1.8	1.3	0.9
TOTAL XYLENES	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
TRICHLOROETHENE	36	86	19	19	57	36	32	39	67	42
TRICHLOROFLUOROMETHANE	0.41	<5	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE								<2.0	3.6	4.6
VINYL CHLORIDE	<0.2	<10	<2.0	<2.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2

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COMPOUND NAME	EW-13 12/05/94 FD	EW-13 06/21/95 FD	EW-13 04/08/96 FD	EW-14 03/05/91 FD	EW-14 06/17/91 FD	EW-14 09/10/91 FD	EW-14 12/09/91 FD	EW-14 03/10/92 FD	EW-14 03/10/92 FD	EW-14 04/01/92 FD
DATE ANALYZED	12/07/94	6/30/95	4/19/96	3/07/91	6/19/91	9/12/91	12/10/91	3/17/92	3/12/92	4/07/92
1,1,1-TRICHLOROETHANE	1	<0.5	<0.5	3.5	2	2.1	1.7	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE			3.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.9	1.1	0.79	4.6	11	5.3	5.4	1.2	1.2	1.3
1,1-DICHLOROETHENE	6.7	5	4.6	14	13	7.2	8.5	<0.2	<0.2	0.9
1,2-DICHLOROBENZENE	<1.0	<0.5	<0.5	1.3	2.3	<1.0	1.2	4.6	4.7	4.1
1,2-DICHLOROETHANE	<0.4	<0.5	<0.5	0.28	1.9	0.86	0.67	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	0.5	0.9	0.61	5.9	30	11	12	10	11	7.7
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<1.0	<0.5	<0.5	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<1.0	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE	<100	<50								
ACETONE/1,1-DCE			<50							
BENZENE	<1.0	<0.5	<0.5	<0.5	93	0.76	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.4	<0.5	0.58	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<1.0	<0.5	<0.5	0.74	1.2	<0.5	0.75	1.5	1.5	1.3
CHLOROETHANE	<0.4	<0.5	<0.5	<0.2	0.67	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	1	1.6	1.2	0.99	0.34	1.3	0.91	0.81	0.68	0.3
CHLOROMETHANE	<0.8	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.4	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.8	<0.5	<0.5	<0.2	1.5	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE			<0.5							
METHYLENE CHLORIDE	<4.0	<2.0	<0.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE			<0.5							
TETRACHLOROETHENE	<0.4	<0.5	<0.5	0.58	2.1	1	2.3	<0.2	<0.2	0.2
TOLUENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	0.56	<0.5	<0.5	<0.5
TOTAL THM	1	1.6	1.8							
TOTAL XYLENES	<1.0	<0.5	<0.5					<1.0	<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE	<0.4	<0.5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	58	44	33	29	23	20	25	1.5	1.2	2.2
TRICHLOROFLUOROMETHANE	<1.0	<0.5	<0.5	0.34	0.28	<0.2	<0.2	<0.2	<0.2	0.2
TRICHLOROTRIFLUOROETHANE	<4.0	6								
VINYL CHLORIDE	<0.4	<0.5	<0.5	8.9	6.3	2.1	2	15	14	12

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-19 06/02/92 FD	EW-14 06/02/92 FO	EW-14 09/08/92 FO	EW-14 12/02/92 FO	EW-14 03/02/93 FD	EW-14 03/02/93 FO	EW-14 09/08/93 FO	EW-14 12/09/93 FO	EW-14 03/16/94 FO	EW-14 06/10/94 FO
DATE ANALYZED	6/04/92	6/04/92	9/17/92	12/16/92	3/08/93	3/08/93	9/22/93	12/20/93	3/27/94	7/05/94
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	1.2	2.2	1.9
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	0.61	<5	<1.0	<1.0	<1.0	1.6		
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
1,1-DICHLOROETHANE	2.2	2	1.8	17	4.3	4.6	9.6	8.1	14	9.9
1,1-DICHLOROETHENE	1	0.96	1.1	4.5	1.7	1.6	3.7	3.9	5	3
1,2-DICHLOROBENZENE	3.5	3.3	7.3	1.9	8	8.5	3.7	5	2.9	0.8
1,2-DICHLOROETHANE	<0.2	0.31	<0.2	<5	<1.0	<1.0	<1.0	<1.0	0.7	0.5
1,2-DICHLOROETHENE (CIS)	6.3	5.9	24	49	61	55	47	46	47	31
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	0.3	<5	<1.0	<1.0	<1.0	<1.0	0.7	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<2.0	1.2	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5
ACETONE									<50	<50
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	0.62	<5	1.2	1.1	<1.0	<1.0	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	0.5	<0.2
CHLOROBENZENE	1.2	1.2	1.7	<5	2.9	2.7	<1.0	2.3	1.7	0.7
CHLOROETHANE	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	0.4
CHLOROFORM	0.25	0.22	0.41	<5	<1.0	<1.0	<1.0	<1.0	0.9	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<10	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<5	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2
DICHLORODIFLUOROMETHANE	0.73	0.72	1.4	<10	<2.0	<2.0	<2.0	<2.0	<0.2	0.6
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<5	<2.0	<2.0	<2.0	8.1	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	0.36	0.35	0.41	<5	<1.0	<1.0	2	3.1	4.1	3.1
TOLUENE	<0.5	<0.5	<0.5	<5	1.1	<1.0	<1.0	<1.0	<0.5	<0.5
TOTAL THM									0.9	<0.2
TOTAL XYLENES	<1.0	<1.0	<1.0	<5	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<5	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2
TRICHLOROETHENE	2.2	2.2	2.9	17	4.2	4.5	18	17	28	24
TRICHLOROFLUOROMETHANE	0.6	0.61	0.73	<5	<2.0	<2.0	<2.0	<2.0	0.8	<0.2
TRICHLOROTRIFLUOROETHANE									<2.0	<2.0
VINYL CHLORIDE	15	14	39	<10	38	38	24	20	7.5	3

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Volatile Organic Compounds

COMPOUND NAME	EW-14 09/14/94 FQ	EW-14 12/08/94 FD	EW-14 12/08/94 FQ	EW-14 06/21/95 FQ	EW-14 10/26/95 FQ	EW-14 12/18/95 FQ	EW-14 04/08/96 FQ	EW-14 06/17/96 FQ	EW-14 09/25/96 FQ	EW-14 12/09/96 FQ
DATE ANALYZED	9/20/94	12/15/94	12/15/94	6/30/95	11/03/95	12/30/95	4/18/96	06/25/96	9/29/96	12/20/96
1,1,1-TRICHLOROETHANE	1.7	0.9	0.8	1	0.83	0.9	0.62	<0.5	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE					<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,1-DICHLOROETHANE	7.1	4.8	4.8	8.3	8	7.9	5.9	5.3	4.6	5.4
1,1-DICHLOROETHENE	3	2.4	2.1	1.3	1.8	1.9	1.5	1.5	1.2	1.3
1,2-DICHLOROBENZENE	0.8	0.5	<0.5	1	0.57	<0.5	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROETHANE	1.1	0.4	0.4	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	23	15	14	24	19	18	12	10	8.6	7.6
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	<0.5	N/A	N/A	N/A
ACETONE	<50	<50	<50	<50						
ACETONE/1,1-DCE					<50.0	<50	<50	<50	<50	<50
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
BROMOFORM	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
BROMOMETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CHLOROBENZENE	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CHLOROETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CHLOROFORM	<0.2	0.7	0.8	0.6	0.89	0.8	0.93	0.66	<0.5	<0.50
CHLOROMETHANE	<0.2	<0.4	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<0.2	<0.4	<0.4	<0.5	<0.5	0.55	<0.5	<0.5	<0.5	0.59
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	1.3	<0.5	<0.5	<0.5	0.84	<0.50
ORTHO-XYLENE					<0.5	<0.5	0.68	<0.5	<0.5	<0.5
TETRACHLOROETHENE	2.8	2.4	1.8	0.8	1.5	1.5	1.6	1.5	1.6	1.3
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.2	0.7	0.8	0.6	0.89	0.8	0.93	0.66	<0.5	0.51
TOTAL XYLENES	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.68	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.5						
TRICHLOROETHENE	20	13	12	15	16	15	14	12	9.1	8.1
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0	<2.0	<2.0						
VINYL CHLORIDE	0.8	1	0.8	7	2.3	2.6	1.1	0.87	0.53	0.99

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COMPOUND NAME	EW-15 12/15/93 FO	EW-15 03/18/94 FO	EW-15 06/13/94 FD	EW-15 06/13/94 FO	EW-15 09/19/94 FD	EW-15 09/19/94 FO	EW-15 12/06/94 FD	EW-15 12/06/94 FO	EW-15 06/28/95 FO	EW-15 12/21/95 FO
DATE ANALYZED	12/26/93	3/30/94	6/23/94	6/23/94	9/23/94	9/23/94	12/08/94	12/08/94	7/12/95	01/01/96
1,1,1-TRICHLOROETHANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
1,1,2,2-TETRACHLOROETHANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0									<20.0
1,1,2-TRICHLOROETHANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
1,1-DICHLOROETHANE	2.2	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	2.2	<5.0
1,1-DICHLOROETHENE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	2.7	<5.0
1,2-DICHLOROBENZENE	95	120	72	84	76	66	48	57	120	88
1,2-DICHLOROETHANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
1,2-DICHLOROETHENE (CIS)	1100	910	730	820	550	570	480	520	270	580
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	14	16	7	7	4	<5.0	<5.0	<5.0	14	13
1,2-DICHLOROPROPANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
1,3-DICHLOROBENZENE	<2.0	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	0.8	<5.0
1,4-DICHLOROBENZENE	5	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	5.8	5.5
2-CHLOROETHYL VINYL ETHER	<2.0	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	0.6	N/A
ACETONE		<1250	<1000	<1000	<1000	<1250	<1250	<1250	<50	
ACETONE/1,1-DCE										<500
BENZENE	2	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	1.4	<5.0
BROMODICHLOROMETHANE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
BROMOFORM	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
BROMOMETHANE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
CARBON TETRACHLORIDE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
CHLOROBENZENE	22	29	10	10	11	<12.5	<12.5	<12.5	37	39
CHLOROETHANE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
CHLOROFORM	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
CHLOROMETHANE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<10.0	<10.0	<0.5	<5.0
CIS-1,3-DICHLOROPROPENE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
DIBROMOCHLOROMETHANE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
DICHLORODIFLUOROMETHANE	<2.0	<5.0	<4.0	<4.0	<4.0	<5.0	<10.0	<10.0	<0.5	<5.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<1.0	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	<0.5	<5.0
META- & PARA-XYLENE										<5.0
METHYLENE CHLORIDE	<2.0	<50.0	<40.0	<40.0	<40.0	<50.0	<50.0	<50.0	<2.0	<5.0
ORTHO-XYLENE										<5.0
TETRACHLOROETHENE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
TOLUENE	<1.0	23	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	<0.5	<5.0
TOTAL THM		<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	<5.0
TOTAL XYLENES	<2.0	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	<0.5	<5.0
TRANS-1,3-DICHLOROPROPENE	<1.0	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<0.5	
TRICHLOROETHENE	3.2	<5.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	2.7	<5.0
TRICHLOROFLUOROMETHANE	<2.0	<12.5	<10.0	<10.0	<10.0	<12.5	<12.5	<12.5	<0.5	<5.0
TRICHLOROTRIFLUOROETHANE		<50.0	<40.0	<40.0	<40.0	<50.0	<50.0	<50.0	<2.0	
VINYL CHLORIDE	1700	800	440	460	500	520	340	390	750	710

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COMPOUND NAME	EW-15 06/26/96 FD	EW-15 12/12/96 FD	EW-16 12/15/93 FD	EW-16 03/21/94 FD	EW-16 06/08/94 FD	EW-16 09/13/94 FD	EW-16 12/07/94 FD	EW-16 06/21/95 FD	EW-16 12/09/96 FD
DATE ANALYZED	07/03/96	12/22/96	12/27/93	4/01/94*	6/16/94	9/20/94	12/09/94	6/30/95	12/20/96
1,1,1-TRICHLOROETHANE	<10.0	0.68	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<40.0	<2.0	<1.0						<2.0
1,1,2-TRICHLOROETHANE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,1-DICHLOROETHANE	<10.0	2.1	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,1-DICHLOROETHENE	<10.0	1.7	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,2-DICHLOROBENZENE	62	55	<2.0	<0.5	<1.0	1.2	<1.0	0.5	<0.50
1,2-DICHLOROETHANE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	380	230	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<10.0	7.8	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,2-DICHLOROPROPANE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
1,3-DICHLOROBENZENE	<10.0	0.55	<2.0	0.8	3	3.5	3.1	1.1	1.6
1,4-DICHLOROBENZENE	<10.0	3.3	6.5	2.3	5	5.8	10	3.7	4.8
2-CHLOROETHYL VINYL ETHER	N/A	N/A	<2.0	<0.5	<1.0	<0.5	<1.0	<0.5	N/A
ACETONE				<50	<100	<50	<100	<50	
ACETONE/1,1-DCE	<1000	<50							<50
BENZENE	<10.0	1	<1.0	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5
BROMODICHLOROMETHANE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
BROMOFORM	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
BROMOMETHANE	<10.0	<0.50	<2.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
CARBON TETRACHLORIDE	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
CHLOROBENZENE	21	18	33	46	67	34	43	24	21
CHLOROETHANE	<10.0	1.7	<2.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
CHLOROFORM	<10.0	<0.50	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
CHLOROMETHANE	<10.0	<0.50	<2.0	<0.2	<0.4	<0.2	<0.8	<0.5	0.76
CIS-1,3-DICHLOROPROPENE	<10.0	<0.50	<2.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
DIBROMOCHLOROMETHANE	<10.0	<0.50	<2.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<10.0	0.94	<2.0	<0.2	<0.4	<0.2	<0.8	<0.5	<0.50
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<10.0	<0.5	<1.0	<0.5	<1.0	25	<1.0	<0.5	<0.5
META- & PARA-XYLENE	<10.0	<0.5							<0.5
METHYLENE CHLORIDE	17	2.8	2.8	<2.0	<4.0	<2.0	<4.0	<2.0	0.88
ORTHO-XYLENE	<10.0	<0.5							<0.5
TETRACHLOROETHENE	<10.0	<0.5	<1.0	<0.2	0.8	<0.2	<0.4	<0.5	<0.5
TOLUENE	<10.0	<0.5	<1.0	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5
TOTAL THM	<10.0	<0.50		<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
TOTAL XYLENES	<10.0	<0.5	<2.0	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE			<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	
TRICHLOROETHENE	<10.0	2.7	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50
TRICHLOROFLUOROMETHANE	<10.0	3.5	<2.0	<0.5	<1.0	<0.5	<1.0	<0.5	<0.50
TRICHLOROTRIFLUOROETHANE				<2.0	<4.0	<2.0	<4.0	<2.0	
VINYL CHLORIDE	390	220	<1.0	<0.2	<0.4	<0.2	<0.4	<0.5	<0.50

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Volatile Organic Compounds

COMPOUND NAME	EW-17 12/16/93 FD	EW-17 12/16/93 FQ	EW-17 03/21/94 FO	EW-17 06/08/94 FO	EW-17 09/12/94 FO	EW-17 12/05/94 FO	EW-17 06/21/95 FD	EW-17 06/21/95 FQ	EW-17 10/26/95 FO	EW-17 12/19/95 FO
DATE ANALYZED	12/27/93	12/27/93	4/01/94*	6/15/94	9/21/94	12/07/94	6/30/95	6/30/95	11/03/95	12/30/95
1,1,1-TRICHLOROETHANE	<1.0	<1.0	<0.2	0.9	<0.2	0.4	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0	<1.0							<2.0	<2.0
1,1,2-TRICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,1-DICHLOROETHANE	1.6	1.2	0.4	0.6	1.4	0.6	1	0.9	0.62	0.94
1,1-DICHLOROETHENE	5.1	4.2	2.6	3	1.7	2.4	1.6	1.6	1.5	2.7
1,2-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHENE (CIS)	2.9	1.9	0.6	0.9	0.7	0.6	1	0.9	0.55	0.78
1,2-DICHLOROETHENE (TRANS)	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROPROPANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
1,3-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/A
ACETONE			<50	<50	<50	<50	<50	<50		
ACETONE/1,1-DCE									<50.0	<50
BENZENE	3.6	6.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOFORM	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CARBON TETRACHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CHLOROFORM	<1.0	<1.0	<0.2	0.4	0.2	0.4	0.8	0.7	<0.5	0.8
CHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5
CIS-1,3-DICHLOROPROPENE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
DIBROMOCHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.5
ETHYLBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE									<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.8	<0.5
ORTHO-XYLENE									<0.5	<0.5
TETRACHLOROETHENE	3.1	1.7	1	2.8	2	1.8	2.1	2.1	2	2.1
TOLUENE	<1.0	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM			<0.2	0.4	0.2	0.4	0.8	0.7	<0.5	0.91
TOTAL XYLENES	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5		
TRICHLOROETHENE	11	9.5	7.9	10	7.1	6.9	5.5	5.5	5.8	5.9
TRICHLOROFLUOROMETHANE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
VINYL CHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	0.76	<0.5

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COMPOUND NAME	EW-17 04/08/96 FQ	EW-17 06/17/96 FQ	EW-17 09/26/96 FQ	EW-17 12/09/96 FQ	EW-18 12/15/93 FQ	EW-18 03/18/94 FQ	EW-18 03/18/94 FQ	EW-18 06/14/94 FQ	EW-18 09/14/94 FQ	EW-18 12/12/94 FQ
DATE ANALYZED	4/19/96	06/25/96	9/28/96	12/20/96	12/26/93	3/29/94	3/30/94	6/23/94	9/21/94	12/19/94
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<2.0	<2.0	<2.0	<1.0					
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,1-DICHLOROETHANE	0.59	<0.5	0.6	0.58	2.4	2	<2.0	<1.0	<2.0	<1.0
1,1-DICHLOROETHENE	1.3	1.3	1.4	0.93	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,2-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.50	68	52	48	23	8.2	9.5
1,2-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,2-DICHLOROETHENE (CIS)	<0.5	<0.5	<0.5	<0.50	330	210	200	120	73	66
1,2-DICHLOROETHENE (TRANS)	<0.5	<0.5	<0.5	<0.50	7.7	4	4	2.5	<2.0	<1.0
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.50	<2.0	<2.5	<5.0	<2.5	<5.0	<2.5
1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.50	7.9	8	8	3.4	<5.0	<2.5
2-CHLOROETHYL VINYL ETHER	<0.5	N/A	N/A	N/A	<2.0	<2.5	<5.0	<2.5	<5.0	<2.5
ACETONE						<250	<500	<250	<500	<250
ACETONE/1,1-DCE	<50	<50	<50	<50						
BENZENE	<0.5	<0.5	<0.5	<0.5	3.6	<2.5	<5.0	<2.5	<5.0	<2.5
BROMODICHLOROMETHANE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
BROMOFORM	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
BROMOMETHANE	<0.5	<0.5	<0.5	<0.50	<2.0	<1.0	<2.0	<1.0	<2.0	<1.0
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.50	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.50	55	40	40	19	5.8	6.6
CHLOROETHANE	<0.5	<0.5	<0.5	<0.50	<2.0	<1.0	<2.0	<1.0	<2.0	<1.0
CHLOROFORM	0.77	0.83	0.94	0.91	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
CHLOROMETHANE	<0.5	0.95	<0.5	0.63	<2.0	<1.0	<2.0	<1.0	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.50	<2.0	<1.0	<2.0	<1.0	<2.0	<1.0
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.5	<0.50	<2.0	<1.0	<2.0	<1.0	<2.0	<1.0
DICHLORODIFLUOROMETHANE	<0.5	<0.5	<0.5	<0.50	<2.0	<1.0	<2.0	<1.0	<2.0	<2.0
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<1.0	<2.5	<5.0	<2.5	<5.0	<2.5
META- & PARA-XYLENE	<0.5	<0.5	<0.5	<0.5						
METHYLENE CHLORIDE	<0.5	<0.5	<0.5	<0.50	<2.0	<10.0	<20.0	<10.0	<20.0	<10.0
ORTHO-XYLENE	0.62	<0.5	<0.5	<0.5						
TETRACHLOROETHENE	1.5	1.3	1.3	1.1	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<1.0	<2.5	<5.0	<2.5	<5.0	<2.5
TOTAL THM	0.87	0.88	0.94	0.95		<1.0	<2.0	<1.0	<2.0	<1.0
TOTAL XYLENES	0.72	<0.5	<0.5	<0.5	<2.0	<2.5	<5.0	<2.5	<5.0	<2.5
TRANS-1,3-DICHLOROPROPENE					<1.0	<1.0	<2.0	<1.0	<2.0	<1.0
TRICHLOROETHENE	4.4	4.2	4.3	3.5	1.2	2	2	<1.0	<2.0	1.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.50	<2.0	6	<5.0	<2.5	<5.0	<2.5
TRICHLOROTRIFLUOROETHANE						<10.0	<20.0	<10.0	<20.0	<10.0
VINYL CHLORIDE	<0.5	<0.5	<0.5	<0.50	1100	280	270	110	79	33

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COMPOUND NAME	EW-18 06/28/95 FO	EW-18 10/26/95 FO	EW-18 12/19/95 FD	EW-18 12/19/95 FO	EW-18 04/08/96 FO	EW-18 09/26/96 FO	EW-18 12/09/96 FO	EW-19 06/20/96 FD	EW-19 06/20/96 FO	EW-19 09/25/96 FO
DATE ANALYZED	7/07/95	11/04/95	12/31/95	12/31/95	4/18/96	9/28/96	12/20/96	07/04/96	07/02/96	9/29/96
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<2.0	<2.0	<10.0	<10.0	<2.0	<2.0	<4.0	1.3	<4.0
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,1-DICHLOROETHANE	1	0.82	0.97	<2.5	<2.5	0.56	0.63	<1.0	<0.5	<1.0
1,1-DICHLOROETHENE	0.6	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,2-DICHLOROBENZENE	52	29	25	26	11	4.5	3.3	1.7	1.8	1.4
1,2-DICHLOROETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,2-DICHLOROETHENE (CIS)	80	58	47	54	25	15	12	58	56	58
1,2-DICHLOROETHENE (TRANS)	3.1	2.5	2.3	2.5	<2.5	<0.5	<0.50	2.9	2.7	<1.0
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,3-DICHLOROBENZENE	0.6	0.52	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
1,4-DICHLOROBENZENE	5.4	4.5	4.3	4.2	<2.5	1.3	1.1	<1.0	<0.5	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	N/A	N/A	<2.5	N/A	N/A	N/A	N/A	N/A
ACETONE	<50									
ACETONE/1,1-DCE		<50.0	<50	<250	<250	<50	<50	<100	<50	<100
BENZENE	1.8	2.3	2.3	2.7	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
BROMODICHLOROMETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
BROMOFORM	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
BROMOMETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
CHLOROBENZENE	45	46	35	39	18	3.1	1.7	<1.0	0.86	<1.0
CHLOROETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
CHLOROFORM	<0.5	2.1	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
CHLOROMETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	0.53	<1.0	0.74	<1.0
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
DIBROMOCHLOROMETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
DICHLORODIFLUOROMETHANE	<0.5	3.2	3.9	2.5	<2.5	2	2.6	<1.0	<0.5	<1.0
ETHYLBENZENE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
META- & PARA-XYLENE		0.58	<0.5	<2.5	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
METHYLENE CHLORIDE	<2.0	2.4	0.9	<2.5	<2.5	<0.5	0.53	<1.0	<0.5	1.4
ORTHO-XYLENE		<0.5	<0.5	<2.5	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.5	<1.0	0.61	<1.0
TOLUENE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
TOTAL THM	<0.5	2.1	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	<0.5	<1.0
TOTAL XYLENES	0.6	0.92	0.52	<2.5	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0
TRANS-1,3-DICHLOROPROPENE	<0.5									
TRICHLOROETHENE	0.8	0.75	0.7	<2.5	<2.5	0.82	0.78	25	25	24
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<2.5	<2.5	<0.5	<0.50	<1.0	0.68	<1.0
TRICHLOROTRIFLUOROETHANE	<2.0									
VINYL CHLORIDE	220	130	140	140	53	23	17	12	10	9.1

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Volatile Organic Compounds

COMPOUND NAME	EW-19 12/10/96 FO	EW-22 06/22/95 FD	EW-22 06/22/95 FO	EW-22 10/27/95 FD	EW-22 10/27/95 FO	EW-22 12/18/95 FD	EW-22 12/18/95 FO	EW-22 04/09/96 FD	EW-22 04/09/96 FO	EW-22 06/21/96 FO
DATE ANALYZED	12/21/96	7/01/95	7/01/95	11/04/95	11/04/95	12/30/95	12/30/95	4/20/96	4/19/96	07/01/96
1,1,1-TRICHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-DICHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-DICHLOROETHENE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROBENZENE	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHENE (CIS)	38	1.2	1.3	2.8	2.7	1.3	1.3	2.1	2.1	4.8
1,2-DICHLOROETHENE (TRANS)	0.95	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROPROPANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-DICHLOROBENZENE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	N/A	<0.5	<0.5	<0.5	<0.5	N/A	N/A	<0.5	<0.5	N/A
ACETONE		<50	<50							
ACETONE/1,1-DCE	<50			<50.0	<50.0	<50	<50	<50	<50	<50
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMOFORM	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CARBON TETRACHLORIDE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	0.67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROFORM	0.56	4.3	4.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.52
CIS-1,3-DICHLOROPROPENE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
DIBROMOCHLOROMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	2.4	<2.0	<2.0	2.1	1.4	<0.5	<0.5	<0.5	<0.5	<0.5
ORTHO-XYLENE	<0.5			<0.5	<0.5	0.63	<0.5	1.1	1.3	<0.5
TETRACHLOROETHENE	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOLUENE	<0.5	3.3	3.1	<0.5	<0.5	<0.5	<0.5	0.5	0.55	<0.5
TOTAL THM	0.68	4.3	4.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL XYLENES	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	1.1	1.3	<0.5
TRANS-1,3-DICHLOROPROPENE		<0.5	<0.5							
TRICHLOROETHENE	21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROFLUOROMETHANE	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE		<2.0	<2.0							
VINYL CHLORIDE	7.9	3	3.7	7.1	7.2	4.3	3.9	5.9	6.2	13

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COMPOUND NAME	EW-22 09/24/96 FO	EW-22 12/11/96 FO	EW-22 12/11/96 FO	EW-PZ1 12/13/93 FO	EW-PZ1 03/18/94 FO	EW-PZ1 06/14/94 FO	EW-PZ1 09/16/94 FO	EW-PZ1 12/09/94 FO	EW-PZ1 06/28/95 FO	EW-PZ1 12/21/95 FO
DATE ANALYZED	9/29/96	12/21/96	12/21/96	12/26/93	3/29/94	6/24/94	9/22/94	12/16/94	7/12/95	01/03/96
1,1,1-TRICHLOROETHANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<2.0	<2.0	6.7						<20.0
1,1,2-TRICHLOROETHANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
1,1-DICHLOROETHANE	<0.5	<0.50	<0.50	7.6	<40	5.2	<50	<40	<5.0	<5.0
1,1-DICHLOROETHENE	<0.5	<0.50	<0.50	7.6	<40	13	<50	<40	6	7.7
1,2-DICHLOROBENZENE	0.8	<0.50	<0.50	430	590	140	<125	<100	190	140
1,2-DICHLOROETHANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
1,2-DICHLOROETHENE (CIS)	10	7.9	7.9	4100	8300	3500	2800	2300	2000	2700
1,2-DICHLOROETHENE (TRANS)	<0.5	<0.50	<0.50	45	100	29	<50	<40	31	32
1,2-DICHLOROPROPANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
1,3-DICHLOROBENZENE	<0.5	<0.50	<0.50	3.7	<100	<2.5	<125	<100	<5.0	<5.0
1,4-DICHLOROBENZENE	<0.5	<0.50	<0.50	18	100	5.2	<125	<100	9	7.3
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	<2.0	<100	<2.5	<125	<100	<5.0	N/A
ACETONE					<10000	<250	<12500	<10000	<500	
ACETONE/1,1-DCE	<50	<50	<50							<500
BENZENE	<0.5	<0.5	<0.5	7.8	<100	<2.5	<125	<100	<5.0	<5.0
BROMODICHLOROMETHANE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
BROMOFORM	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
BROMOMETHANE	<0.5	<0.50	<0.50	<2.0	<40	<1.0	<50	<40	<5.0	<5.0
CARBON TETRACHLORIDE	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
CHLOROBENZENE	<0.5	<0.50	<0.50	97	<100	20	<125	<100	50	32
CHLOROETHANE	<0.5	<0.50	<0.50	<2.0	<40	<1.0	<50	<40	<5.0	<5.0
CHLOROFORM	<0.5	<0.50	<0.50	<1.0	<40	<1.0	<50	<40	<5.0	<5.0
CHLOROMETHANE	<0.5	<0.50	<0.50	<2.0	<40	<1.0	<50	<80	<5.0	<5.0
CIS-1,3-DICHLOROPROPENE	<0.5	<0.50	<0.50	<2.0	<40	<1.0	<50	<40	<5.0	<5.0
DIBROMOCHLOROMETHANE	<0.5	<0.50	<0.50	<2.0	<40	<1.0	<50	<40	<5.0	<5.0
DICHLORODIFLUOROMETHANE	<0.5	<0.50	<0.50	<2.0	<40	4	<50	<80	<5.0	<5.0
ETHYLBENZENE	<0.5	<0.5	<0.5	83	<100	<2.5	<125	<100	9	<5.0
META- & PARA-XYLENE	<0.5	<0.5	<0.5							<5.0
METHYLENE CHLORIDE	0.93	3.5	3.5	6	<400	<10.0	<500	<400	<20.0	<5.0
ORTHO-XYLENE	<0.5	<0.5	<0.5							<5.0
TETRACHLOROETHENE	<0.5	<0.5	<0.5	2	<40	1	<50	<40	<5.0	<5.0
TOLUENE	<0.5	<0.5	<0.5	8	<100	<2.5	<125	<100	<5.0	<5.0
TOTAL THM	<0.5	<0.50	<0.50		<40	<1.0	<50	<40	<5.0	<5.0
TOTAL XYLENES	<0.5	<0.5	<0.5	84	<100	<2.5	<125	<100	6	<5.0
TRANS-1,3-DICHLOROPROPENE				<1.0	<40	<1.0	<50	<40	<5.0	
TRICHLOROETHENE	0.52	0.53	0.51	28	120	59	<50	<40	33	49
TRICHLOROFLUOROMETHANE	<0.5	<0.50	<0.50	<2.0	<100	22	<125	<100	<5.0	<5.0
TRICHLOROTRIFLUOROETHANE					<400	<10.0	<500	<400	<20.0	
VINYL CHLORIDE	33	20	19	8100	4800	1400	980	650	1700	1300

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COMPOUND NAME	EW-PZ1 06/19/96 FG	EW-PZ1 12/13/96 FG	EW-PZ2 12/13/93 FG	EW-PZ2 03/18/94 FG	EW-PZ2 06/14/94 FG	EW-PZ2 06/28/95 FG	EW-PZ2 12/21/95 FG	EW-PZ3 12/13/93 FG	EW-PZ3 03/18/94 FG	EW-PZ3 06/14/94 FG
DATE ANALYZED	07/01/96	12/22/96	12/26/93	3/30/94	6/24/94	7/12/95	01/03/96	12/27/93	3/30/94	6/24/94
1,1,1-TRICHLOROETHANE	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	1.1	<5.0	<20
1,1,2,2-TETRACHLOROETHANE	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<100.0	5.9	<1.0				<20.0	<1.0		
1,1,2-TRICHLOROETHANE	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
1,1-DICHLOROETHANE	<25.0	3.9	2.4	<2.0	0.5	2.1	<5.0	5.3	<5.0	<20
1,1-DICHLOROETHENE	<25.0	5.6	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
1,2-DICHLOROBENZENE	82	80	220	87	24	150	58	670	100	<50
1,2-DICHLOROETHANE	<25.0	0.68	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
1,2-DICHLOROETHENE (CIS)	1700	580	380	34	8.2	200	260	240	44	27
1,2-DICHLOROETHENE (TRANS)	<25.0	25	13	6	0.8	13	7.4	30	11	<20
1,2-DICHLOROPROPANE	<25.0	0.72	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
1,3-DICHLOROBENZENE	<25.0	0.82	2.1	<5.0	<1.0	1.8	<5.0	5.5	<12.5	<50
1,4-DICHLOROBENZENE	<25.0	4.5	12	12	3.8	12	6.2	26	<12.5	<50
2-CHLOROETHYL VINYL ETHER	N/A	N/A	<2.0	<5.0	<1.0	<0.5	N/A	<2.0	<12.5	<50
ACETONE				<500	<100	<50			<1250	<5000
ACETONE/1,1-DCE	<2500	<50					<500			
BENZENE	<25.0	0.88	7.7	<5.0	1	11	5	12	<12.5	<50
BROMODICHLOROMETHANE	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
BROMOFORM	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
BROMOMETHANE	<25.0	<0.50	<2.0	<2.0	<0.4	<0.5	<5.0	<2.0	<5.0	<20
CARBON TETRACHLORIDE	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
CHLOROBENZENE	<25.0	15	150	170	59	180	82	220	70	<50
CHLOROETHANE	<25.0	<0.50	<2.0	4	9	6.2	9.3	2.5	<5.0	<20
CHLOROFORM	<25.0	<0.50	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
CHLOROMETHANE	<25.0	<0.50	<2.0	<2.0	<0.4	<0.5	<5.0	<2.0	<5.0	<20
CIS-1,3-DICHLOROPROPENE	<25.0	<0.50	<2.0	<2.0	<0.4	<0.5	<5.0	<2.0	<5.0	<20
DIBROMOCHLOROMETHANE	<25.0	<0.50	<2.0	<2.0	<0.4	<0.5	<5.0	<2.0	<5.0	<20
DICHLORODIFLUOROMETHANE	<25.0	1.6	<2.0	<2.0	<0.4	<0.5	<5.0	<2.0	<5.0	<20
ETHYLBENZENE	<25.0	<0.5	58	8	<1.0	23	<5.0	6.5	<12.5	<50
META- & PARA-XYLENE	<25.0	<0.5					<5.0			
METHYLENE CHLORIDE	<25.0	3.1	7.3	<20.0	<4.0	<2.0	<5.0	<2.0	<50.0	<200
ORTHO-XYLENE	<25.0	<0.5					<5.0			
TETRACHLOROETHENE	<25.0	1.1	<1.0	<2.0	<0.4	<0.5	<5.0	1.1	<5.0	<20
TOLUENE	<25.0	1	4.2	<5.0	<1.0	1.3	<5.0	7.5	<12.5	<50
TOTAL THM	<25.0	<0.50		<2.0	<0.4	<0.5	<5.0		<5.0	<20
TOTAL XYLENES	<25.0	<0.5	160	7	<1.0	7.2	5.3	20	<12.5	<50
TRANS-1,3-DICHLOROPROPENE			<1.0	<2.0	<0.4	<0.5		<1.0	<5.0	<20
TRICHLOROETHENE	32	28	<1.0	<2.0	<0.4	<0.5	<5.0	<1.0	<5.0	<20
TRICHLOROFLUOROMETHANE	<25.0	6.6	<2.0	<5.0	4.4	<0.5	<5.0	<2.0	<12.5	<50
TRICHLOROTRIFLUOROETHANE				<20.0	<4.0	<2.0			<50.0	<200
VINYL CHLORIDE	680	430	2500	420	82	930	400	10000	1000	360

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COMPOUND NAME	EW-PZ3 09/16/94 FQ	EW-PZ3 12/09/94 FQ	EW-PZ3 06/23/95 FQ	EW-PZ3 06/13/96 FQ	EW-PZ3 12/12/96 FQ	EW-PZ4 12/08/93 FQ	EW-PZ4 03/21/94 FQ	EW-PZ4 06/08/94 FQ	EW-PZ4 09/13/94 FQ	EW-PZ4 12/07/94 FQ
DATE ANALYZED	9/23/94	12/16/94	7/12/95	07/02/96	12/22/96	12/21/93	3/26/94*	6/16/94	9/21/94	12/09/94
1,1,1-TRICHLOROETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				<4.0	<2.0	<1.0				
1,1,2-TRICHLOROETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.5	<2.0	2.4	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	13	12	170	12	6.8	<2.0	<0.5	0.6	1.2	<0.5
1,2-DICHLOROETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	210	220	210	83	87	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (TRANS)	2.3	<2.0	18	1.6	1.4	<1.0	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<5.0	1.4	<1.0	<0.50	2.3	2	3.4	3.9	2.8
1,4-DICHLOROBENZENE	<1.0	<5.0	9.2	1	0.64	7.6	3.8	4.9	6.8	8.2
2-CHLOROETHYL VINYL ETHER	<1.0	<5.0	<0.5	N/A	N/A	<2.0	<0.5	<0.5	<0.5	<0.5
ACETONE	<100	<500	<50				<50	<50	<50	<50
ACETONE/1,1-DCE				<100	<50					
BENZENE	<1.0	<5.0	3.1	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<2.0	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	3.3	<5.0	90	7.8	3.1	40	51	66	58	76
CHLOROETHANE	0.9	<2.0	3.5	<1.0	<0.50	<2.0	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.4	<2.0	<0.5	<1.0	<0.50	<1.0	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.4	<4.0	<0.5	<1.0	<0.50	<2.0	<0.2	<0.2	<0.2	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4	<2.0	<0.5	<1.0	<0.50	<2.0	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.4	<2.0	<0.5	<1.0	<0.50	<2.0	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.4	<4.0	<0.5	2	1.6	<2.0	<0.2	<0.2	<0.2	<0.4
ETHYLBENZENE	<1.0	<5.0	1	<1.0	<0.5	<1.0	<0.5	<0.5	31	<0.5
META- & PARA-XYLENE				<1.0	<0.5					
METHYLENE CHLORIDE	<4.0	<20.0	<2.0	<1.0	4.1	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE				<1.0	<0.5					
TETRACHLOROETHENE	<0.4	<2.0	<0.5	<1.0	<0.5	<1.0	<0.2	<0.2	<0.2	<0.2
TOLUENE	<1.0	<5.0	1.3	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5
TOTAL THM	<0.4	<2.0	<0.5	<1.0	<0.50		<0.2	<0.2	<0.2	<0.2
TOTAL XYLENES	<1.0	<5.0	1.5	<1.0	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.4	<2.0	<0.5			<1.0	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	4.7	13	0.7	4.5	4.2	<1.0	<0.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	2.1	<5.0	<0.5	2.2	1.2	<2.0	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	<4.0	<20.0	<2.0				<2.0	<2.0	<2.0	<2.0
VINYL CHLORIDE	210	100	1400	66	33	<1.0	<0.2	<0.2	<0.2	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-PZ4 12/07/94 FO	EW-PZ4 06/21/95 FO	EW-PZ4 12/09/96 FO	EW-PZ5 12/14/93 FO	EW-PZ5 03/22/94 FO	EW-PZ5 06/09/94 FO	EW-PZ5 09/16/94 FO	EW-PZ5 12/09/94 FO	EW-PZ5 06/27/95 FO	EW-PZ5 12/20/95 FO
DATE ANALYZED	12/09/94	6/30/95	12/20/96	12/27/93	4/01/94	6/21/94	9/23/94	12/16/94	7/11/95	01/01/96
1,1,1-TRICHLOROETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	<1.0	<2.0	<1.0	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE			<2.0	14						<2.0
1,1,2-TRICHLOROETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
1,1-DICHLOROETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	1.1	<2.0	<1.0	0.6	1.1
1,1-DICHLOROETHENE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
1,2-DICHLOROBENZENE	<2.5	0.7	0.58	21	35	22	30	57	16	43
1,2-DICHLOROETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	<1.0	<2.0	<1.0	<0.5	<0.5
1,2-DICHLOROETHENE (CIS)	<1.0	<0.5	<0.50	39	23	21	23	64	1.7	39
1,2-DICHLOROETHENE (TRANS)	<1.0	<0.5	<0.50	<1.0	2	3.4	2.1	4.4	1.9	4.6
1,2-DICHLOROPROPANE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
1,3-DICHLOROBENZENE	<2.5	1.3	2.9	<2.0	<0.5	<1.0	<5.0	<2.5	<0.5	0.8
1,4-DICHLOROBENZENE	6.6	4.3	8.1	<2.0	2	3.9	<5.0	5.8	3.8	5.7
2-CHLOROETHYL VINYL ETHER	<2.5	<0.5	N/A	<2.0	<0.5	<1.0	<5.0	<2.5	<0.5	N/A
ACETONE	<250	<50			<50	<100	<500	<250	<50	
ACETONE/1,1-DCE			<50							<50
BENZENE	<2.5	<0.5	<0.5	<1.0	2.6	2	<5.0	2.8	1.2	2.9
BROMODICHLOROMETHANE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
BROMOFORM	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
BROMOMETHANE	<1.0	<0.5	<0.50	<2.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
CARBON TETRACHLORIDE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
CHLOROBENZENE	64	37	28	16	35	56	46	83	58	62
CHLOROETHANE	<1.0	<0.5	<0.50	<2.0	<0.2	0.9	<2.0	<1.0	1	0.85
CHLOROFORM	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
CHLOROMETHANE	<2.0	<0.5	<0.50	<2.0	<0.2	<0.4	<2.0	<2.0	<0.5	<0.5
CIS-1,3-DICHLOROPROPENE	<1.0	<0.5	<0.50	<2.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
DIBROMOCHLOROMETHANE	<1.0	<0.5	<0.50	<2.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<2.0	<0.5	<0.50	<2.0	<0.2	<0.4	<2.0	<2.0	<0.5	0.82
ETHYLBENZENE	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0	<5.0	<2.5	<0.5	<0.5
META- & PARA-XYLENE			<0.5							<0.5
METHYLENE CHLORIDE	<10.0	<2.0	0.54	14	<2.0	<4.0	<20.0	<10.0	<2.0	<0.5
ORTHO-XYLENE			<0.5							0.79
TETRACHLOROETHENE	<1.0	<0.5	<0.5	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
TOLUENE	<2.5	<0.5	<0.5	<1.0	<0.5	<1.0	<5.0	<2.5	<0.5	0.81
TOTAL THM	<1.0	<0.5	<0.50		<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
TOTAL XYLENES	<2.5	<0.5	<0.5	<2.0	<0.5	<1.0	<5.0	<2.5	<0.5	1.3
TRANS-1,3-DICHLOROPROPENE	<1.0	<0.5		<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	
TRICHLOROETHENE	<1.0	<0.5	<0.50	<1.0	<0.2	<0.4	<2.0	<1.0	<0.5	<0.5
TRICHLOROFLUOROMETHANE	<2.5	<0.5	<0.50	<2.0	<0.5	1.2	<5.0	<2.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	<10.0	<2.0			<2.0	<4.0	<20.0	<10.0	<2.0	
VINYL CHLORIDE	<1.0	<0.5	<0.50	260	130	86	110	210	17	340

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-PZ5 06/18/96 FD	EW-PZ5 06/18/96 FD	EW-PZ5 12/11/96 FD	EW-PZ5 12/11/96 FD	EW-PZ5 12/14/93 FD	EW-PZ5 03/22/94 FD	EW-PZ5 06/09/94 FD	EW-PZ5 09/16/94 FD	EW-PZ5 12/09/94 FD	EW-PZ5 06/27/95 FD
DATE ANALYZED	06/26/96	06/26/96	12/21/96	12/21/96	12/26/93	4/01/94	6/21/94	9/22/94	12/15/94	7/11/95
1,1,1-TRICHLOROETHANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<1.0	<10.0	<5.0	<0.5
1,1,2,2-TETRACHLOROETHANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<20.0	<4.0	<2.0	<2.0	1.2					
1,1,2-TRICHLOROETHANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
1,1-DICHLOROETHANE	<5.0	1.8	1.4	1.4	<1.0	1.4	2.2	<10.0	<5.0	<0.5
1,1-DICHLOROETHENE	<5.0	<1.0	0.52	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
1,2-DICHLOROBENZENE	48	50	41	42	49	110	89	95	80	19
1,2-DICHLOROETHANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<1.0	<10.0	<5.0	<0.5
1,2-DICHLOROETHENE (CIS)	43	45	37	37	26	14	6.6	<10.0	18	3.5
1,2-DICHLOROETHENE (TRANS)	<5.0	5.7	4.2	4.7	5.7	7.7	11	<10.0	<5.0	1.2
1,2-DICHLOROPROPANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
1,3-DICHLOROBENZENE	<5.0	<1.0	0.8	0.84	<2.0	<0.5	1.4	<25.0	<12.5	<0.5
1,4-DICHLOROBENZENE	<5.0	5.8	5.5	5.5	4.7	5.8	9.5	<25.0	<12.5	3
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	N/A	<2.0	<0.5	<1.0	<25.0	<12.5	<0.5
ACETONE						<50	<100	<2500	<1250	<50
ACETONE/1,1-DCE	<500	<100	<50	<50						
BENZENE	<5.0	3.3	2.3	2.3	2.2	5.1	5.1	<25.0	<12.5	0.7
BROMODICHLOROMETHANE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
BROMOFORM	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
BROMOMETHANE	<5.0	<1.0	<0.50	<0.50	<2.0	<0.2	<0.4	<10.0	<5.0	<0.5
CARBON TETRACHLORIDE	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
CHLOROBENZENE	65	70	52	53	41	130	130	90	73	30
CHLOROETHANE	<5.0	<1.0	<0.50	<0.50	<2.0	<0.2	0.4	<10.0	<5.0	0.7
CHLOROFORM	<5.0	<1.0	<0.50	<0.50	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
CHLOROMETHANE	<5.0	<1.0	<0.50	<0.50	<2.0	<0.2	<0.4	<10.0	<10.0	<0.5
CIS-1,3-DICHLOROPROPENE	<5.0	<1.0	<0.50	<0.50	<2.0	<0.2	<0.4	<10.0	<5.0	<0.5
DIBROMOCHLOROMETHANE	<5.0	<1.0	<0.50	<0.50	<2.0	<0.2	<0.4	<10.0	<5.0	<0.5
DICHLORODIFLUOROMETHANE	<5.0	1.6	1.9	1.8	<2.0	<0.2	<0.4	<10.0	<10.0	<0.5
ETHYLBENZENE	<5.0	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	<25.0	<12.5	<0.5
META- & PARA-XYLENE	<5.0	<1.0	<0.5	<0.5						
METHYLENE CHLORIDE	<5.0	1.3	3.3	3.6	6	<2.0	<4.0	<100.0	<50.0	<2.0
ORTHO-XYLENE	<5.0	<1.0	<0.5	<0.5						
TETRACHLOROETHENE	<5.0	<1.0	<0.5	<0.5	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
TOLUENE	<5.0	<1.0	0.6	0.62	<1.0	1.4	1.3	<25.0	<12.5	<0.5
TOTAL THM	<5.0	<1.0	<0.50	<0.50		<0.2	<0.4	<10.0	<5.0	<0.5
TOTAL XYLENES	<5.0	<1.0	<0.5	<0.5	<2.0	3	1.5	<25.0	<12.5	<0.5
TRANS-1,3-DICHLOROPROPENE					<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
TRICHLOROETHENE	<5.0	<1.0	1.3	1.3	<1.0	<0.2	<0.4	<10.0	<5.0	<0.5
TRICHLOROFLUOROMETHANE	6.4	8.8	1.9	2.6	<2.0	2.7	2.7	<25.0	<12.5	<0.5
TRICHLOROTRIFLUOROETHANE						<2.0	<4.0	<100.0	<50.0	<2.0
VINYL CHLORIDE	270	290	210	170	860	800	570	640	470	98

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-PZ6 06/27/95 FO	EW-PZ6 12/20/95 FO	EW-PZ6 06/18/96 FO	EW-PZ6 12/11/96 FO	EW-PZ7 06/19/96 FO	EW-PZ7 09/24/96 FO	EW-PZ7 12/12/96 FO	EW-PZ8 06/19/96 FO	EW-PZ8 09/24/96 FD	EW-PZ8 09/24/96 FO
DATE ANALYZED	7/11/95	01/01/96	06/26/96	12/22/96	07/01/96	9/28/96	12/22/96	07/01/96	9/28/96	9/28/96
1,1,1-TRICHLOROETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,1,2,2-TETRACHLOROETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<4.0	<10.0	<2.0	<40.0	<20.0	<20	<40.0	<20.0	<20.0
1,1,2-TRICHLOROETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,1-DICHLOROETHANE	<0.5	1.5	<2.5	1.4	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,1-DICHLOROETHENE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,2-DICHLOROBENZENE	19	87	75	56	49	130	160	41	7.5	7.4
1,2-DICHLOROETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,2-DICHLOROETHENE (CIS)	3.4	32	10	9.3	47	28	5.8	210	290	270
1,2-DICHLOROETHENE (TRANS)	1.1	11	9.4	6.1	<10.0	11	16	<10.0	<5.0	<5.0
1,2-DICHLOROPROPANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,3-DICHLOROBENZENE	<0.5	1.3	<2.5	1.6	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
1,4-DICHLOROBENZENE	3	8.8	13	10	<10.0	11	13	<10.0	<5.0	<5.0
2-CHLOROETHYL VINYL ETHER	<0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ACETONE	<50									
ACETONE/1,1-DCE		<100	<250	<50	<1000	<500	<500	<1000	<500	<500
BENZENE	0.7	6.6	7.8	4.7	<10.0	13	15	<10.0	<5.0	<5.0
BROMODICHLOROMETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
BROMOFORM	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
BROMOMETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	6.6	<10.0	<5.0	<5.0
CARBON TETRACHLORIDE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
CHLOROBENZENE	31	150	250	140	62	170	220	46	<5.0	<5.0
CHLOROETHANE	0.8	3.3	14	2.4	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
CHLOROFORM	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
CHLOROMETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
CIS-1,3-DICHLOROPROPENE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
DIBROMOCHLOROMETHANE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
DICHLORODIFLUOROMETHANE	<0.5	<1.0	<2.5	1.2	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
ETHYLBENZENE	<0.5	<1.0	<2.5	<0.5	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
META- & PARA-XYLENE		1.2	<2.5	<0.5	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
METHYLENE CHLORIDE	<2.0	<1.0	<2.5	4.4	<10.0	7.7	53	<10.0	9.1	8.6
ORTHO-XYLENE		1.7	<2.5	<0.5	<10.0	5.3	<5.0	<10.0	<5.0	<5.0
TETRACHLOROETHENE	<0.5	<1.0	<2.5	<0.5	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
TOLUENE	<0.5	1.8	<2.5	1	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
TOTAL THM	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	<5.0	<5.0
TOTAL XYLENES	<0.5	2.9	<2.5	<0.5	<10.0	7.2	<5.0	<10.0	<5.0	<5.0
TRANS-1,3-DICHLOROPROPENE	<0.5									
TRICHLOROETHENE	<0.5	<1.0	<2.5	<0.50	<10.0	<5.0	<5.0	<10.0	17	16
TRICHLOROFLUOROMETHANE	<0.5	<1.0	13	2.6	<10.0	5.2	9.8	<10.0	<5.0	<5.0
TRICHLOROTRIFLUOROETHANE	<2.0									
VINYL CHLORIDE	100	870	470	130	300	590	510	260	45	41

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Volatile Organic Compounds

COMPOUND NAME	EW-PZ8 12/12/96 FD	EW-PZ9 06/19/96 FD	EW-PZ9 09/24/96 FD	EW-PZ9 12/13/96 FD	EW-PZ10 06/19/96 FD	EW-PZ10 09/24/96 FD	EW-PZ10 12/13/96 FD
DATE ANALYZED	12/22/96	07/01/96	9/28/96	12/23/96	07/01/96	9/28/96	12/22/96
1,1,1-TRICHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<20	<40.0	<20.0	<20	<2.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,1-DICHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,1-DICHLOROETHENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,2-DICHLOROBENZENE	8.5	46	35	75	0.55	<0.5	<0.50
1,2-DICHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	300	46	29	45	23	21	21
1,2-DICHLOROETHENE (TRANS)	5.5	<10.0	<5.0	11	1.2	0.53	0.99
1,2-DICHLOROPROPANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,3-DICHLOROBENZENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
1,4-DICHLOROBENZENE	<5.0	<10.0	<5.0	7	<0.5	<0.5	<0.50
2-CHLOROETHYL VINYL ETHER	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ACETONE							
ACETONE/1,1-DCE	<500	<1000	<500	<500	<50	<50	<50
BENZENE	<5.0	<10.0	<5.0	6.2	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
BROMOFORM	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
BROMOMETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
CARBON TETRACHLORIDE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
CHLOROBENZENE	<5.0	120	51	110	<0.5	<0.5	<0.50
CHLOROETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
CHLOROFORM	<5.0	<10.0	<5.0	<5.0	0.65	<0.5	0.71
CHLOROMETHANE	<5.0	<10.0	<5.0	<5.0	1.4	<0.5	<0.50
CIS-1,3-DICHLOROPROPENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
DIBROMOCHLOROMETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.50
ETHYLBENZENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	85	<10.0	21	84	<0.5	0.86	4.4
ORTHO-XYLENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
TETRACHLOROETHENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
TOLUENE	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
TOTAL THM	<5.0	<10.0	<5.0	<5.0	0.65	<0.5	0.74
TOTAL XYLENES	<5.0	<10.0	<5.0	<5.0	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE							
TRICHLOROETHENE	21	<10.0	<5.0	<5.0	1.4	1.3	1.4
TRICHLOROFLUOROMETHANE	<5.0	<10.0	<5.0	6	<0.5	<0.5	<0.50
TRICHLOROTRIFLUOROETHANE							
VINYL CHLORIDE	53	340	86	300	1.3	0.54	<0.50

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COMPOUND NAME	EW-E 09/28/88 FD	EW-E 09/28/88 FQ	EW-E 03/30/89 FQ	EW-E 03/30/89 FD	EW-E 06/01/89 FQ	EW-E 09/06/89 FQ	EW-E 12/07/89 FQ	EW-E 03/07/90 FQ	EW-E 06/07/90 FD	EW-E 06/07/90 FQ
DATE ANALYZED	9/30/88	9/30/88	4/06/89	4/06/89	6/08/89	9/13/89	12/14/89	3/17/90	6/12/90	6/12/90
1,1,1-TRICHLOROETHANE	<10	<25	<5	<0.5	<0.5	<5	<5	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE			<10	2	<1	<10	<10	<10	<10	<10
1,1,2-TRICHLOROETHANE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
1,1-DICHLOROETHANE	<10	<25	<5	4.6	5.4	<5	<5	<5	<5	<5
1,1-DICHLOROETHENE	<10	<25	<5	1.4	1.3	<5	<5	<5	<5	<5
1,2-DICHLOROBENZENE	25	27	130	130	100	98	92	70	79	87
1,2-DICHLOROETHANE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
1,2-DICHLOROETHENE (CIS)										
1,2-DICHLOROETHENE (CIS/TRANS)	540	510	210	150	190	220	120	110	100	110
1,2-DICHLOROETHENE (TRANS)										
1,2-DICHLOROPROPANE			<10	<1	<1	<10	<10	<10	<10	<10
1,3-DICHLOROBENZENE	<20	<20	1	1.1	<1	1.3	1.1	<1	1.1	1.2
1,4-DICHLOROBENZENE	<20	20	7.8	7.7	5.8	8.2	6.9	6	5.9	6.1
2-CHLOROETHYL VINYL ETHER	<20	<50								
ACETONE	<50	<125								
ACETONE/1,1-DCE										
BENZENE	<10	<25	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	0.82	0.89
BROMODICHLOROMETHANE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
BROMOFORM	<10	<25	<50	<5	<5	<50	<50	<50	<50	<50
BROMOMETHANE	<20	<50	<50	<5	<5	<50	<50	<50	<50	<50
CARBON TETRACHLORIDE	<10	<25	<5	<0.5	<0.5	<5	<5	<5	<5	<5
CHLOROBENZENE	<10	<25	18	18	22	19	19	21	22	24
CHLOROETHANE	<20	<50	<50	<5	<5	<50	<50	<50	<50	<50
CHLOROFORM	<10	<25	<5	<0.5	<0.5	<5	<5	<5	<5	<5
CHLOROMETHANE	<20	<50	<50	<5	<5	<50	<50	<50	<50	<50
CIS-1,3-DICHLOROPROPENE	<10	<25	<20	<2	<2	<20	<20	<20	<20	<20
DIBROMOCHLOROMETHANE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
DICHLORODIFLUOROMETHANE										
EDB (1,2-DIBROMOETHANE)			<20	<2	<2	<20	<20	<20	<20	<20
ETHYLBENZENE	<10	<25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<50	<125	<50	<5	<5	<50	<50	<50	<50	<50
ORTHO-XYLENE										
TETRACHLOROETHENE	<10	<25	<5	0.5	<0.5	<5	<5	<5	<5	<5
TOLUENE	<10	<25	1.2	1.2	1.3	0.9	1.2	0.86	1.1	1.2
TOTAL THM										
TOTAL XYLENES	<10	<25	3	3.1	2.6	1.2	1.2	<1	1.1	1.2
TRANS-1,3-DICHLOROPROPENE	<10	<25	<10	<1	<1	<10	<10	<10	<10	<10
TRICHLOROETHENE	28	<25	5.9	7.7	7.7	6.5	<5	<5	<5	<5
TRICHLOROFLUOROMETHANE										
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	810	670	1800	2600	3200	1700	1400	1200	1400	1400

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COMPOUND NAME	EW-E 09/18/90 FG	EW-E 12/05/90 FD	EW-E 12/05/90 FG	EW-E 03/07/91 FG	EW-E 06/20/91 FD	EW-E 06/20/91 FG	EW-E 09/13/91 FG	EW-E 12/10/91 FG	EW-E 03/12/92 FG	EW-E 04/01/92 FG
DATE ANALYZED	9/19/90	12/10/90	12/08/90	3/08/91	6/22/91	6/22/91	9/14/91	12/11/91	3/19/92	4/08/92
1,1,1-TRICHLOROETHANE	<0.2	<0.2	0.3	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.83	0.36	0.21	2.4	2.4	<2.0	<2.0	<10	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
1,1-DICHLOROETHANE	1.8	1.3	2	2.2	1.5	<2.0	<2.0	<10	<2.0	<2.0
1,1-DICHLOROETHENE	0.28	0.47	0.4	1.7	1.5	<2.0	<2.0	<10	<2.0	<2.0
1,2-DICHLOROBENZENE	47	50	53	39	42	57	56	71	21	31
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
1,2-DICHLOROETHENE (CIS)	87	230	250	400	1000	740	1200	1400	430	320
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	6.6	9.2	10	9.7	8.8	<2.0	11	<10	7.2	2.1
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
1,3-DICHLOROBENZENE	<1	<1	<1	<1.0	<1.0	<10	<10	<50	<10	<10
1,4-DICHLOROBENZENE	3.2	2.8	3.4	2.3	3	<10	<10	<50	<10	<10
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	0.55	<0.5	<0.5	<5.0	<5.0	<25	<5.0	<5.0
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
CHLOROBENZENE	14	17	18	9.5	9.9	3.7	<5.0	27	6.4	9.5
CHLOROETHANE	8	3.6	3.1	1.9	<0.2	<2.0	<2.0	<10	<2.0	<2.0
CHLOROFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
DICHLORODIFLUOROMETHANE	0.77	2.3	1.6	<0.2	1.9	<2.0	<2.0	<10	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	4.6	<5.0	<5.0	<25	<5.0	7.8
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2	<2	<2	<2.0	<2.0	<20	<20	<100	<20	27
ORTHO-XYLENE										
TETRACHLOROETHENE	0.21	0.34	2.3	0.91	1.1	<2.0	<2.0	<10	<2.0	<2.0
TOLUENE	0.72	1.4	1.5	<0.5	0.8	<5.0	<5.0	<25	6.7	5.2
TOTAL THM										
TOTAL XYLENES									<10	5.2
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<10	<2.0	<2.0
TRICHLOROETHENE	11	10	11	41	21	28	12	10	2.2	<2.0
TRICHLOROFLUOROMETHANE	4.5	12	9.6	4.4	12	3.1	<2.0	<10	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	590	660	550	1100	310	440	710	770	210	180

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COMPOUND NAME	EW-E 06/03/92 FG	EW-E 09/18/92 FG	EW-E 12/07/92 FG	EW-E 03/09/93 FG	EW-E 03/16/94 FG	EW-E 09/19/94 FG	EW-E 12/08/94 FG	EW-E 06/28/95 FG	EW-E 12/20/95 FG	EW-E 06/28/96 FG
DATE ANALYZED	6/05/92	9/23/92	12/20/92	3/10/93	3/29/94	9/23/94	12/16/94	7/12/95	01/02/96	07/04/96
1,1,1-TRICHLOROETHANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
1,1,2,2-TETRACHLOROETHANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<4.0	<10	<100					<20.0	<40.0
1,1,2-TRICHLOROETHANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
1,1-DICHLOROETHANE	<2.0	<4.0	<10	<100	2	<4.0	<5.0	2.8	<5.0	<10.0
1,1-DICHLOROETHENE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	1.5	<5.0	<10.0
1,2-DICHLOROBENZENE	52	200	230	450	110	31	20	200	38	13
1,2-DICHLOROETHANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
1,2-DICHLOROETHENE (CIS)	290	1300	1900	2000	360	560	500	600	460	340
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	5.5	24	35	<100	13	<4.0	<5.0	17	8.3	<10.0
1,2-DICHLOROPROPANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
1,3-DICHLOROBENZENE	<10	<20	<50	<200	<2.5	<10.0	<12.5	1.7	<5.0	<10.0
1,4-DICHLOROBENZENE	<10	<20	<50	<200	10	<10.0	<12.5	11	<5.0	<10.0
2-CHLOROETHYL VINYL ETHER	<2.0	<4.0	<10	<200	<2.5	<10.0	<12.5	<0.5	N/A	N/A
ACETONE					<250	<1000	<1250	<50		
ACETONE/1,1-DCE									<500	<1000
BENZENE	<5.0	<10	<25	<100	<2.5	<10.0	<12.5	3.4	<5.0	<10.0
BROMODICHLOROMETHANE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
BROMOFORM	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
BROMOMETHANE	<2.0	<4.0	<10	<200	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
CARBON TETRACHLORIDE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
CHLOROBENZENE	36	68	55	290	54	<10.0	<12.5	84	44	<10.0
CHLOROETHANE	<2.0	<4.0	<10	<200	<1.0	<4.0	<5.0	2	<5.0	<10.0
CHLOROFORM	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
CHLOROMETHANE	<2.0	<4.0	<10	<200	<1.0	<4.0	<10.0	<0.5	<5.0	<10.0
CIS-1,3-DICHLOROPROPENE	<2.0	<4.0	<10	<200	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
DIBROMOCHLOROMETHANE	<2.0	<4.0	<10	<200	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
DICHLORODIFLUOROMETHANE	<2.0	<4.0	<10	<200	13	<4.0	<10.0	<0.5	<5.0	<10.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<5.0	70	28	330	<2.5	<10.0	<12.5	3.2	<5.0	<10.0
META- & PARA-XYLENE									<5.0	<10.0
METHYLENE CHLORIDE	42	<40	<100	<200	<10.0	<40.0	<50.0	<2.0	<5.0	<10.0
ORTHO-XYLENE									<5.0	<10.0
TETRACHLOROETHENE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
TOLUENE	<5.0	<10	<25	<100	<2.5	<10.0	<12.5	1.4	<5.0	<10.0
TOTAL THM					<1.0	<4.0	<5.0	<0.5	<5.0	<10.0
TOTAL XYLENES	<10	34	<50	210	<2.5	<10.0	<12.5	6.2	<5.0	<10.0
TRANS-1,3-DICHLOROPROPENE	<2.0	<4.0	<10	<100	<1.0	<4.0	<5.0	<0.5		
TRICHLOROETHENE	<2.0	<4.0	<10	<100	4	<4.0	5	3.4	5.5	<10.0
TRICHLOROFLUOROMETHANE	<2.0	10	15	<200	8	<10.0	<12.5	<0.5	<5.0	<10.0
TRICHLOROTRIFLUOROETHANE					<10.0	<40.0	<50.0	<2.0		
VINYL CHLORIDE	370	1500	2100	2700	1100	400	220	1700	390	160

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COMPOUND NAME	EW-E 12/10/96 FQ	EW-NE 09/26/88 FQ	EW-NE 03/29/89 FQ	EW-NE 05/31/89 FQ	EW-NE 09/05/89 FQ	EW-NE 12/05/89 FQ	EW-NE 03/05/90 FQ	EW-NE 06/05/90 FQ	EW-NE 09/11/90 FQ	EW-NE 12/04/90 FQ
DATE ANALYZED	12/21/96	10/14/88	4/01/89	6/05/89	9/13/89	12/13/89	3/13/90	6/07/90	9/17/90	12/10/90
1,1,1-TRICHLOROETHANE	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<0.50	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0		<1	<1	<1	<1	<1	<1	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.50	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2
1,1-DICHLOROETHANE	0.54	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
1,1-DICHLOROETHENE	0.58	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
1,2-DICHLOROBENZENE	9	<20	<1	<1	<1	<1	<1	<1	<1	<1
1,2-DICHLOROETHANE	<0.50	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	200								<0.2	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)		<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
1,2-DICHLOROETHENE (TRANS)	3.3								<0.2	<0.2
1,2-DICHLOROPROPANE	<0.50		<1	<1	<1	<1	<1	<1	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.50	<20	<1	<1	<2.5	<1	<1	<1	<1	<1
1,4-DICHLOROBENZENE	0.84	<20	<1	<1	<1	<1	<1	<1	<1	<1
2-CHLOROETHYL VINYL ETHER	N/A	<10							<0.2	<0.2
ACETONE		<25								
ACETONE/1,1-DCE	<50									
BENZENE	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.50	<5	<1	<1	<1	<1	<1	<1	<0.2	0.32
BROMOFORM	<0.50	<5	<5	<5	<10	<5	<5	<5	<0.2	<0.2
BROMOMETHANE	<0.50	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2
CARBON TETRACHLORIDE	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
CHLOROBENZENE	4.1	<5	<2	<2	<2.5	<2	<5	<2	<0.5	<0.5
CHLOROETHANE	<0.50	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2
CHLOROFORM	<0.50	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.45
CHLOROMETHANE	<0.50	<10	<5	<5	<5	<5	<5	<5	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.50	<5	<2	<2	<2	<2	<2	<2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.50	<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2
DICHLORODIFLUOROMETHANE	1.4								<0.2	<0.2
EDB (1,2-DIBROMOETHANE)			<2	<2	<2	<2	<2	<2		
ETHYLBENZENE	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5
META- & PARA-XYLENE	<0.5									
METHYLENE CHLORIDE	2.5	<25	<5	<5	<5	<5	<5	<5	<2	<2
ORTHO-XYLENE	<0.5									
TETRACHLOROETHENE	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
TOLUENE	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5
TOTAL THM	<0.50									
TOTAL XYLENES	<0.5	<5	<1	<1	<1	<1	<1	<1		
TRANS-1,3-DICHLOROPROPENE		<5	<1	<1	<1	<1	<1	<1	<0.2	<0.2
TRICHLOROETHENE	5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
TRICHLOROFLUOROMETHANE	0.78								<0.2	<0.2
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	38	<10	<1	<1	<1	<1	<1	<1	<0.2	<0.2

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COMPOUND NAME	EW-NE 03/05/91 FO	EW-NE 06/16/91 FO	EW-NE 09/07/91 FO	EW-NE 12/06/91 FO	EW-NE 03/12/92 FO	EW-NE 06/02/92 FO	EW-NE 09/09/92 FO	EW-NE 12/07/92 FD	EW-NE 12/07/92 FO	EW-NE 03/04/93 FO
DATE ANALYZED	3/07/91	6/19/91	9/10/91	12/10/91	3/19/92	6/04/92	9/21/92	12/18/92	12/18/92	3/10/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,2-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,2-DICHLOROETHENE (CIS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.22	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CHLOROFORM	0.72	0.5	0.42	0.62	<0.2	0.23	<0.2	<0.2	<0.2	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.73	0.26	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
TOLUENE	<0.5	<0.5	<0.5	0.51	2.3	<0.5	<0.5	<0.5	<0.5	<1.0
TOTAL THM										
TOTAL XYLENES					<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
TRICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0

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COMPOUND NAME	EW-NE 08/13/93 FO	EW-NE 12/10/93 FO	EW-NE 03/17/94 FO	EW-NE 06/13/94 FO	EW-NE 09/13/94 FO	EW-NE 12/06/94 FO	EW-NE 06/26/95 FO	EW-NE 12/18/95 FO	EW-NE 06/18/96 FO	EW-NE 12/09/96 FO
DATE ANALYZED	9/27/93	12/24/93	3/29/94*	6/22/94	9/20/94	12/09/94	7/07/95	12/30/95	06/26/96	12/20/96
1,1,1-TRICHLOROETHANE	<1.0	<1.0	0.3	<0.5	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0	<1.0						<2.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,1-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,1-DICHLOROETHENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,2-DICHLOROPROPANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
1,3-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
1,4-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
2-CHLOROETHYL VINYL ETHER	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	N/A	N/A
ACETONE			<50	<50	<50	<50	<50			
ACETONE/1,1-DCE								<50	<50	<50
BENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
BROMOFORM	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
BROMOMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
CARBON TETRACHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
CHLOROBENZENE	2	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
CHLOROETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
CHLOROFORM	<1.0	<1.0	0.4	<0.2	<0.2	<0.2	<0.5	<0.5	1.2	0.81
CHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	0.8	0.65	0.53
CIS-1,3-DICHLOROPROPENE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
DIBROMOCHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.5	<0.5	<0.50
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE								<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	3.9	<2.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.50
ORTHO-XYLENE								<0.5	<0.5	<0.5
TETRACHLOROETHENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
TOLUENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM			0.4	<0.2	<0.2	<0.2	<0.5	0.58	1.2	0.81
TOTAL XYLENES	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5			
TRICHLOROETHENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50
TRICHLOROFLUOROMETHANE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
TRICHLOROTRIFLUOROETHANE			<2.0	<2.0	<2.0	<2.0	<2.0			
VINYL CHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.50

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-NW 09/19/88 FO	EW-NW 03/30/89 FO	EW-NW 05/31/89 FO	EW-NW 09/06/89 FO	EW-NW 12/06/89 FO	EW-NW 03/06/90 FO	EW-NW 06/07/90 FO	EW-NW 09/12/90 FO	EW-NW 12/06/90 FO	EW-NW 03/05/91 FO
DATE ANALYZED	10/15/88	4/06/89	6/05/89	9/14/89	12/14/89	3/15/90	6/13/90	9/18/90	12/10/90	3/07/91
1,1,1-TRICHLOROETHANE	<10	<0.5	<0.5	<2.5	<0.5	<5	<5	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<10	<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<10	<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<10	1.4	2.5	<2.5	2.3	<5	<5	<0.2	0.57	0.4
1,1-DICHLOROETHENE	<10	<0.5	2.2	<2.5	<0.5	<5	<5	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<20	42	56	35	48	25	28	2.7	18	12
1,2-DICHLOROETHANE	<10	<1	<1	<5	<1	<10	<10	<0.2	0.57	<0.2
1,2-DICHLOROETHENE (CIS)								0.86	8.5	6.5
1,2-DICHLOROETHENE (CIS/TRANS)	13	19	26	20	29	24	26			
1,2-DICHLOROETHENE (TRANS)								<0.2	1.5	0.84
1,2-DICHLOROPROPANE		<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<20	<1	<1	<2.5	<1	<1	<1	<1	<1	<1.0
1,4-DICHLOROBENZENE	<20	3.1	4.1	3.8	3.6	1.7	3.2	<1	1	<1.0
2-CHLOROETHYL VINYL ETHER	<20							<0.2	<0.2	<0.2
ACETONE	<50									
ACETONE/1,1-DCE										
BENZENE	<10	<0.5	0.6	<0.5	<0.5	<5	0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<10	<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
BROMOFORM	<10	<5	<5	<50	<5	<50	<50	<0.2	<0.2	<0.2
BROMOMETHANE	<20	<5	<5	<25	<5	<50	<50	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<10	<0.5	<0.5	<2.5	<0.5	<5	<5	<0.2	<0.2	<0.2
CHLOROBENZENE	14	9	11	8.6	9.6	4.1	8.5	0.69	4.4	3.1
CHLOROETHANE	<20	<5	<5	<25	<5	<50	<50	<0.2	<0.2	<0.2
CHLOROFORM	<10	<0.5	<0.5	<2.5	<0.5	<5	<5	<0.2	0.28	<0.2
CHLOROMETHANE	<20	<5	<5	<25	<5	<50	<50	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<10	<2	<2	<10	<2	<20	<20	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<10	<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE								<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)		<2	<2	<10	<2	<20	<20			
ETHYLBENZENE	<10	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<50	<5	<5	<25	<5	<50	<50	<2	<2	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<10	<0.5	<0.5	<2.5	<0.5	<5	<5	<0.2	0.47	<0.2
TOLUENE	<10	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5
TOTAL THM										
TOTAL XYLENES	<10	<1	<1	<1	<1	<1	<1			
TRANS-1,3-DICHLOROPROPENE	<10	<1	<1	<5	<1	<10	<10	<0.2	<0.2	<0.2
TRICHLOROETHENE	<10	1.1	1.5	<2.5	2.1	<5	<5	<0.2	1.3	<0.2
TRICHLOROFLUOROMETHANE								<0.2	2.4	0.4
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	150	510	910	230	270	300	360	9.5	130	50

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-NW 06/12/91 FQ	EW-NW 09/10/91 FQ	EW-NW 12/09/91 FQ	EW-NW 03/10/92 FQ	EW-NW 06/02/92 FQ	EW-NW 09/08/92 FQ	EW-NW 12/07/92 FQ	EW-NW 03/03/93 FQ	EW-NW 09/09/93 FQ	EW-NW 12/10/93 FQ
DATE ANALYZED	6/20/91	9/12/91	12/10/91	3/12/92	6/04/92	9/17/92	12/18/92	3/09/93	9/22/93	12/24/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	1.3	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	0.44	<0.2	<1.0	<1.0	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,1-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,2-DICHLOROBENZENE	2.2	9.2	<1.0	<1.0	<1.0	<1.0	3.4	<2.0	<2.0	<2.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)	1.6	26	0.51	<0.2	<0.2	<0.2	16	<1.0	1.8	2
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	<0.2	1.1	<0.2	<0.2	<0.2	<0.2	0.52	<1.0	<1.0	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.58	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
CHLOROBENZENE	<0.5	2.9	<0.5	<0.5	<0.5	<0.5	1.3	<1.0	<1.0	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
CHLOROFORM	0.77	<0.2	3.4	0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1	<2.0	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0
TOTAL THM										
TOTAL XYLENES				<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0
TRICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.25	<1.0	<1.0	<1.0
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	31	53	0.52	<0.2	<0.2	0.29	21	<2.0	14	25

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-NW 03/17/94 FQ	EW-NW 06/10/94 FQ	EW-NW 09/13/94 FQ	EW-NW 12/05/94 FQ	EW-NW 06/28/95 FQ	EW-NW 10/26/95 FQ	EW-NW 12/18/95 FQ	EW-NW 04/08/96 FQ	EW-NW 06/17/96 FQ	EW-NW 09/25/96 FQ
DATE ANALYZED	3/28/94	6/21/94	9/21/94	12/07/94	7/07/95	11/04/95	12/31/95	4/19/96	06/25/96	9/29/96
1,1,1-TRICHLOROETHANE	<0.2	2.3	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE						<2.0	<2.0	<10.0	<2.0	<10.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
1,1-DICHLOROETHANE	0.6	1	1.5	<2.0	<0.5	<0.5	<0.5	<2.5	1.4	<2.5
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	0.8	<2.5
1,2-DICHLOROBENZENE	36	60	45	54	19	16	20	33	35	20
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
1,2-DICHLOROETHENE (CIS)	32	69	32	53	7.1	11	16	22	32	13
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	3.3	5.6	3.9	2.5	1.2	1.3	2.2	<2.5	4	<2.5
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
1,3-DICHLOROBENZENE	<0.5	0.9	2.1	<5.0	<0.5	<0.5	<0.5	<2.5	0.7	<2.5
1,4-DICHLOROBENZENE	4.1	5.1	4.4	<5.0	1.9	1.8	2.5	3.3	5.3	<2.5
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<5.0	<0.5	<0.5	N/A	<2.5	N/A	N/A
ACETONE	<50	<50	<50	<500	<50					
ACETONE/1,1-DCE						<50.0	<50	<250	<50	<250
BENZENE	1.2	2.4	1.9	<5.0	0.6	0.66	1.2	<2.5	2.6	<2.5
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
BROMOFORM	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
BROMOMETHANE	<0.2	<0.2	2.5	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
CHLOROBENZENE	31	51	49	46	18	22	24	45	57	30
CHLOROETHANE	1.3	5	1.8	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
CHLOROFORM	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
CHLOROMETHANE	<0.2	<0.2	<0.2	<4.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
DICHLORODIFLUOROMETHANE	<0.2	0.4	<0.2	<4.0	<0.5	<0.5	<0.5	<2.5	1.9	<2.5
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<0.5	13	<5.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
META- & PARA-XYLENE						<0.5	<0.5	<2.5	<0.5	<2.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<20.0	<2.0	2.4	<0.5	<2.5	<0.5	4.3
ORTHO-XYLENE						<0.5	0.97	<2.5	<0.5	<2.5
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<2.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
TOLUENE	<0.5	0.7	<0.5	<5.0	<0.5	<0.5	<0.5	<2.5	0.51	<2.5
TOTAL THM	<0.2	<0.2	<0.2	<4.0	<0.5	<0.5	<0.5	<2.5	<0.5	<2.5
TOTAL XYLENES	<0.5	<0.5	0.6	<5.0	<0.5	0.65	1.2	<2.5	<0.5	<2.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<2.0	<0.5					
TRICHLOROETHENE	<0.2	0.3	0.3	<2.0	<0.5	<0.5	<0.5	<2.5	0.94	<2.5
TRICHLOROFLUOROMETHANE	1	2.3	1.2	<5.0	<0.5	<0.5	0.69	<2.5	3.2	<2.5
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0	<2.0	<20.0	<2.0					
VINYL CHLORIDE	380	320	220	360	130	98	160	190	200	130

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COMPOUND NAME	EW-NW 12/09/96 FD	EW-NW 12/09/96 FQ	EW-RW1 03/07/91 FD	EW-RW1 03/07/91 FQ	EW-RW1 05/10/91 FQ	EW-RW1 12/11/91 FD	EW-RW1 12/11/91 FQ	EW-RW1 03/11/92 FD	EW-RW1 03/11/92 FQ	EW-RW1 09/09/92 FD
DATE ANALYZED	12/20/96	12/20/96	3/08/91	3/08/91	5/14/91	12/13/91	12/26/91	3/17/92	3/17/92	9/22/92
1,1,1-TRICHLOROETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
1,1,2,2-TETRACHLOROETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.0	<10	1.9	2.2	<200	1.5	0.29	<10	<2.0	<20
1,1,2-TRICHLOROETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
1,1-DICHLOROETHANE	1.1	<2.5	1.9	1.9	<200	2.6	1.7	<10	<2.0	<20
1,1-DICHLOROETHENE	0.9	<2.5	1.8	1.7	<200	2.3	1.5	<10	<2.0	<20
1,2-DICHLOROBENZENE	37	39	32	30	1000	32	32	96	120	980
1,2-DICHLOROETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
1,2-DICHLOROETHENE (CIS)	20	27	410	340	12000	1400	1700	2600	2500	7300
1,2-DICHLOROETHENE (CIS/TRANS)					<200					
1,2-DICHLOROETHENE (TRANS)	4.3	4.9	8.9	9.8	<200	15	15	14	13	81
1,2-DICHLOROPROPANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
1,3-DICHLOROBENZENE	0.86	<2.5	<1.0	<1.0	<1000	<1.0	<1.0	<50	<10	<100
1,4-DICHLOROBENZENE	5.5	5.4	1.9	1.9	<1000	2.1	2	<50	<10	<100
2-CHLOROETHYL VINYL ETHER	N/A	N/A	<0.2	<0.2		<0.2	<0.2	<10	<2.0	<20
ACETONE										
ACETONE/1,1-DCE	<50	<250								
BENZENE	2.2	2.5	<0.5	<0.5	<500	<0.5	<0.5	<25	<5.0	<50
BROMODICHLOROMETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
BROMOFORM	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
BROMOMETHANE	<0.50	3	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
CARBON TETRACHLORIDE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
CHLOROBENZENE	61	59	7.5	7.9	<1000	9.3	9.2	61	38	140
CHLOROETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
CHLOROFORM	0.98	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
CHLOROMETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
CIS-1,3-DICHLOROPROPENE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
DIBROMOCHLOROMETHANE	<0.50	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
DICHLORODIFLUOROMETHANE	1.3	<2.5	<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	83
EDB (1,2-DIBROMOETHANE)					<200					
ETHYLBENZENE	<0.5	<2.5	<0.5	<0.5	<500	<0.5	<0.5	<25	8.8	310
META- & PARA-XYLENE	<0.5	<2.5								
METHYLENE CHLORIDE	1.1	6.5	<2.0	<2.0	<2000	<2.0	<2.0	<100	<20	<200
ORTHO-XYLENE	<0.5	<2.5								
TETRACHLOROETHENE	<0.5	<2.5	0.73	0.86	<200	0.4	0.33	<10	<2.0	<20
TOLUENE	0.68	<2.5	<0.5	<0.5	<500	0.62	0.76	<25	<5.0	<50
TOTAL THM	0.98	<2.5								
TOTAL XYLENES	<0.5	<2.5			1000			<50	17	320
TRANS-1,3-DICHLOROPROPENE			<0.2	<0.2	<200	<0.2	<0.2	<10	<2.0	<20
TRICHLOROETHENE	<0.50	<2.5	39	42	<200	33	28	<10	<2.0	<20
TRICHLOROFLUOROMETHANE	2.4	<2.5	3.3	3.6	<200	7.3	8.4	<10	<2.0	25
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	190	220	530	610	460	280	490	330	350	6700

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	EW-RW1 12/08/92 FD	EW-RW2 03/11/92 FD	EW-RW2 12/08/92 FD	EW-RW2 03/05/93 FD	EW-W 09/20/88 FD	EW-W 03/31/89 FD	EW-W 05/31/89 FD	EW-W 05/31/89 FD	EW-W 09/06/89 FD	EW-W 12/06/89 FD
DATE ANALYZED	12/27/92	3/17/92	12/20/92	3/11/93	10/15/88	4/07/89	6/05/89	6/05/89	9/13/89	12/13/89
1,1,1-TRICHLOROETHANE	<10	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.5	<5	<0.5
1,1,2,2-TETRACHLOROETHANE	<10	<0.2	<2.0	<20	<5	<1	<1	<1	<10	<1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<10	<0.2	<2.0	<20		<1	<1	<1	<10	<1
1,1,2-TRICHLOROETHANE	<10	<0.2	<2.0	<20	<5	<1	<1	<1	<10	<1
1,1-DICHLOROETHANE	<10	<0.2	<2.0	<20	<5	3.7	3	3.9	<5	2.2
1,1-DICHLOROETHENE	<25	<0.2	<2.0	<20	<5	<0.5	2.5	2.7	<5	<0.5
1,2-DICHLOROBENZENE	360	7.2	92	43	62	100	76	66	69	50
1,2-DICHLOROETHANE	<25	<0.2	<2.0	<20	<5	<1	<1	<1	<10	<1
1,2-DICHLOROETHENE (CIS)	2900	35	310	100						
1,2-DICHLOROETHENE (CIS/TRANS)					10	22	16	20	13	29
1,2-DICHLOROETHENE (TRANS)	35	0.38	8.7	<20						
1,2-DICHLOROPROPANE	<10	<0.2	<2.0	<20		<1	<1	<1	<10	<1
1,3-DICHLOROBENZENE	<50	<1.0	<10	<40	<20	<1	<1	<1	<2.5	<1
1,4-DICHLOROBENZENE	<50	<1.0	6.5	<40	<20	5.9	4.5	4.9	6.2	3.6
2-CHLOROETHYL VINYL ETHER	<10	<0.2	<2.0	<40	<10					
ACETONE					<25					
ACETONE/1,1-DCE										
BENZENE	6.8	<0.5	<5.0	<20	<5	0.5	0.6	0.6	0.6	<0.5
BROMODICHLOROMETHANE	<10	<0.2	<2.0	<20	<5	<1	<1	<1	<10	<1
BROMOFORM	<10	<0.2	<2.0	<20	<5	<5	<5	<5	<50	<5
BROMOMETHANE	<10	<0.2	<2.0	<40	<10	<5	<5	<5	<50	<5
CARBON TETRACHLORIDE	<25	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.5	<5	<0.5
CHLOROBENZENE	67	4.6	23	25	14	14	7.8	11	14	9.4
CHLOROETHANE	<10	<0.2	<2.0	<40	<10	<5	<5	<5	<50	<5
CHLOROFORM	<25	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.5	<5	<0.5
CHLOROMETHANE	<10	<0.2	<2.0	<40	<10	<5	<5	<5	<50	<5
CIS-1,3-DICHLOROPROPENE	<10	<0.2	<2.0	<40	<5	<2	<2	<2	<20	<2
DIBROMOCHLOROMETHANE	<10	<0.2	<2.0	<40	<5	<1	<1	<1	<10	<1
DICHLORODIFLUOROMETHANE	<10	<0.2	<2.0	<40						
EDB (1,2-DIBROMOETHANE)						<2	<2	<2	<20	<2
ETHYLBENZENE	88	<0.5	<5.0	<20	<5	<0.5	<0.5	<0.5	<0.5	<0.5
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<100	<2.0	<20	<40	<25	<5	<5	<5	<50	<5
ORTHO-XYLENE										
TETRACHLOROETHENE	<25	<0.2	<2.0	<20	<5	<0.5	<0.5	<0.5	<5	<0.5
TOLUENE	<25	<0.5	<5.0	<20	7	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM										
TOTAL XYLENES	<50	<1.0	<10	<40	<5	<1	<1	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	<10	<0.2	<2.0	<20	<5	<1	<1	<1	<10	<1
TRICHLOROETHENE	<25	0.49	<2.0	<20	<5	1.2	1	1.3	<5	2.1
TRICHLOROFLUOROMETHANE	14	<0.2	<2.0	<40						
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	2100	39	420	300	420	1000	1300	1300	530	290

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COMPOUND NAME	EW-W 12/06/89 FO	EW-W 03/13/90 FO	EW-W 06/07/90 FO	EW-W 09/12/90 FD	EW-W 09/12/90 FO	EW-W 12/05/90 FO	EW-W 03/11/91 FO	EW-W 06/20/91 FD	EW-W 06/20/91 FO	EW-W 09/11/91 FO
DATE ANALYZED	12/14/89	3/20/90	6/12/90	9/19/90	9/18/90	12/11/90	3/12/91	6/22/91	6/22/91	9/12/91
1,1,1-TRICHLOROETHANE	<5	<5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,1,2,2-TETRACHLOROETHANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<10	<10	2.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,1,2-TRICHLOROETHANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,1-DICHLOROETHANE	<5	<5	1.8	1.6	1.6	2.2	1.2	1.4	1.1	<2.0
1,1-DICHLOROETHENE	<5	<5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,2-DICHLOROBENZENE	57	50	39	29	33	38	29	26	27	40
1,2-DICHLOROETHANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,2-DICHLOROETHENE (CIS)				10	10	17	7.2	22	22	140
1,2-DICHLOROETHENE (CIS/TRANS)	11	13	26							
1,2-DICHLOROETHENE (TRANS)				2.6	2.6	3.9	1.9	1.6	1	<2.0
1,2-DICHLOROPROPANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
1,3-DICHLOROBENZENE	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<10
1,4-DICHLOROBENZENE	4.3	3.4	2.4	2.7	2.5	2.7	2.5	2.8	2.7	<10
2-CHLOROETHYL VINYL ETHER				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
ACETONE										
ACETONE/1,1-DCE										
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.69	0.61	<5.0
BROMODICHLOROMETHANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
BROMOFORM	<50	<50	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
BROMOMETHANE	<50	<50	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CARBON TETRACHLORIDE	<5	<5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CHLOROBENZENE	12	7.4	6.3	7.8	7.8	8	9.6	12	12	8.1
CHLOROETHANE	<50	<50	<5	2.1	5	<0.2	<0.2	<0.2	<0.2	<2.0
CHLOROFORM	<5	<5	<0.5	0.25	0.62	<0.2	<0.2	<0.2	<0.2	<2.0
CHLOROMETHANE	<50	<50	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CIS-1,3-DICHLOROPROPENE	<20	<20	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
DIBROMOCHLOROMETHANE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
DICHLORODIFLUOROMETHANE				0.98	0.65	0.97	<0.2	<0.2	0.3	<2.0
EDB (1,2-DIBROMOETHANE)	<20	<20	<2							
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<50	<50	<5	<2	<2	<2	<2.0	<2.0	<2.0	<20
ORTHO-XYLENE										
TETRACHLOROETHENE	<5	<5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.89	<5.0
TOTAL THM										
TOTAL XYLENES	<1	<1	<1							
TRANS-1,3-DICHLOROPROPENE	<10	<10	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
TRICHLOROETHENE	<5	<5	4.1	1.4	1.1	3.3	1.9	<0.2	<0.2	<2.0
TRICHLOROFLUOROMETHANE				1.2	2.3	5.3	1.2	4.1	1.8	<2.0
TRICHLOROTRIFLUOROETHANE										
VINYL CHLORIDE	500	340	320	220	260	380	530	120	160	120

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COMPOUND NAME	EW-W 12/09/91 FD	EW-W 12/09/91 FQ	EW-W 03/12/92 FQ	EW-W 04/01/92 FQ	EW-W 06/03/92 FQ	EW-W 09/09/92 FD	EW-W 09/09/92 FQ	EW-W 12/07/92 FQ	EW-W 03/03/93 FD	EW-W 03/21/94 FQ
DATE ANALYZED	12/17/91	12/11/91	3/19/92	4/07/92	6/12/92	9/21/92	9/21/92	12/20/92	3/11/93	3/30/94*
1,1,1-TRICHLOROETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	0.36	<1.0	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	4.4
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	
1,1,2-TRICHLOROETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
1,1-DICHLOROETHANE	1.63	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	2.6	<1.0	<2.0
1,1-DICHLOROETHENE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	0.21	0.48	<1.0	<2.0
1,2-DICHLOROBENZENE	16	18	3.2	3.2	2	1.4	1.5	97	5.1	100
1,2-DICHLOROETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	2.2
1,2-DICHLOROETHENE (CIS)	57	54	1	0.73	0.62	0.94	0.9	320	11	150
1,2-DICHLOROETHENE (CIS/TRANS)										
1,2-DICHLOROETHENE (TRANS)	1.1	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	6.3	<1.0	4.8
1,2-DICHLOROPROPANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
1,3-DICHLOROBENZENE	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<2.0	<5.0
1,4-DICHLOROBENZENE	1.6	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.8	4	7.2
2-CHLOROETHYL VINYL ETHER	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<5.0
ACETONE										<500
ACETONE/1,1-DCE										
BENZENE	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	3.3	<5.0
BROMODICHLOROMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
BROMOFORM	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
BROMOMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
CHLOROBENZENE	7	8	3.6	3.6	3	3.7	4.1	26	26	110
CHLOROETHANE	0.59	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	0.94	<2.0	<2.0
CHLOROFORM	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
CHLOROMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	0.45	1.2	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)										
ETHYLBENZENE	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	1.3	<5.0
META- & PARA-XYLENE										
METHYLENE CHLORIDE	<2.0	<10	<2.0	<2.0	11	<2.0	<2.0	<20	<2.0	<20
ORTHO-XYLENE										
TETRACHLOROETHENE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
TOLUENE	0.67	<2.5	0.56	<0.5	0.53	<0.5	<0.5	<5.0	<1.0	<5.0
TOTAL THM										<2.0
TOTAL XYLENES			<1.0	<1.0	<1.0	<1.0	<1.0	<10	<2.0	<5.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<1.0	<2.0
TRICHLOROETHENE	0.73	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	0.76	<1.0	<2.0
TRICHLOROFLUOROMETHANE	<0.2	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	3	<2.0	<5.0
TRICHLOROTRIFLUOROETHANE										<20
VINYL CHLORIDE	44	52	9.2	8	5.2	9.5	9.6	300	23	570

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COMPOUND NAME	EW-W 09/19/94 FO	EW-W 12/12/94 FO	EW-W 06/27/95 FO	EW-W 12/20/95 FO	EW-W 06/17/96 FO	EW-W 12/11/96 FO
DATE ANALYZED	9/23/94	12/17/94	7/10/95	01/01/96	06/26/96	12/21/96
1,1,1-TRICHLOROETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
1,1,2,2-TETRACHLOROETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				<10.0	<2.0	<2.0
1,1,2-TRICHLOROETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
1,1-DICHLOROETHANE	<2.0	<4.0	0.6	<2.5	1.1	1
1,1-DICHLOROETHENE	<2.0	<4.0	<0.5	<2.5	1.5	0.54
1,2-DICHLOROBENZENE	59	34	36	81	40	25
1,2-DICHLOROETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
1,2-DICHLOROETHENE (CIS)	72	52	18	64	37	20
1,2-DICHLOROETHENE (CIS/TRANS)						
1,2-DICHLOROETHENE (TRANS)	<2.0	<4.0	1.6	8.7	4.5	2.8
1,2-DICHLOROPROPANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
1,3-DICHLOROBENZENE	<5.0	<10.0	<0.5	<2.5	0.74	0.58
1,4-DICHLOROBENZENE	5.8	<10.0	4.7	9.1	5.3	4.2
2-CHLOROETHYL VINYL ETHER	<5.0	<10.0	<0.5	N/A	N/A	N/A
ACETONE	<500	<1000	<50			
ACETONE/1,1-DCE				<250	<50	<50
BENZENE	<5.0	<10.0	0.8	6	2.5	1.7
BROMODICHLOROMETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
BROMOFORM	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
BROMOMETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
CARBON TETRACHLORIDE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
CHLOROBENZENE	50	30	38	100	53	45
CHLOROETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
CHLOROFORM	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
CHLOROMETHANE	<2.0	<8.0	<0.5	<2.5	<0.5	<0.50
CIS-1,3-DICHLOROPROPENE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
DIBROMOCHLOROMETHANE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
DICHLORODIFLUOROMETHANE	<2.0	<8.0	<0.5	<2.5	0.71	2.4
EDB (1,2-DIBROMOETHANE)						
ETHYLBENZENE	<5.0	<10.0	<0.5	<2.5	<0.5	<0.5
META- & PARA-XYLENE				<2.5	<0.5	<0.5
METHYLENE CHLORIDE	<20.0	<40.0	<2.0	<2.5	<0.5	3.2
ORTHO-XYLENE				<2.5	<0.5	<0.5
TETRACHLOROETHENE	<2.0	<4.0	<0.5	<2.5	<0.5	<0.5
TOLUENE	<5.0	<10.0	<0.5	<2.5	0.51	<0.5
TOTAL THM	<2.0	<4.0	<0.5	<2.5	<0.5	<0.50
TOTAL XYLENES	<5.0	<10.0	<0.5	2.6	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<2.0	<4.0	<0.5			
TRICHLOROETHENE	<2.0	<4.0	<0.5	<2.5	<0.5	0.87
TRICHLOROFLUOROMETHANE	<5.0	<10.0	<0.5	<2.5	4.6	1.7
TRICHLOROTRIFLUOROETHANE	<20.0	<40.0	<2.0			
VINYL CHLORIDE	350	230	160	600	240	110

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Volatile Organic Compounds

COMPOUND NAME	EW-OE 07/19/89 FO	EW-OE 09/07/89 FO	EW-OE 03/07/90 FO	EW-OE 12/05/90 FO	EW-OE 06/18/91 FO	EW-OE 12/11/91 FO	EW-OE 03/11/92 FO	EW-OE 05/05/92 FO	EW-OE 09/09/92 FO
DATE ANALYZED	8/04/89	9/19/89	3/17/90	12/08/90	6/19/91	12/13/91	3/17/92	5/07/92	9/17/92
1,1,1-TRICHLOROETHANE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROBENZENE	<1	<1	<1	<1	<1.0	<1.0	<1.0	1.1	1.1
1,2-DICHLOROETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)				<0.2	<0.2	<0.2	6.2	1.4	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)	<0.5	<0.5	<0.5						
1,2-DICHLOROETHENE (TRANS)				<0.2	<0.2	<0.2	0.24	<0.2	<0.2
1,2-DICHLOROPROPANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1	<2.5	<1	<1	<1.0	<1.0	<1.0	1.3	1.1
1,4-DICHLOROBENZENE	<1	<1	<1	<1	<1.0	<1.0	3.2	4.6	3.6
2-CHLOROETHYL VINYL ETHER				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE									
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	16	5.7
BROMODICHLOROMETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<2.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<2	<2	<2	<0.5	<0.5	<0.5	29	120	84
CHLOROETHANE	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.5	<2.5	<0.5	<0.2	<0.2	<0.2	0.4	<0.2	<0.2
CHLOROMETHANE	<5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<2	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)	<2	<2	<2						
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<5	<5	<5	<2	<2.0	<2.0	<2.0	3.7	<2.0
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.65	<0.5
TOTAL THM									
TOTAL XYLENES	<1	<1	<1				<1.0	16	<1.0
TRANS-1,3-DICHLOROPROPENE	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	<1	<1	<1	<0.2	<0.2	<0.2	4.8	<0.2	0.91

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COMPOUND NAME	EW-OE 12/08/92 FO	EW-OE 03/05/93 FO	EW-OE 09/15/93 FO	EW-OE 12/13/93 FO	SB-8 09/16/91 FO	SB-4 09/16/91 FO	SB-4 12/11/91 FO	SB-4 03/11/92 FO	SB-4 06/09/92 FO
DATE ANALYZED	12/19/92	3/11/93	9/28/93	12/26/93	9/18/91	9/18/91	12/16/91	3/17/92	6/12/92
1,1,1-TRICHLOROETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	1.5	2	1	1.2
1,1,2,2-TETRACHLOROETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<2.5	<1.0	2	<0.2	2.4	3.2	<0.2	0.45
1,1,2-TRICHLOROETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	1.1	1.6	4.8	11
1,1-DICHLOROETHENE	<0.2	<2.5	<1.0	<1.0	8.3	4.8	5.5	<0.2	4.7
1,2-DICHLOROBENZENE	2.7	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	1.4
1,2-DICHLOROETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	0.25
1,2-DICHLOROETHENE (CIS)	0.21	<2.5	<1.0	<1.0	<0.2	0.91	1.1	12	18
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	0.28	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	0.21	0.28
1,2-DICHLOROPROPANE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	1.3	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	5.1	5	2.2	2.1	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE									
BENZENE	5.9	15	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	1.2
BROMODICHLOROMETHANE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	0.86	<0.2	<0.2
BROMOFORM	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<2.5	<1.0	<1.0	9.1	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	62	130	35	29	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.2	<2.5	<1.0	<1.0	3	1.2	1.1	1.4	1
CHLOROMETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	0.79
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	2.8	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<5.0	<2.0	8.6	<2.0	<2.0	<2.0	<2.0	<2.0
TETRACHLOROETHENE	<0.2	<2.5	<1.0	<1.0	<0.2	0.42	0.5	1.1	1.3
TOLUENE	0.87	<2.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM									
TOTAL XYLENES	<1.0	<5.0	<2.0	<2.0				<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<2.5	<1.0	<1.0	1.2	25	27	25	23
TRICHLOROFLUOROMETHANE	<0.2	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	0.38
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	0.8	<5.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	3.9

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COMPOUND NAME	SB-4 09/15/92 FO	SB-4 12/04/92 FO	SB-4 03/03/93 FO	SB-4 09/10/93 FO	SB-5 09/10/93 FO	SB-4 12/10/93 FO	SB-4 03/16/94 FO	SB-4 06/10/94 FO	SB-4 09/16/94 FO
DATE ANALYZED	9/24/92	12/18/92	3/09/93	9/24/93	9/24/93	12/24/93	3/26/94	6/21/94	9/22/94
1,1,1-TRICHLOROETHANE	1	1.4	1	2.3	2.7	1.8	1.6	1.4	0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	1.2	1.6	1	2.7	3.3	1.1			
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	5.8	3.5	6.3	2.8	2.7	2.7	2.5	1.3	1.4
1,1-DICHLOROETHENE	4.9	5.2	7.3	5	5.5	5.4	5.8	3.3	2.7
1,2-DICHLOROBENZENE	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE	<0.2	0.35	<1.0	<1.0	<1.0	<1.0	<0.2	0.2	<0.2
1,2-DICHLOROETHENE (CIS)	14	7.2	21	5.8	7.2	5.9	4.4	2.7	0.6
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<0.2	0.28	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	0.3	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
1,4-DICHLOROBENZENE	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
ACETONE							<50	<50	<50
BENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	0.3	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CHLOROFORM	0.96	1.6	1.3	1.1	1.3	<1.0	1.6	1.1	0.8
CHLOROMETHANE	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	0.98	<0.2	<2.0	<2.0	<2.0	<2.0	<0.2	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	<2.0
TETRACHLOROETHENE	1.8	2.5	4.9	7	6.7	4.6	4.2	2.8	1.5
TOLUENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
TOTAL THM							1.6	1.1	0.8
TOTAL XYLENES	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2
TRICHLOROETHENE	21	24	20	36	38	17	18	17	13
TRICHLOROFLUOROMETHANE	0.49	0.3	<2.0	<2.0	<2.0	<2.0	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE							<2.0	<2.0	1.8
VINYL CHLORIDE	0.32	<0.2	<2.0	<1.0	<1.0	<1.0	<0.2	<0.2	<0.2

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COMPOUND NAME	SB-4 12/08/94 FO	SB-4 06/23/95 FO	SB-5 09/16/91 FO	SB-6 09/16/91 FO	SB-6 12/11/91 FO	SB-6 03/11/92 FO	SB-6 06/04/92 FO	SB-6 09/15/92 FO	SB-6 12/04/92 FO
DATE ANALYZED	12/13/94	7/05/95	9/18/91	9/18/91	12/16/91	3/17/92	6/08/92	9/24/92	12/18/92
1,1,1-TRICHLOROETHANE	0.8	<0.5	<0.2	4.6	3.9	0.49	0.73	0.51	1.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE			<0.2	6	13	0.32	3.1	3.6	3.4
1,1,2-TRICHLOROETHANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.5	1.3	<0.2	1	1.4	1.9	2.1	1.2	1.4
1,1-DICHLOROETHENE	2.5	1.9	16	4.8	15	3.7	5.5	4.4	11
1,2-DICHLOROBENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	<1.0
1,2-DICHLOROETHANE	0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
1,2-DICHLOROETHENE (CIS)	0.4	2.3	<0.2	0.59	1.2	4.3	3.3	5	1.8
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.26
1,2-DICHLOROPROPANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-DICHLOROBENZENE	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ACETONE	<50	<50							
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<0.2	<0.5	<0.2	<0.2	2.5	<0.2	<0.2	<0.2	0.76
BROMOFORM	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.5	8.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	0.8	1.2	2.3	1.2	1.7	1.2	1.4	1.4	2.6
CHLOROMETHANE	<0.4	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.87
CIS-1,3-DICHLOROPROPENE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<0.4	<0.5	<0.2	<0.2	<0.2	<0.2	0.33	0.87	0.65
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TETRACHLOROETHENE	0.9	1.8	<0.2	0.68	0.66	<0.2	0.59	0.41	0.9
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM	0.8	1.2							
TOTAL XYLENES	<0.5	<0.5				<1.0	<1.0	<1.0	<1.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	11	9.4	1.3	87	93	25	33	33	72
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2.0	<2.0							
VINYL CHLORIDE	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	0.66	<0.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	SB-6 03/03/93 FO	SB-6 09/10/93 FO	SB-6 12/16/93 FO	SB-6 03/16/94 FO	SB-6 06/10/94 FO	SB-6 09/15/94 FO	SB-6 12/08/94 FO	SB-6 06/23/95 FO	SB-7 09/10/91 FO
DATE ANALYZED	3/09/93	9/24/93	12/24/93	3/26/94	6/21/94	9/22/94	12/15/94	7/05/95	9/18/91
1,1,1-TRICHLOROETHANE	<2.5	1.1	<1.0	0.6	1.1	0.4	1.7	0.6	0.3
1,1,2,2-TETRACHLOROETHANE	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<2.5	4.3	1.7						3.8
1,1,2-TRICHLOROETHANE	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
1,1-DICHLOROETHANE	<2.5	<1.0	1	1.2	0.9	2	1.2	1.1	0.48
1,1-DICHLOROETHENE	2.9	8.5	4.7	7.9	7.7	8.7	9.2	5.1	18
1,2-DICHLOROBENZENE	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0
1,2-DICHLOROETHANE	<2.5	<1.0	<1.0	0.4	0.5	0.3	0.4	<0.5	<0.2
1,2-DICHLOROETHENE (CIS)	<2.5	1	1.3	0.9	0.8	0.6	0.5	0.7	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
1,2-DICHLOROPROPANE	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
1,3-DICHLOROBENZENE	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0
1,4-DICHLOROBENZENE	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0
2-CHLOROETHYL VINYL ETHER	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.2
ACETONE				<50	<50	<50	<100	<50	
BENZENE	<2.5	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5
BROMODICHLOROMETHANE	<2.5	<1.0	<1.0	<0.2	<0.2	0.3	<0.4	<0.5	<0.2
BROMOFORM	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
BROMOMETHANE	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
CARBON TETRACHLORIDE	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
CHLOROBENZENE	<2.5	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5
CHLOROETHANE	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
CHLOROFORM	<2.5	2.3	1.8	2.3	1.7	1.3	1.2	1.9	0.94
CHLOROMETHANE	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.8	<0.5	<0.2
CIS-1,3-DICHLOROPROPENE	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
DIBROMOCHLOROMETHANE	<5.0	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
DICHLORODIFLUOROMETHANE	<5.0	<2.0	<2.0	1.5	<0.2	<0.2	<0.8	<0.5	<0.2
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<2.5	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5
METHYLENE CHLORIDE	<5.0	<2.0	3.9	3	<2.0	<2.0	<4.0	<2.0	<2.0
TETRACHLOROETHENE	<2.5	<1.0	<1.0	0.8	0.8	1	0.6	0.5	0.24
TOLUENE	<2.5	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5
TOTAL THM				2.3	1.7	1.6	1.2	1.9	
TOTAL XYLENES	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	
TRANS-1,3-DICHLOROPROPENE	<2.5	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2
TRICHLOROETHENE	24	55	26	42	58	57	63	40	46
TRICHLOROFLUOROMETHANE	<5.0	<2.0	<2.0	<0.5	<0.5	<0.5	<1.0	<0.5	<0.2
TRICHLOROTRIFLUOROETHANE				3.3	2.7	3.5	<4.0	3.4	
VINYL CHLORIDE	<5.0	<1.0	<1.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2

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Volatile Organic Compounds

COMPOUND NAME	TW-1 12/05/90 FD	TW-1 03/12/91 FD	TW-1 09/12/91 FD	TW-1 12/12/91 FD	TW-1 03/17/92 FD	TW-1 06/05/92 FD	TW-1 09/14/92 FD	TW-1 12/03/92 FD	TW-1 03/08/93 FD
DATE ANALYZED	12/11/90	3/13/91	9/16/91	12/17/91	3/25/92	6/08/92	9/23/92	12/17/92	3/11/93
1,1,1-TRICHLOROETHANE	2.6	1.6	0.95	1.1	0.63	<0.2	0.72	<0.2	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	4.2	2.5	2.8	4.6	<0.2	0.26	0.21	0.22	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,1-DICHLOROETHANE	1.5	1.5	0.59	0.83	5.2	<0.2	7.5	4.4	<1.0
1,1-DICHLOROETHENE	7.3	2.8	1.6	4.3	3.3	0.84	3.2	1.4	<1.0
1,2-DICHLOROBENZENE	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	2.2	1.1	<2.0
1,2-DICHLOROETHANE	0.28	<0.2	<0.2	<0.2	<0.2	<0.2	0.59	<0.2	<1.0
1,2-DICHLOROETHENE (CIS)	1.2	1	0.34	0.46	15	0.78	23	7.8	<1.0
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
1,3-DICHLOROBENZENE	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
1,4-DICHLOROBENZENE	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
ACETONE									
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	11	3.7	<0.5	<1.0
BROMODICHLOROMETHANE	0.27	0.23	<0.2	<0.2	<0.2	0.21	1.7	0.99	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
CHLOROBENZENE	0.32	<0.5	<0.5	<0.5	<0.5	<0.5	0.58	<0.5	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
CHLOROFORM	1.5	1.2	0.84	0.81	0.89	0.98	4.1	3	1.1
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.32	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.32	0.26	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3	<0.2	<2.0
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	2.8	1.4	<0.5	1.8
METHYLENE CHLORIDE	<2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TETRACHLOROETHENE	0.77	0.26	<0.2	0.35	0.39	2.3	0.71	0.54	<1.0
TOLUENE	<0.5	<0.5	<0.5	0.91	<0.5	8.7	4.9	0.65	<1.0
TOTAL THM									
TOTAL XYLENES					<1.0	8	6.8	<1.0	<2.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0
TRICHLOROETHENE	25	25	16	18	15	2	13	16	1.4
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.63	<0.2	<2.0
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	7.2	0.26	<2.0

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COMPOUND NAME	TW-1 09/14/93 FO	TW-1 12/07/93 FO	TW-1 03/16/94 FO	TW-1 06/09/94 FO	TW-1 09/15/94 FO	TW-1 12/08/94 FO	TW-1 06/22/95 FO	TW-3 12/07/90 FO	TW-3 03/12/91 FO
DATE ANALYZED	9/24/93	12/19/93	3/24/94	6/21/94	9/22/94	12/15/94	7/01/95	12/11/90	3/13/91
1,1,1-TRICHLOROETHANE	1	3.4	1.2	2.5	0.4	0.7	0.6	1.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0	2.7						<0.2	<0.2
1,1,2-TRICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,1-DICHLOROETHANE	1.3	5.5	2.9	7.5	1.3	0.3	3.5	6.2	4.7
1,1-DICHLOROETHENE	<1.0	2.6	0.4	2.1	2.3	1.8	0.7	5.5	<0.2
1,2-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	4.3	8.3
1,2-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.5	<0.2	<0.2	<0.5	0.53	<0.2
1,2-DICHLOROETHENE (CIS)	7.1	24	8.3	17	0.5	0.3	9.5	8.1	13
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	0.3	0.35
1,2-DICHLOROPROPANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,3-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1.0
1,4-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1.0
2-CHLOROETHYL VINYL ETHER	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
ACETONE			<50	<50	<50	<50	<50		
BENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5
BROMODICHLOROMETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
BROMOFORM	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
BROMOMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CARBON TETRACHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CHLOROBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	2.7
CHLOROETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CHLOROFORM	1.5	1.2	3.4	1.3	0.7	0.9	1.4	0.6	0.85
CHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
DIBROMOCHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	0.2	<0.5	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	0.43	<0.2
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2.0
TETRACHLOROETHENE	1.2	4.1	0.8	2.2	1.2	0.6	1.3	0.63	0.33
TOLUENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM			3.4	1.3	0.7	1.1	1.4		
TOTAL XYLENES	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5		
TRANS-1,3-DICHLOROPROPENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
TRICHLOROETHENE	4.4	9.1	6.4	14	11	9.5	6.2	8.8	9.6
TRICHLOROFLUOROMETHANE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	0.58	0.83
TRICHLOROTRIFLUOROETHANE			<2.0	<2.0	1.9	<2.0	<2.0		
VINYL CHLORIDE	<1.0	<1.0	<0.2	0.2	<0.2	<0.2	<0.5	16	30

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COMPOUND NAME	TW-3 06/20/91 FO	TW-3 09/13/91 FO	TW-3 12/12/91 FO	TW-3 03/17/92 FO	TW-3 06/05/92 FO	TW-3 09/14/92 FO	TW-3 12/03/92 FO	TW-3 03/08/93 FO	TW-3 09/14/93 FO
DATE ANALYZED	6/21/91	9/16/91	12/14/91	3/26/92	6/08/92	9/23/92	12/17/92	3/11/93	9/25/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHANE	2.2	1.9	2.7	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHENE	0.25	0.31	0.62	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROBENZENE	1.8	4.4	6	<1.0	<1.0	<1.0	1.1	<2.0	<2.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)	1.2	7.3	11	<0.2	<0.2	0.28	0.97	<1.0	<1.0
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
ACETONE									
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<1.0	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	0.55	<0.2	1.4	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
CHLOROBENZENE	1.1	1.6	2.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CHLOROFORM	<0.2	<0.2	<0.2	<0.2	<0.2	1.2	<0.2	1.4	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.35	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<1.0	<1.0
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TETRACHLOROETHENE	0.44	<0.2	0.34	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TOLUENE	0.67	<0.5	2.3	<0.5	<0.5	4.2	<0.5	<1.0	<1.0
TOTAL THM									
TOTAL XYLENES				<1.0	<1.0	5.2	<1.0	<2.0	3
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROETHENE	<0.2	0.67	2.1	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	3	11	16	<0.2	<0.2	<0.2	1	<2.0	<1.0

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COMPOUND NAME	TW-3 12/07/93 FO	TW-3 03/15/94 FD	TW-3 06/08/94 FO	TW-3 09/16/94 FD	TW-3 12/08/94 FD	TW-3 12/08/94 FO	TW-3 06/22/95 FO	TW-4 12/07/90 FO	TW-4 03/12/91 FO
DATE ANALYZED	12/19/93	3/24/94	6/21/94	9/22/94	12/20/94	12/14/94	7/02/95	12/12/90	3/13/91
1,1,1-TRICHLOROETHANE	<1.0	<0.2	<0.5	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,1,2,2-TETRACHLOROETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	2.3							<0.2	<0.2
1,1,2-TRICHLOROETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,1-DICHLOROETHANE	<1.0	<0.2	1.4	1.8	0.7	0.8	<0.5	2.6	<0.2
1,1-DICHLOROETHENE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	0.69	<0.2
1,2-DICHLOROBENZENE	<2.0	<0.5	1	1.2	<0.5	<0.5	<0.5	12	<1.0
1,2-DICHLOROETHANE	<1.0	<0.2	<0.5	0.2	0.5	0.4	<0.5	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)	1.5	0.4	3.7	2.8	1.7	1.7	<0.5	14	<0.2
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	0.99	<0.2
1,2-DICHLOROPROPANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
1,3-DICHLOROBENZENE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1.0
1,4-DICHLOROBENZENE	<2.0	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<1	<1.0
2-CHLOROETHYL VINYL ETHER	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
ACETONE		<50	<50	<50	<50	<50	<50		
BENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
BROMOFORM	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
BROMOMETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CARBON TETRACHLORIDE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CHLOROBENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.3	<0.5
CHLOROETHANE	<2.0	<0.2	<0.2	<0.2	0.3	0.3	<0.5	<0.2	<0.2
CHLOROFORM	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
CHLOROMETHANE	<2.0	<0.2	<0.2	<0.2	<0.4	<0.4	<0.5	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
DIBROMOCHLOROMETHANE	<2.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
DICHLORODIFLUOROMETHANE	<2.0	<0.2	1.8	<0.2	1.3	1.1	<0.5	0.55	<0.2
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	2.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2.0
TETRACHLOROETHENE	<1.0	<0.2	0.2	0.3	<0.2	<0.2	<0.5	<0.2	<0.2
TOLUENE	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TOTAL THM		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		
TOTAL XYLENES	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
TRANS-1,3-DICHLOROPROPENE	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
TRICHLOROETHENE	<1.0	<0.2	1	1.4	0.9	0.9	<0.5	2.5	<0.2
TRICHLOROFLUOROMETHANE	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.2
TRICHLOROTRIFLUOROETHANE		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
VINYL CHLORIDE	2.8	0.6	2	1.4	0.6	0.8	<0.5	0.71	<0.2

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COMPOUND NAME	TW-4 06/20/91 FD	TW-4 09/13/91 FD	TW-4 12/12/91 FD	TW-4 03/17/92 FD	TW-4 06/05/92 FD	TW-4 09/14/92 FD	TW-4 12/08/92 FD	TW-4 03/08/93 FD	TW-4 09/14/93 FD
DATE ANALYZED	6/21/91	9/16/91	12/17/91	3/26/92	6/08/92	9/23/92	12/17/92	3/11/93	9/25/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHANE	<0.2	0.63	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROBENZENE	2.7	4.9	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	2.1
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROETHENE (CIS)	1.3	11	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROETHENE (CIS/TRANS)									
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	2.4
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
ACETONE									
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	0.33	<0.2	<0.2	<0.2	<0.2	1.3	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
CHLOROBENZENE	0.74	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	1.1
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CHLOROFORM	<0.2	<0.2	6.5	<0.2	<0.2	<0.2	<0.2	1	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
EDB (1,2-DIBROMOETHANE)									
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	1.1
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TOLUENE	0.51	<0.5	0.76	0.58	<0.5	<0.5	<0.5	<1.0	<1.0
TOTAL THM									
TOTAL XYLENES				<1.0	<1.0	<1.0	<1.0	<2.0	3.6
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	12	18	<0.2	<0.2	<0.2	0.25	0.42	<2.0	<1.0

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COMPOUND NAME	TW-4 12/07/93 FD	TW-4 12/07/93 FO	TW-4 03/16/94 FO	TW-4 06/08/94 FO	TW-4 09/16/94 FO	TW-4 12/08/94 FO	TW-4 06/22/95 FO	TW-P 09/28/88 FO	TW-P 03/31/89 FO
DATE ANALYZED	12/19/93	12/19/93	3/25/94	6/21/94	9/22/94	12/15/94	7/02/95	10/20/88	4/07/89
1,1,1-TRICHLOROETHANE	<1.0	<1.0	<0.2	<0.5	<0.2	<0.2	<0.5	<5	4
1,1,2,2-TETRACHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<1.0	<1.0							<1
1,1,2-TRICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<1
1,1-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.2	1.1	0.5	<0.5	<5	1.6
1,1-DICHLOROETHENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	2.8
1,2-DICHLOROBENZENE	<2.0	<2.0	<0.5	1	5.4	17	<0.5	<20	1.2
1,2-DICHLOROETHANE	<1.0	<1.0	<0.2	<0.5	<0.2	<0.2	<0.5	<5	<1
1,2-DICHLOROETHENE (CIS)	<1.0	<1.0	1.1	5.8	14	35	<0.5		
1,2-DICHLOROETHENE (CIS/TRANS)								10	5.2
1,2-DICHLOROETHENE (TRANS)	<1.0	<1.0	<0.2	<0.2	<0.2	0.8	<0.5		
1,2-DICHLOROPROPANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5		<1
1,3-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<20	<1
1,4-DICHLOROBENZENE	<2.0	<2.0	<0.5	<0.5	1.1	1.9	<0.5	<20	<1
2-CHLOROETHYL VINYL ETHER	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<10	
ACETONE			<50	<50	<50	<50	<50	<25	
BENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	0.6	<0.5	<5	<0.5
BROMODICHLOROMETHANE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<1
BROMOFORM	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<5
BROMOMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<10	<5
CARBON TETRACHLORIDE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<0.5
CHLOROBENZENE	<1.0	<1.0	<0.5	<0.5	3.5	12	<0.5	<5	<2
CHLOROETHANE	<2.0	<2.0	<0.2	0.2	<0.2	<0.2	<0.5	<10	<5
CHLOROFORM	<1.0	<1.0	0.4	<0.2	<0.2	<0.2	<0.5	<5	<0.5
CHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.4	<0.5	<10	<5
CIS-1,3-DICHLOROPROPENE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<2
DIBROMOCHLOROMETHANE	<2.0	<2.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<1
DICHLORODIFLUOROMETHANE	<2.0	<2.0	<0.2	0.4	<0.2	<0.4	<0.5		
EDB (1,2-DIBROMOETHANE)									<2
ETHYLBENZENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
METHYLENE CHLORIDE	2.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<25	<5
TETRACHLOROETHENE	<1.0	<1.0	<0.2	0.3	<0.2	<0.2	<0.5	<5	<0.5
TOLUENE	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5
TOTAL THM			0.4	<0.2	<0.2	<0.2	<0.5		
TOTAL XYLENES	<2.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1
TRANS-1,3-DICHLOROPROPENE	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.5	<5	<1
TRICHLOROETHENE	<1.0	<1.0	<0.2	<0.2	<0.2	0.2	<0.5	6.3	5
TRICHLOROFLUOROMETHANE	2	<2.0	<0.5	<0.5	<0.5	0.7	<0.5		
TRICHLOROTRIFLUOROETHANE			<2.0	<2.0	<2.0	<2.0	<2.0		
VINYL CHLORIDE	<1.0	<1.0	2.8	12	20	78	<0.5	<10	6.9

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	TW-P 06/05/89 FO	TW-P 09/08/89 FO	TW-P 12/08/89 FO	TW-P 03/07/90 FD	TW-P 03/07/90 FO	TW-P 06/07/90 FO	TW-P 09/13/90 FO	TW-P 12/07/90 FO	TW-P 06/20/91 FO
DATE ANALYZED	6/13/89	9/13/89	12/14/89	3/17/90	3/17/90	6/13/90	9/20/90	12/12/90	6/21/91
1,1,1-TRICHLOROETHANE	4.2	3.1	0.7	1.6	1.6	1.3	0.48	0.76	<0.2
1,1,2,2-TETRACHLOROETHANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	1.6	1.1	<1	1.3	1.3	1.4	<0.2	0.66	<0.2
1,1,2-TRICHLOROETHANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	1.9	1.1	0.5	1	1.1	1.5	1.3	1.9	1.7
1,1-DICHLOROETHENE	3.8	3.1	1	3	2.8	3.4	1.5	2.6	1.4
1,2-DICHLOROBENZENE	<1	<1	<1	<1	<1	<1	2.5	1.7	2.8
1,2-DICHLOROETHANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (CIS)							7.4	4.1	11
1,2-DICHLOROETHENE (CIS/TRANS)	6.9	5	2.5	2.5	2.6	2.7			
1,2-DICHLOROETHENE (TRANS)							0.27	<0.2	<0.2
1,2-DICHLOROPROPANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<1	<1	<1	<1	<1	<1	<1	<1	<1.0
1,4-DICHLOROBENZENE	<1	<1	<1	<1	<1	<1	<1	<1	<1.0
2-CHLOROETHYL VINYL ETHER							<0.2	<0.2	<0.2
ACETONE									
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMODICHLOROMETHANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
BROMOFORM	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
BROMOMETHANE	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
CHLOROBENZENE	<2	<2	<2	<2	<2	<2	8.4	0.61	1
CHLOROETHANE	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CHLOROFORM	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	0.51	0.45	<0.2
CHLOROMETHANE	<5	<5	<5	<5	<5	<5	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<2	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
DICHLORODIFLUOROMETHANE							0.22	<0.2	<0.2
EDB (1,2-DIBROMOETHANE)	<2	<2	<2	<2	<2	<2			
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<5	<5	<5	<5	<5	<5	<2	<2	<2.0
TETRACHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.25	0.77	0.66
TOLUENE	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5
TOTAL THM									
TOTAL XYLENES	<1	<1	<1	<1	<1	<1			
TRANS-1,3-DICHLOROPROPENE	<1	<1	<1	<1	<1	<1	<0.2	<0.2	<0.2
TRICHLOROETHENE	6.7	5.4	2.6	3.6	3.7	5	4.3	5.3	4.4
TRICHLOROFLUOROMETHANE							<0.2	0.29	<0.2
TRICHLOROTRIFLUOROETHANE									
VINYL CHLORIDE	6	3	<1	1.6	1.4	1.9	12	3.4	8.2

Estes Landfill Groundwater Database
Volatile Organic Compounds

COMPOUND NAME	TW-P 09/16/91 FD	TW-P 12/12/91 FD	TW-P 03/13/92 FD	TW-P 06/05/92 FD	TW-P 09/14/92 FD	TW-P 12/03/92 FD	TW-P 03/08/93 FD
DATE ANALYZED	9/18/91	12/14/91	3/24/92	6/08/92	9/23/92	12/17/92	3/11/93
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,1-DICHLOROETHANE	2.4	2.6	<0.2	<0.2	0.22	1.7	<1.0
1,1-DICHLOROETHENE	1.2	1.4	<0.2	<0.2	<0.2	<5	<1.0
1,2-DICHLOROBENZENE	2.1	3.2	<1.0	<1.0	<1.0	3	<2.0
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,2-DICHLOROETHENE (CIS)	9.1	13	1.2	0.69	1.8	21	4.3
1,2-DICHLOROETHENE (CIS/TRANS)							
1,2-DICHLOROETHENE (TRANS)	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
1,3-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0
1,4-DICHLOROBENZENE	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<2.0
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0
ACETONE							
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0
BROMODICHLOROMETHANE	<0.2	<0.2	0.5	<0.2	<0.2	<5	<1.0
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
CHLOROBENZENE	0.9	1.4	<0.5	<0.5	0.21	<5	<1.0
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0
CHLOROFORM	<0.2	0.89	1.9	<0.2	<0.2	<5	<1.0
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<2.0
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	0.23	<10	<2.0
EDB (1,2-DIBROMOETHANE)							
ETHYLBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	1.2
METHYLENE CHLORIDE	<2.0	<2.0	<2.0	<2.0	<2.0	<5	<2.0
TETRACHLOROETHENE	1.5	1.2	<0.2	<0.2	<0.2	<5	<1.0
TOLUENE	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1.0
TOTAL THM							
TOTAL XYLENES			<1.0	<1.0	<1.0	<5	<2.0
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<1.0
TRICHLOROETHENE	6.2	6	<0.2	<0.2	0.33	1.9	<1.0
TRICHLOROFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<5	<2.0
TRICHLOROTRIFLUOROETHANE							
VINYL CHLORIDE	3.7	6.2	<0.2	<0.2	<0.2	<10	<2.0

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-NE	12/29/83	1133.50	28.69	1104.81	(unknown depth interval)
BW-NE	7/9/84	1133.50	35.91	1097.59	(unknown depth interval)
BW-NE	12/18/84	1133.50	38.52	1094.98	(unknown depth interval)
BW-NE	1/3/85	1133.50	31.94	1101.56	(unknown depth interval)
BW-NE	1/8/85	1133.50	34.50	1099.00	(unknown depth interval)
BW-NE	2/20/85	1133.50	29.62	1103.88	(unknown depth interval)
BW-NE	8/14/85	1133.50	30.61	1102.89	(unknown depth interval)
BW-NED	1/12/88	1133.09	44.21	1088.88	Measured from top of steel casing
BW-NED	3/4/88	1133.09	45.18	1087.91	
BW-NED	6/14/88	1133.09	44.33	1088.76	
BW-NED	7/22/88	1133.09	45.46	1087.63	
BW-NED	8/25/88	1133.09	46.74	1086.35	
BW-NED	9/24/88	1133.09	46.97	1086.12	
BW-NED	10/21/88	1133.09	46.66	1086.43	
BW-NED	12/16/88	1133.09	47.08	1086.01	
BW-NED	1/19/89	1133.09	48.08	1085.01	
BW-NED	4/4/89	1133.09	51.00	1082.09	
BW-NED	5/8/89	1133.09	53.20	1079.89	
BW-NED	5/30/89	1133.09	53.50	1079.59	
BW-NED	6/30/89	1133.09	54.40	1078.69	
BW-NED	7/27/89	1133.09	55.05	1078.04	
BW-NED	9/5/89	1133.09	55.90	1077.19	
BW-NED	9/28/89	1133.09	56.35	1076.74	
BW-NED	11/6/89	1133.09	57.28	1075.81	
BW-NED	12/1/89	1133.09	58.10	1074.99	
BW-NED	1/8/90	1133.09	59.25	1073.84	
BW-NED	2/5/90	1133.09	59.89	1073.20	
BW-NED	3/5/90	1133.09	60.58	1072.51	
BW-NED	4/6/90	1133.09	61.70	1071.39	
BW-NED	5/8/90	1133.09	62.68	1070.41	
BW-NED	6/5/90	1133.09	63.42	1069.67	
BW-NED	7/6/90	1133.09	64.13	1068.96	
BW-NED	7/30/90	1133.09	63.94	1069.15	
BW-NED	8/7/90	1133.09	63.00	1070.09	
BW-NED	9/11/90	1133.09	58.64	1074.45	
BW-NED	10/8/90	1133.09	57.41	1075.68	
BW-NED	11/1/90	1133.09	58.07	1075.02	
BW-NED	12/3/90	1133.09	59.06	1074.03	
BW-NED	1/8/91	1133.09	61.56	1071.53	
BW-NED	2/4/91	1133.09	63.22	1069.87	
BW-NED	3/4/91	1133.09	64.81	1068.28	
BW-NED	4/4/91	1133.09	55.25	1077.84	
BW-NED	4/22/91	1133.09	49.74	1083.35	
BW-NED	6/3/91	1133.09	53.50	1079.59	From top of steel casing
BW-NED	7/5/91	1133.09	58.35	1074.74	Good reading
BW-NED	8/6/91	1133.09	58.69	1074.40	
BW-NED	9/6/91	1133.09	60.29	1072.80	
BW-NED	10/8/91	1133.09	60.95	1072.14	
BW-NED	11/6/91	1133.09	61.39	1071.70	
BW-NED	12/5/91	1133.09	60.58	1072.51	
BW-NED	1/2/92	1133.09	60.19	1072.90	
BW-NED	1/24/92	1133.09	54.31	1078.78	
BW-NED	2/7/92	1133.09	49.08	1084.01	
BW-NED	2/14/92	1133.09	47.16	1085.93	
BW-NED	2/21/92	1133.09	44.73	1088.36	
BW-NED	2/28/92	1133.09	42.99	1090.10	
BW-NED	3/9/92	1133.09	40.95	1092.14	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-NED	3/20/92	1133.09	38.52	1094.57	
BW-NED	4/3/92	1133.09	36.63	1096.46	
BW-NED	5/1/92	1133.09	35.21	1097.88	
BW-NED	6/1/92	1133.09	33.72	1099.37	
BW-NED	6/26/92	1133.09	33.59	1099.50	
BW-NED	7/10/92	1133.09	34.33	1098.76	
BW-NED	7/24/92	1133.09	34.95	1098.14	
BW-NED	8/7/92	1133.09	33.98	1099.11	
BW-NED	9/4/92	1133.09	32.54	1100.55	
BW-NED	10/2/92	1133.09	33.34	1099.75	
BW-NED	11/5/92	1133.09	35.71	1097.38	
BW-NED	12/1/92	1133.09	37.73	1095.36	
BW-NED	1/4/93	1133.09	35.55	1097.54	
BW-NED	1/11/93	1133.09	32.95	1100.14	
BW-NED	1/18/93	1133.09	29.82	1103.27	
BW-NED	1/26/93	1133.09	28.52	1104.57	
BW-NED	2/2/93	1133.09	28.48	1104.61	
BW-NED	2/9/93	1133.09	28.46	1104.63	
BW-NED	2/16/93	1133.09	27.99	1105.10	
BW-NED	3/1/93	1133.09	27.41	1105.68	
BW-NED	3/15/93	1133.09	27.72	1105.37	
BW-NED	4/1/93	1133.09	27.55	1105.54	
BW-NED	4/26/93	1133.09	28.56	1104.53	
BW-NED	5/3/93	1133.09	28.37	1104.72	
BW-NED	6/1/93	1133.09	28.80	1104.29	
BW-NED	6/11/93	1133.09	29.34	1103.75	
BW-NED	7/1/93	1133.09	29.87	1103.22	
BW-NED	8/6/93	1133.09	30.98	1102.11	
BW-NED	9/7/93	1133.09	30.99	1102.10	
BW-NED	10/6/93	1133.09	32.24	1100.85	
BW-NED	11/9/93	1133.09	32.91	1100.18	
BW-NED	12/6/93	1133.09	31.87	1101.22	
BW-NED	1/4/94	1133.09	32.51	1100.58	
BW-NED	2/3/94	1133.09	34.12	1098.97	
BW-NED	3/7/94	1133.09	35.96	1097.13	
BW-NED	4/6/94	1133.09	36.81	1096.28	
BW-NED	5/6/94	1133.09	38.00	1095.09	
BW-NED	6/7/94	1133.09	39.36	1093.73	
BW-NED	7/6/94	1133.09	40.78	1092.31	
BW-NED	8/4/94	1133.09	42.07	1091.02	
BW-NED	9/9/94	1133.09	42.72	1090.37	
BW-NED	10/13/94	1133.09	43.20	1089.89	
BW-NED	11/4/94	1133.09	42.98	1090.11	
BW-NED	12/2/94	1133.09	43.29	1089.80	
BW-NED	1/9/95	1133.09	43.29	1089.80	
BW-NED	2/3/95	1133.09	38.72	1094.37	
BW-NED	3/2/95	1133.09	34.04	1099.05	
BW-NED	4/5/95	1133.09	31.77	1101.32	
BW-NED	5/10/95	1133.09	32.34	1100.75	
BW-NED	6/6/95	1133.09	33.46	1099.63	
BW-NED	7/7/95	1133.09	34.72	1098.37	
BW-NED	8/4/95	1133.09	36.53	1096.56	
BW-NED	9/7/95	1133.09	35.00	1098.09	
BW-NED	10/6/95	1133.09	34.81	1098.28	
BW-NED	11/10/95	1133.09	34.55	1098.54	
BW-NED	12/9/95	1133.09	35.53	1097.56	
BW-NED	1/11/96	1133.09	37.24	1095.85	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-NED	2/10/96	1133.09	38.82	1094.27	
BW-NED	3/8/96	1133.09	40.00	1093.09	
BW-NED	4/5/96	1133.09	41.45	1091.64	
BW-NED	5/7/96	1133.09	42.96	1090.13	
BW-NED	6/5/96	1133.09	42.20	1090.89	
BW-NED	7/8/96	1133.09	45.21	1087.88	
BW-NED	8/2/96	1133.09	45.50	1087.59	
BW-NED	9/9/96	1133.09	45.92	1087.17	
BW-NED	10/4/96	1133.09	46.20	1086.89	
BW-NED	11/1/96	1133.09	46.78	1086.31	
BW-NED	12/5/96	1133.09	47.52	1085.57	
BW-NED	4/7/97	1133.09	52.13	1080.96	
BW-NED	6/2/97	1133.09	53.57	1079.52	
BW-NED	9/10/97	1133.09	54.87	1078.22	
BW-NED	12/11/97	1133.09	53.37	1079.72	
BW-NED	3/13/98	1133.50	48.15	1085.35	(unknown depth interval)
BW-NED	6/23/98	1133.50	43.19	1090.31	
BW-NED	9/22/98	1133.50	41.41	1092.09	
BW-NES	1/12/88	1133.09	44.11	1088.98	Top of pad to TOC = .47'
BW-NES	3/4/88	1133.09	45.08	1088.01	
BW-NES	6/14/88	1133.09	44.23	1088.86	
BW-NES	7/22/88	1133.09	45.33	1087.76	
BW-NES	8/25/88	1133.09	46.60	1086.49	
BW-NES	9/24/88	1133.09	ND		
BW-NES	10/21/88	1133.09	46.66	1086.43	
BW-NES	12/16/88	1133.09	47.08	1086.01	
BW-NES	1/19/89	1133.09	48.08	1085.01	
BW-NES	4/4/89	1133.09	50.88	1082.21	
BW-NES	5/8/89	1133.09	53.25	1079.84	
BW-NES	5/30/89	1133.09	53.35	1079.74	
BW-NES	6/30/89	1133.09	54.40	1078.69	
BW-NES	7/27/89	1133.09	55.05	1078.04	
BW-NES	9/5/89	1133.09	55.90	1077.19	
BW-NES	9/28/89	1133.09	56.35	1076.74	
BW-NES	11/6/89	1133.09	57.28	1075.81	
BW-NES	12/1/89	1133.09	58.10	1074.99	
BW-NES	1/8/90	1133.09	59.25	1073.84	
BW-NES	2/5/90	1133.09	59.88	1073.21	
BW-NES	3/5/90	1133.09	60.58	1072.51	
BW-NES	4/6/90	1133.09	61.69	1071.40	
BW-NES	5/8/90	1133.09	62.68	1070.41	
BW-NES	6/5/90	1133.09	63.42	1069.67	
BW-NES	7/6/90	1133.09	64.12	1068.97	
BW-NES	8/7/90	1133.09	63.00	1070.09	
BW-NES	9/11/90	1133.09	58.64	1074.45	
BW-NES	10/8/90	1133.09	57.36	1075.73	
BW-NES	11/1/90	1133.09	58.07	1075.02	
BW-NES	12/3/90	1133.09	59.07	1074.02	
BW-NES	1/8/91	1133.09	61.47	1071.62	
BW-NES	2/4/91	1133.09	63.19	1069.90	
BW-NES	3/4/91	1133.09	64.98	1068.11	
BW-NES	4/4/91	1133.09	55.24	1077.85	
BW-NES	4/22/91	1133.09	49.73	1083.36	
BW-NES	6/3/91	1133.09	53.48	1079.61	From top of steel casing
BW-NES	7/5/91	1133.09	54.78	1078.31	
BW-NES	8/6/91	1133.09	58.65	1074.44	
BW-NES	9/3/91	1133.09	60.28	1072.81	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-NES	10/8/91	1133.09	60.91	1072.18	Tip of sounder in well
BW-NES	11/6/91	1133.09	61.37	1071.72	
BW-NES	12/5/91	1133.09	60.46	1072.63	
BW-NES	1/2/92	1133.09	60.16	1072.93	
BW-NES	1/24/92	1133.09	54.22	1078.87	
BW-NES	2/7/92	1133.09	49.10	1083.99	
BW-NES	2/14/92	1133.09	47.17	1085.92	
BW-NES	2/21/92	1133.09	44.70	1088.39	
BW-NES	2/28/92	1133.09	42.96	1090.13	
BW-NES	3/9/92	1133.09	40.93	1092.16	
BW-NES	3/20/92	1133.09	38.50	1094.59	
BW-NES	4/3/92	1133.09	36.61	1096.48	
BW-NES	5/1/92	1133.09	35.05	1098.04	
BW-NES	6/1/92	1133.09	33.71	1099.38	
BW-NES	6/26/92	1133.09	33.59	1099.50	
BW-NES	7/10/92	1133.09	34.34	1098.75	
BW-NES	7/24/92	1133.09	34.92	1098.17	
BW-NES	8/7/92	1133.09	33.98	1099.11	
BW-NES	9/4/92	1133.09	32.53	1100.56	
BW-NES	10/2/92	1133.09	33.34	1099.75	
BW-NES	11/5/92	1133.09	35.67	1097.42	
BW-NES	12/1/92	1133.09	37.72	1095.37	
BW-NES	1/4/93	1133.09	35.43	1097.66	
BW-NES	1/11/93	1133.09	32.75	1100.34	
BW-NES	1/18/93	1133.09	29.80	1103.29	
BW-NES	1/26/93	1133.09	28.51	1104.58	
BW-NES	2/2/93	1133.09	28.52	1104.57	
BW-NES	2/9/93	1133.09	28.41	1104.68	
BW-NES	2/16/93	1133.09	28.03	1105.06	
BW-NES	3/1/93	1133.09	28.37	1104.72	
BW-NES	3/15/93	1133.09	27.73	1105.36	
BW-NES	4/1/93	1133.09	27.53	1105.56	
BW-NES	4/26/93	1133.09	28.56	1104.53	
BW-NES	5/3/93	1133.09	28.37	1104.72	
BW-NES	6/1/93	1133.09	28.80	1104.29	
BW-NES	6/11/93	1133.09	29.34	1103.75	
BW-NES	7/1/93	1133.09	29.87	1103.22	
BW-NES	8/6/93	1133.09	30.98	1102.11	
BW-NES	9/7/93	1133.09	30.99	1102.10	
BW-NES	10/6/93	1133.09	25.26	1107.83	
BW-NES	11/9/93	1133.09	32.91	1100.18	
BW-NES	12/6/93	1133.09	31.87	1101.22	
BW-NES	1/4/94	1133.09	32.51	1100.58	
BW-NES	2/3/94	1133.09	34.12	1098.97	
BW-NES	3/7/94	1133.09	35.96	1097.13	
BW-NES	7/6/94	1133.09	40.78	1092.31	
BW-NES	8/4/94	1133.09	42.07	1091.02	
BW-NES	9/9/94	1133.09	42.72	1090.37	
BW-NES	10/13/94	1133.09	43.20	1089.89	
BW-NES	11/4/94	1133.09	42.98	1090.11	
BW-NES	12/2/94	1133.09	43.29	1089.80	
BW-NES	1/9/95	1133.09	40.71	1092.38	
BW-NES	2/3/95	1133.09	38.72	1094.37	
BW-NES	3/2/95	1133.09	34.04	1099.05	
BW-NES	4/5/95	1133.09	31.76	1101.33	
BW-NES	5/10/95	1133.09	32.36	1100.73	
BW-NES	6/6/95	1133.09	33.46	1099.63	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-NES	7/7/95	1133.09	34.72	1098.37	
BW-NES	8/4/95	1133.09	36.54	1096.55	
BW-NES	9/7/95	1133.09	35.01	1098.08	
BW-NES	10/6/95	1133.09	34.81	1098.28	
BW-NES	11/10/95	1133.09	34.55	1098.54	
BW-NES	12/9/95	1133.09	35.54	1097.55	
BW-NES	1/11/96	1133.09	37.24	1095.85	
BW-NES	2/10/96	1133.09	38.82	1094.27	
BW-NES	3/8/96	1133.09	39.99	1093.10	
BW-NES	4/5/96	1133.09	41.43	1091.66	
BW-NES	5/7/96	1133.09	42.95	1090.14	
BW-NES	6/5/96	1133.09	42.20	1090.89	
BW-NES	7/8/96	1133.09	45.21	1087.88	
BW-NES	8/2/96	1133.09	45.50	1087.59	
BW-NES	9/9/96	1133.09	45.92	1087.17	
BW-NES	10/4/96	1133.09	46.19	1086.90	
BW-NES	11/1/96	1133.09	46.78	1086.31	
BW-NES	12/5/96	1133.09	47.52	1085.57	
BW-NES	4/7/97	1133.09	52.14	1080.95	
BW-NES	6/2/97	1133.09	53.57	1079.52	
BW-NES	9/10/97	1133.09	54.87	1078.22	
BW-NES	12/11/97	1133.09	nm		Not Measured
BW-NES	3/13/98	1133.09	48.13	1084.96	
BW-NES	6/23/98	1133.09	43.04	1090.05	
BW-NES	9/22/98	1133.09	41.40	1091.69	
BW-S	6/28/83	1120.70	32.80	1087.90	Data from Graf (1984)
BW-S	7/9/84	1120.70	44.75	1075.95	(unknown depth interval)
BW-S	12/18/84	1120.70	48.06	1072.64	(unknown depth interval)
BW-S	1/3/85	1120.70	40.84	1079.86	(unknown depth interval)
BW-S	1/8/85	1120.70	39.10	1081.60	(unknown depth interval)
BW-S	2/20/85	1120.70	34.83	1085.87	(unknown depth interval)
BW-S	8/14/85	1120.70	40.91	1079.79	(unknown depth interval)
BW-SD	1/12/88	1122.26	51.88	1070.38	Measured from top of steel casing
BW-SD	3/4/88	1122.26	51.45	1070.81	
BW-SD	6/14/88	1122.26	50.62	1071.64	
BW-SD	7/22/88	1122.26	51.78	1070.48	
BW-SD	8/25/88	1122.26	52.72	1069.54	
BW-SD	9/24/88	1122.26	53.05	1069.21	
BW-SD	10/21/88	1122.26	52.95	1069.31	
BW-SD	12/16/88	1122.26	53.95	1068.31	
BW-SD	1/19/89	1122.26	54.70	1067.56	
BW-SD	4/4/89	1122.26	55.78	1066.48	
BW-SD	5/8/89	1122.26	57.80	1064.46	
BW-SD	5/30/89	1122.26	58.23	1064.03	
BW-SD	6/30/89	1122.26	59.05	1063.21	
BW-SD	7/27/89	1122.26	59.75	1062.51	
BW-SD	9/5/89	1122.26	59.52	1062.74	
BW-SD	9/28/89	1122.26	59.70	1062.56	
BW-SD	11/6/89	1122.26	60.73	1061.53	
BW-SD	12/1/89	1122.26	61.35	1060.91	
BW-SD	1/8/90	1122.26	62.45	1059.81	
BW-SD	2/5/90	1122.26	62.61	1059.65	
BW-SD	3/5/90	1122.26	63.16	1059.10	
BW-SD	4/6/90	1122.26	63.95	1058.31	
BW-SD	5/8/90	1122.26	64.51	1057.75	
BW-SD	6/5/90	1122.26	65.26	1057.00	
BW-SD	7/6/90	1122.26	65.99	1056.27	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SD	7/30/90	1122.26	64.84	1057.42	
BW-SD	8/7/90	1122.26	63.95	1058.31	
BW-SD	9/11/90	1122.26	60.72	1061.54	
BW-SD	10/8/90	1122.26	61.50	1060.76	
BW-SD	11/1/90	1122.26	62.69	1059.57	
BW-SD	12/3/90	1122.26	63.93	1058.33	
BW-SD	1/8/91	1122.26	65.15	1057.11	
BW-SD	2/4/91	1122.26	66.16	1056.10	
BW-SD	3/4/91	1122.26	66.98	1055.28	
BW-SD	4/4/91	1122.26	59.05	1063.21	
BW-SD	4/22/91	1122.26	53.16	1069.10	
BW-SD	6/3/91	1122.26	59.10	1063.16	From top of steel casing
BW-SD	7/5/91	1122.26	61.47	1060.79	
BW-SD	8/6/91	1122.26	63.38	1058.88	
BW-SD	9/6/91	1122.26	64.58	1057.68	
BW-SD	10/8/91	1122.26	65.28	1056.98	
BW-SD	11/6/91	1122.26	65.25	1057.01	
BW-SD	12/5/91	1122.26	63.72	1058.54	
BW-SD	1/2/92	1122.26	63.66	1058.60	
BW-SD	1/24/92	1122.26	58.27	1063.99	
BW-SD	2/7/92	1122.26	53.32	1068.94	
BW-SD	2/14/92	1122.26	51.31	1070.95	
BW-SD	2/21/92	1122.26	48.65	1073.61	
BW-SD	2/28/92	1122.26	47.94	1074.32	
BW-SD	3/9/92	1122.26	44.33	1077.93	
BW-SD	3/20/92	1122.26	41.78	1080.48	
BW-SD	4/3/92	1122.26	39.19	1083.07	
BW-SD	5/1/92	1122.26	36.42	1085.84	
BW-SD	6/1/92	1122.26	34.01	1088.25	
BW-SD	6/26/92	1122.26	34.94	1087.32	
BW-SD	7/10/92	1122.26	37.32	1084.94	
BW-SD	7/24/92	1122.26	39.03	1083.23	
BW-SD	8/7/92	1122.26	37.59	1084.67	
BW-SD	9/4/92	1122.26	34.26	1088.00	
BW-SD	10/2/92	1122.26	36.63	1085.63	
BW-SD	11/5/92	1122.26	41.17	1081.09	
BW-SD	12/1/92	1122.26	44.09	1078.17	
BW-SD	1/4/93	1122.26	41.10	1081.16	
BW-SD	1/11/93	1122.26	36.08	1086.18	
BW-SD	1/18/93	1122.26	32.17	1090.09	
BW-SD	1/26/93	1122.26	30.69	1091.57	
BW-SD	2/2/93	1122.26	30.63	1091.63	
BW-SD	2/9/93	1122.26	30.17	1092.09	
BW-SD	2/16/93	1122.26	29.38	1092.88	
BW-SD	3/1/93	1122.26	28.34	1093.92	
BW-SD	3/15/93	1122.26	28.46	1093.80	
BW-SD	4/1/93	1122.26	28.02	1094.24	
BW-SD	4/26/93	1122.26	28.77	1093.49	
BW-SD	5/3/93	1122.26	28.46	1093.80	
BW-SD	6/1/93	1122.26	28.87	1093.39	
BW-SD	6/11/93	1122.26	29.29	1092.97	
BW-SD	7/1/93	1122.26	30.37	1091.89	
BW-SD	8/6/93	1122.26	34.09	1088.17	
BW-SD	9/7/93	1122.26	34.18	1088.08	
BW-SD	10/6/93	1122.26	35.66	1086.60	
BW-SD	11/9/93	1122.26	38.59	1083.67	
BW-SD	12/6/93	1122.26	36.06	1086.20	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SD	1/4/94	1122.26	37.30	1084.96	
BW-SD	1/9/94	1122.26	48.54	1073.72	
BW-SD	2/3/94	1122.26	40.81	1081.45	
BW-SD	3/7/94	1122.26	43.06	1079.20	
BW-SD	4/6/94	1122.26	44.03	1078.23	
BW-SD	5/6/94	1122.26	45.69	1076.57	
BW-SD	6/7/94	1122.26	47.04	1075.22	
BW-SD	7/6/94	1122.26	48.59	1073.67	
BW-SD	8/4/94	1122.26	49.99	1072.27	
BW-SD	9/9/94	1122.26	50.36	1071.90	
BW-SD	10/13/94	1122.26	51.49	1070.77	
BW-SD	11/4/94	1122.26	51.91	1070.35	
BW-SD	12/2/94	1122.26	52.04	1070.22	
BW-SD	1/9/95	1122.26	48.54	1073.72	
BW-SD	2/3/95	1122.26	46.35	1075.91	
BW-SD	3/2/95	1122.26	39.99	1082.27	
BW-SD	4/5/95	1122.26	35.90	1086.36	
BW-SD	5/10/95	1122.26	36.06	1086.20	
BW-SD	6/6/95	1122.26	39.33	1082.93	
BW-SD	7/7/95	1122.26	42.18	1080.08	
BW-SD	8/4/95	1122.26	44.27	1077.99	
BW-SD	9/7/95	1122.26	43.02	1079.24	
BW-SD	10/6/95	1122.26	41.98	1080.28	
BW-SD	11/10/95	1122.26	41.84	1080.42	
BW-SD	12/9/95	1122.26	43.70	1078.56	Well will not be measured in future
BW-SD	6/2/97	1122.26	59.00	1063.26	
BW-SED	1/12/88	1122.93	44.90	1078.03	Measured from top of steel casing
BW-SED	3/4/88	1122.93	45.03	1077.90	
BW-SED	6/14/88	1122.93	44.91	1078.02	
BW-SED	7/22/88	1122.93	56.76	1066.17	
BW-SED	8/25/88	1122.93	55.63	1067.30	
BW-SED	10/21/88	1122.93	54.50	1068.43	
BW-SED	12/16/88	1122.93	53.50	1069.43	
BW-SED	1/19/89	1122.93	53.00	1069.93	
BW-SED	4/4/89	1122.93	80.40	1042.53	Erroneous data, cement in gravel pack?
BW-SED	5/8/89	1122.93	77.55	1045.38	Erroneous data, cement in gravel pack?
BW-SED	5/30/89	1122.93	76.14	1046.79	Erroneous data, cement in gravel pack?
BW-SED	6/30/89	1122.93	75.20	1047.73	Erroneous data, cement in gravel pack?
BW-SED	7/27/89	1122.93	74.45	1048.48	Erroneous data, cement in gravel pack?
BW-SED	9/5/89	1122.93	72.70	1050.23	Erroneous data, cement in gravel pack?
BW-SED	9/28/89	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	11/6/89	1122.93	84.30	1038.63	Erroneous data, cement in gravel pack?
BW-SED	12/1/89	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	1/8/90	1122.93	81.57	1041.36	Erroneous data, cement in gravel pack?
BW-SED	2/5/90	1122.93	81.47	1041.46	Erroneous data, cement in gravel pack?
BW-SED	3/5/90	1122.93	87.05	1035.88	Erroneous data, cement in gravel pack?
BW-SED	4/6/90	1122.93	83.50	1039.43	Erroneous data, cement in gravel pack?
BW-SED	5/8/90	1122.93	82.71	1040.22	Erroneous data, cement in gravel pack?
BW-SED	6/5/90	1122.93	81.69	1041.24	Erroneous data, cement in gravel pack?
BW-SED	7/6/90	1122.93	80.82	1042.11	Erroneous data, cement in gravel pack?
BW-SED	7/30/90	1122.93	56.55	1066.38	Erroneous data, cement in gravel pack?
BW-SED	8/7/90	1122.93	79.91	1043.02	Erroneous data, cement in gravel pack?
BW-SED	9/11/90	1122.93	81.10	1041.83	Erroneous data, cement in gravel pack?
BW-SED	10/8/90	1122.93	81.10	1041.83	Erroneous data, cement in gravel pack?
BW-SED	11/1/90	1122.93	80.05	1042.88	Erroneous data, cement in gravel pack?
BW-SED	12/3/90	1122.93	83.25	1039.68	Erroneous data, cement in gravel pack?
BW-SED	1/8/91	1122.93	81.27	1041.66	Erroneous data, cement in gravel pack?

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SED	2/4/91	1122.93	80.47	1042.46	Erroneous data, cement in gravel pack?
BW-SED	3/4/91	1122.93	79.70	1043.23	Erroneous data, cement in gravel pack?
BW-SED	4/4/91	1122.93	88+		Erroneous data, cement in gravel pack?
BW-SED	4/22/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	6/3/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	7/5/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	8/6/91	1122.93	86+		Erroneous data, cement in gravel pack?
BW-SED	9/6/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	10/8/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	11/6/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	12/5/91	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	1/2/92	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	1/24/92	1122.93	85.80	1037.13	Erroneous data, cement in gravel pack?
BW-SED	2/7/92	1122.93	84.27	1038.66	Erroneous data, cement in gravel pack?
BW-SED	2/14/92	1122.93	84+		Erroneous data, cement in gravel pack?
BW-SED	2/21/92	1122.93	85.05	1037.88	Erroneous data, cement in gravel pack?
BW-SED	2/28/92	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	3/9/92	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	3/20/92	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	4/3/92	1122.93	82.80	1040.13	Erroneous data, cement in gravel pack?
BW-SED	5/1/92	1122.93	80.60	1042.33	Erroneous data, cement in gravel pack?
BW-SED	6/1/92	1122.93	80.41	1042.52	Erroneous data, cement in gravel pack?
BW-SED	6/26/92	1122.93	87.53	1035.40	Erroneous data, cement in gravel pack?
BW-SED	7/10/92	1122.93	80.38	1042.55	Erroneous data, cement in gravel pack?
BW-SED	7/24/92	1122.93	ND		No access, in lake of water.
BW-SED	8/7/92	1122.93	ND		No access, in lake of water.
BW-SED	9/4/92	1122.93	75.06	1047.87	Erroneous data, cement in gravel pack?
BW-SED	10/2/92	1122.93	73.33	1049.60	Erroneous data, cement in gravel pack?
BW-SED	11/5/92	1122.93	74.84	1048.09	Erroneous data, cement in gravel pack?
BW-SED	12/1/92	1122.93	73.51	1049.42	Erroneous data, cement in gravel pack?
BW-SED	1/4/93	1122.93	73.86	1049.07	Erroneous data, cement in gravel pack?
BW-SED	1/11/93	1122.93	ND		No access, surrounded by water.
BW-SED	1/18/93	1122.93	ND		No access, surrounded by water.
BW-SED	1/26/93	1122.93	67.73	1055.20	Erroneous data, cement in gravel pack?
BW-SED	2/2/93	1122.93	67.73	1055.20	Erroneous data, cement in gravel pack?
BW-SED	2/9/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	2/16/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	3/1/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	3/15/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	4/1/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	4/26/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	5/3/93	1122.93	ND		Erroneous data, cement in gravel pack?
BW-SED	10/6/93	1122.93	57.26	1065.67	Erroneous data, cement in gravel pack?
BW-SED	11/9/93	1122.93	ND		Well has grout intrusion
BW-SED	12/6/93	1122.93	ND		Well has grout intrusion
BW-SED	1/4/94	1122.93	ND		Well has grout intrusion
BW-SED	8/4/94	1122.93	47.77	1075.16	Well has grout intrusion
BW-SED	9/9/94	1122.93	48.03	1074.90	Well has grout intrusion
BW-SED	10/13/94	1122.93	49.38	1073.55	Well has grout intrusion
BW-SED	11/4/94	1122.93	49.26	1073.67	Well has grout intrusion
BW-SED	12/2/94	1122.93	49.16	1073.77	Well has grout intrusion
BW-SED	1/9/95	1122.93	48.96	1073.97	Well has grout intrusion
BW-SED	4/5/95	1122.93	ND		Well has grout intrusion
BW-SED	5/10/95	1122.93	47.40	1075.53	Well has grout intrusion
BW-SED	6/6/95	1122.93	47.12	1075.81	Well has grout intrusion
BW-SED	7/7/95	1122.93	46.68	1076.25	Well has grout intrusion
BW-SED	8/4/95	1122.93	46.52	1076.41	Well has grout intrusion

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SED	9/7/95	1122.93	46.17	1076.76	Well has grout intrusion
BW-SED	10/6/95	1122.93	45.91	1077.02	Well has grout intrusion
BW-SED	11/10/95	1122.93	46.10	1076.83	Well has grout intrusion
BW-SED	12/9/95	1122.93	45.73	1077.20	Well will not be measured in future
BW-SED	6/2/97	1122.93	45.43	1077.50	
BW-SES	3/4/88	1122.93	41.05	1081.88	
BW-SES	6/14/88	1122.93	40.54	1082.39	
BW-SES	7/22/88	1122.93	41.30	1081.63	
BW-SES	8/25/88	1122.93	42.05	1080.88	
BW-SES	10/21/88	1122.93	42.35	1080.58	
BW-SES	12/16/88	1122.93	42.95	1079.98	
BW-SES	1/19/89	1122.93	43.60	1079.33	
BW-SES	4/4/89	1122.93	45.37	1077.56	
BW-SES	5/8/89	1122.93	47.65	1075.28	
BW-SES	5/30/89	1122.93	47.65	1075.28	
BW-SES	6/30/89	1122.93	48.77	1074.16	
BW-SES	7/27/89	1122.93	49.59	1073.34	
BW-SES	9/5/89	1122.93	49.68	1073.25	
BW-SES	9/28/89	1122.93	49.95	1072.98	
BW-SES	11/6/89	1122.93	50.73	1072.20	
BW-SES	12/1/89	1122.93	51.40	1071.53	
BW-SES	1/8/90	1122.93	52.40	1070.53	
BW-SES	2/5/90	1122.93	52.85	1070.08	
BW-SES	3/5/90	1122.93	53.52	1069.41	
BW-SES	4/6/90	1122.93	54.77	1068.16	
BW-SES	5/8/90	1122.93	55.34	1067.59	
BW-SES	6/5/90	1122.93	56.03	1066.90	
BW-SES	7/6/90	1122.93	56.88	1066.05	
BW-SES	7/30/90	1122.93	56.55	1066.38	
BW-SES	8/7/90	1122.93	55.99	1066.94	
BW-SES	9/11/90	1122.93	52.90	1070.03	
BW-SES	10/8/90	1122.93	52.48	1070.45	
BW-SES	11/1/90	1122.93	52.90	1070.03	
BW-SES	12/3/90	1122.93	53.69	1069.24	
BW-SES	1/8/91	1122.93	64.39	1058.54	
BW-SES	2/4/91	1122.93	56.79	1066.14	Poor cut on steel tape
BW-SES	3/4/91	1122.93	57.99	1064.94	
BW-SES	4/4/91	1122.93	52.12	1070.81	
BW-SES	4/22/91	1122.93	48.13	1074.80	
BW-SES	6/3/91	1122.93	49.81	1073.12	From top of steel casing
BW-SES	7/5/91	1122.93	51.21	1071.72	
BW-SES	8/6/91	1122.93	53.08	1069.85	
BW-SES	9/6/91	1122.93	54.32	1068.61	
BW-SES	10/8/91	1122.93	54.42	1068.51	
BW-SES	11/6/91	1122.93	55.11	1067.82	
BW-SES	12/5/91	1122.93	54.13	1068.80	
BW-SES	1/2/92	1122.93	54.14	1068.79	
BW-SES	1/24/92	1122.93	50.96	1071.97	
BW-SES	2/7/92	1122.93	47.42	1075.51	
BW-SES	2/14/92	1122.93	46.18	1076.75	
BW-SES	2/21/92	1122.93	44.01	1078.92	
BW-SES	2/28/92	1122.93	42.65	1080.28	
BW-SES	3/9/92	1122.93	40.79	1082.14	
BW-SES	3/20/92	1122.93	38.09	1084.84	
BW-SES	4/3/92	1122.93	35.84	1087.09	
BW-SES	5/1/92	1122.93	32.78	1090.15	
BW-SES	6/1/92	1122.93	30.48	1092.45	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SES	6/26/92	1122.93	29.99	1092.94	
BW-SES	7/10/92	1122.93	30.67	1092.26	
BW-SES	7/24/92	1122.93	ND		No access, in lake of water.
BW-SES	8/7/92	1122.93	ND		No access, in lake.
BW-SES	9/4/92	1122.93	29.01	1093.92	
BW-SES	10/2/92	1122.93	29.22	1093.71	
BW-SES	11/5/92	1122.93	31.77	1091.16	
BW-SES	12/1/92	1122.93	33.89	1089.04	
BW-SES	1/4/93	1122.93	32.58	1090.35	
BW-SES	1/11/93	1122.93	ND		No access, surrounded by water.
BW-SES	1/18/93	1122.93	ND		No access, surrounded by water.
BW-SES	1/26/93	1122.93	25.73	1097.20	
BW-SES	2/2/93	1122.93	25.08	1097.85	
BW-SES	2/9/93	1122.93	25.49	1097.44	
BW-SES	2/16/93	1122.93	23.77	1099.16	
BW-SES	3/1/93	1122.93	22.88	1100.05	
BW-SES	3/15/93	1122.93	22.65	1100.28	
BW-SES	4/1/93	1122.93	22.22	1100.71	
BW-SES	4/26/93	1122.93	22.73	1100.20	
BW-SES	5/3/93	1122.93	22.59	1100.34	
BW-SES	6/1/93	1122.93	22.92	1100.01	
BW-SES	6/11/93	1122.93	23.26	1099.67	
BW-SES	7/1/93	1122.93	23.90	1099.03	
BW-SES	8/6/93	1122.93	25.49	1097.44	
BW-SES	9/7/93	1122.93	26.04	1096.89	
BW-SES	10/6/93	1122.93	27.32	1095.61	
BW-SES	11/9/93	1122.93	28.30	1094.63	
BW-SES	12/6/93	1122.93	27.26	1095.67	
BW-SES	1/4/94	1122.93	27.98	1094.95	
BW-SES	2/3/94	1122.93	29.92	1093.01	
BW-SES	3/7/94	1122.93	31.83	1091.10	
BW-SES	4/6/94	1122.93	32.99	1089.94	
BW-SES	5/6/94	1122.93	34.28	1088.65	
BW-SES	6/7/94	1122.93	36.55	1086.38	
BW-SES	7/6/94	1122.93	36.83	1086.10	
BW-SES	8/4/94	1122.93	37.96	1084.97	
BW-SES	9/9/94	1122.93	38.65	1084.28	
BW-SES	10/13/94	1122.93	39.27	1083.66	
BW-SES	11/4/94	1122.93	39.5	1083.43	
BW-SES	12/2/94	1122.93	39.75	1083.18	
BW-SES	1/9/95	1122.93	37.66	1085.27	
BW-SES	2/3/95	1122.93	35.58	1087.35	
BW-SES	3/2/95	1122.93	32.42	1090.51	
BW-SES	4/5/95	1122.93	28.92	1094.01	
BW-SES	5/10/95	1122.93	28.46	1094.47	
BW-SES	6/6/95	1122.93	39.68	1083.25	
BW-SES	7/7/95	1122.93	31.24	1091.69	
BW-SES	8/4/95	1122.93	32.90	1090.03	
BW-SES	9/7/95	1122.93	32.17	1090.76	
BW-SES	10/6/95	1122.93	31.60	1091.33	
BW-SES	11/10/95	1122.93	31.37	1091.56	
BW-SES	12/9/95	1122.93	32.75	1090.18	
BW-SES	1/11/96	1122.93	33.92	1089.01	
BW-SES	2/10/96	1122.93	35.11	1087.82	
BW-SES	3/8/96	1122.93	36.06	1086.87	
BW-SES	4/5/96	1122.93	37.10	1085.83	
BW-SES	5/7/96	1122.93	38.26	1084.67	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SES	6/5/96	1122.93	39.24	1083.69	
BW-SES	7/8/96	1122.93	40.04	1082.89	
BW-SES	8/2/96	1122.93	40.29	1082.64	
BW-SES	9/9/96	1122.93	40.53	1082.40	
BW-SES	10/4/96	1122.93	40.91	1082.02	
BW-SES	11/1/96	1122.93	41.58	1081.35	
BW-SES	12/5/96	1122.93	42.30	1080.63	
BW-SES	4/7/97	1122.93	ND		Unable to remove well cover
BW-SES	6/2/97	1122.93	47.72	1075.21	
BW-SES	9/10/97	1122.93	46.9	1076.03	
BW-SES	12/11/97	1122.93	48.78	1074.15	
BW-SES	3/13/98	1122.93	45.20	1077.73	
BW-SES	6/23/98	1122.93	40.66	1082.27	
BW-SES	9/22/98	1122.93		1122.93	TRAILER PARKED ON WELLHEAD
BW-SS	1/12/88	1122.26	49.10	1073.16	Top of pad to TOC = 1.0'
BW-SS	3/4/88	1122.26	50.08	1072.18	
BW-SS	6/14/88	1122.26	47.72	1074.54	
BW-SS	7/22/88	1122.26	49.46	1072.80	
BW-SS	8/25/88	1122.26	50.23	1072.03	
BW-SS	9/24/88	1122.26	ND		
BW-SS	10/21/88	1122.26	50.95	1071.31	
BW-SS	12/16/88	1122.26	51.20	1071.06	
BW-SS	1/19/89	1122.26	52.10	1070.16	
BW-SS	4/4/89	1122.26	53.70	1068.56	
BW-SS	5/8/89	1122.26	55.35	1066.91	
BW-SS	5/30/89	1122.26	55.90	1066.36	
BW-SS	6/30/89	1122.26	56.60	1065.66	
BW-SS	7/27/89	1122.26	57.15	1065.11	
BW-SS	9/5/89	1122.26	57.12	1065.14	
BW-SS	9/28/89	1122.26	57.70	1064.56	
BW-SS	11/6/89	1122.26	57.98	1064.28	
BW-SS	12/1/89	1122.26	58.50	1063.76	
BW-SS	1/8/90	1122.26	59.38	1062.88	
BW-SS	2/5/90	1122.26	59.75	1062.51	
BW-SS	3/5/90	1122.26	63.99	1058.27	Erroneous data, cement in gravel pack?
BW-SS	4/6/90	1122.26	64.09	1058.17	Erroneous data, cement in gravel pack?
BW-SS	5/8/90	1122.26	63.77	1058.49	Erroneous data, cement in gravel pack?
BW-SS	6/5/90	1122.26	63.77	1058.49	Erroneous data, cement in gravel pack?
BW-SS	7/6/90	1122.26	64.37	1057.89	Erroneous data, cement in gravel pack?
BW-SS	8/7/90	1122.26	63.77	1058.49	Erroneous data, cement in gravel pack?
BW-SS	9/11/90	1122.26	64.88	1057.38	Erroneous data, cement in gravel pack?
BW-SS	10/8/90	1122.26	63.60	1058.66	Erroneous data, cement in gravel pack?
BW-SS	11/1/90	1122.26	63.80	1058.46	Erroneous data, cement in gravel pack?
BW-SS	12/3/90	1122.26	64.40	1057.86	Erroneous data, cement in gravel pack?
BW-SS	1/8/91	1122.26	64.29	1057.97	Erroneous data, cement in gravel pack?
BW-SS	2/4/91	1122.26	64.27	1057.99	Erroneous data, cement in gravel pack?
BW-SS	3/4/91	1122.26	64.60	1057.66	Erroneous data, cement in gravel pack?
BW-SS	4/4/91	1122.26	64.80	1057.46	Erroneous data, cement in gravel pack?
BW-SS	4/22/91	1122.26	64.59	1057.67	Erroneous data, cement in gravel pack?
BW-SS	6/3/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	7/5/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	8/6/91	1122.26	65.23	1057.03	Erroneous data, cement in gravel pack?
BW-SS	9/6/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	10/8/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	11/6/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	12/5/91	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	1/2/92	1122.26	ND		Erroneous data, cement in gravel pack?

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-SS	1/24/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	2/7/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	2/14/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	2/21/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	2/28/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	3/9/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	3/20/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	4/3/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	5/1/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	6/1/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	6/26/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	7/10/92	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	7/24/92	1122.26	ND		Dry at 61'.
BW-SS	8/7/92	1122.26	ND		Dry at 61'.
BW-SS	9/4/92	1122.26	ND		Dry at 61', cement.
BW-SS	10/2/92	1122.26	ND		Dry at 61'.
BW-SS	11/5/92	1122.26	ND		Dry at 61'.
BW-SS	12/1/92	1122.26	ND		Dry at 61', cement.
BW-SS	1/4/93	1122.26	61.13	1061.13	Erroneous data, cement in gravel pack?
BW-SS	1/11/93	1122.26	61.03	1061.23	Erroneous data, cement in gravel pack?
BW-SS	1/18/93	1122.26	60.30	1061.96	Erroneous data, cement in gravel pack?
BW-SS	1/26/93	1122.26	60.31	1061.95	Erroneous data, cement in gravel pack?
BW-SS	2/2/93	1122.26	60.28	1061.98	Erroneous data, cement in gravel pack?
BW-SS	2/9/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	2/16/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	3/1/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	3/15/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	4/1/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	4/26/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	5/3/93	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	4/5/95	1122.26	ND		Erroneous data, cement in gravel pack?
BW-SS	6/6/95	1122.26	59.49	1062.77	Erroneous data, cement in gravel pack?
BW-SS	7/7/95	1122.26	59.26	1063.00	Erroneous data, cement in gravel pack?
BW-SS	8/4/95	1122.26	59.11	1063.15	Erroneous data, cement in gravel pack?
BW-SS	9/7/95	1122.26	59.04	1063.22	Erroneous data, cement in gravel pack?
BW-SS	10/6/95	1122.26	58.87	1063.39	Erroneous data, cement in gravel pack?
BW-SS	11/10/95	1122.26	59.25	1063.01	Erroneous data, cement in gravel pack?
BW-SS	12/9/95	1122.26	58.87	1063.39	Well will not be measured in future
BW-SS	6/2/97	1122.26	57.68	1064.58	
BW-WD	1/12/88	1125.61	58.45	1067.16	Measured from top of steel casing
BW-WD	3/4/88	1125.61	57.42	1068.19	
BW-WD	6/14/88	1125.61	56.87	1068.74	
BW-WD	7/22/88	1125.61	58.00	1067.61	
BW-WD	8/25/88	1125.61	59.12	1066.49	
BW-WD	9/24/88	1125.61	59.37	1066.24	
BW-WD	10/21/88	1125.61	59.16	1066.45	
BW-WD	12/16/88	1125.61	60.42	1065.19	
BW-WD	1/19/89	1125.61	61.22	1064.39	
BW-WD	4/4/89	1125.61	62.07	1063.54	
BW-WD	5/8/89	1125.61	64.35	1061.26	
BW-WD	5/30/89	1125.61	64.74	1060.87	
BW-WD	6/30/89	1125.61	65.47	1060.14	
BW-WD	7/27/89	1125.61	60.40	1065.21	
BW-WD	9/5/89	1125.61	ND		Cannot get reading
BW-WD	9/28/89	1125.61	66.05	1059.56	
BW-WD	11/6/89	1125.61	67.10	1058.51	
BW-WD	12/1/89	1125.61	67.75	1057.86	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-WD	1/8/90	1125.61	69.30	1056.31	
BW-WD	2/5/90	1125.61	68.98	1056.63	
BW-WD	3/5/90	1125.61	69.58	1056.03	
BW-WD	4/6/90	1125.61	70.27	1055.34	
BW-WD	5/8/90	1125.61	70.70	1054.91	
BW-WD	6/5/90	1125.61	71.51	1054.10	
BW-WD	7/6/90	1125.61	72.52	1053.09	
BW-WD	7/30/90	1125.61	70.81	1054.80	
BW-WD	8/7/90	1125.61	69.34	1056.27	
BW-WD	9/11/90	1125.61	65.82	1059.79	
BW-WD	10/8/90	1125.61	67.42	1058.19	
BW-WD	11/1/90	1125.61	68.75	1056.86	
BW-WD	12/3/90	1125.61	70.12	1055.49	
BW-WD	1/8/91	1125.61	65.44	1060.17	Poor cut
BW-WD	2/4/91	1125.61	72.31	1053.30	
BW-WD	3/4/91	1125.61	72.94	1052.67	
BW-WD	4/4/91	1125.61	62.97	1062.64	
BW-WD	4/22/91	1125.61	57.10	1068.51	
BW-WD	6/3/91	1125.61	65.10	1060.51	From top of steel casing
BW-WD	7/5/91	1125.61	67.67	1057.94	
BW-WD	8/6/91	1125.61	69.78	1055.83	
BW-WD	9/6/91	1125.61	71.00	1054.61	
BW-WD	10/8/91	1125.61	72.78	1052.83	
BW-WD	11/6/91	1125.61	71.39	1054.22	
BW-WD	12/5/91	1125.61	68.58	1057.03	
BW-WD	1/2/92	1125.61	69.63	1055.98	
BW-WD	1/24/92	1125.61	62.64	1062.97	
BW-WD	2/7/92	1125.61	57.32	1068.29	
BW-WD	2/14/92	1125.61	55.00	1070.61	
BW-WD	2/21/92	1125.61	52.20	1073.41	
BW-WD	2/28/92	1125.61	50.82	1074.79	
BW-WD	3/9/92	1125.61	48.13	1077.48	
BW-WD	3/20/92	1125.61	45.41	1080.20	
BW-WD	4/3/92	1125.61	44.45	1081.16	
BW-WD	5/1/92	1125.61	40.46	1085.15	
BW-WD	6/1/92	1125.61	38.06	1087.55	
BW-WD	6/26/92	1125.61	39.82	1085.79	
BW-WD	7/10/92	1125.61	42.83	1082.78	
BW-WD	7/24/92	1125.61	44.76	1080.85	
BW-WD	8/7/92	1125.61	42.03	1083.58	
BW-WD	9/4/92	1125.61	38.78	1086.83	
BW-WD	10/2/92	1125.61	42.53	1083.08	
BW-WD	11/5/92	1125.61	47.74	1077.87	
BW-WD	12/1/92	1125.61	50.91	1074.70	
BW-WD	1/4/93	1125.61	46.49	1079.12	
BW-WD	1/11/93	1125.61	40.09	1085.52	
BW-WD	1/18/93	1125.61	36.30	1089.31	
BW-WD	1/26/93	1125.61	35.21	1090.40	
BW-WD	2/2/93	1125.61	35.48	1090.13	
BW-WD	2/9/93	1125.61	35.17	1090.44	
BW-WD	2/16/93	1125.61	34.45	1091.16	
BW-WD	3/1/93	1125.61	33.17	1092.44	
BW-WD	3/15/93	1125.61	33.77	1091.84	
BW-WD	4/1/93	1125.61	33.31	1092.30	
BW-WD	4/26/93	1125.61	34.51	1091.10	
BW-WD	5/3/93	1125.61	33.81	1091.80	
BW-WD	6/1/93	1125.61	34.64	1090.97	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-WD	6/11/93	1125.61	34.88	1090.73	
BW-WD	7/1/93	1125.61	36.04	1089.57	
BW-WD	8/6/93	1125.61	40.60	1085.01	
BW-WD	9/7/93	1125.61	40.22	1085.39	
BW-WD	10/6/93	1125.61	43.85	1081.76	
BW-WD	11/9/93	1125.61	45.35	1080.26	
BW-WD	12/6/93	1125.61	41.95	1083.66	
BW-WD	1/4/94	1125.61	43.51	1082.10	
BW-WD	2/3/94	1125.61	47.59	1078.02	
BW-WD	3/7/94	1125.61	49.83	1075.78	
BW-WD	4/6/94	1125.61	50.61	1075.00	
BW-WD	5/6/94	1125.61	52.35	1073.26	
BW-WD	6/7/94	1125.61	53.69	1071.92	
BW-WD	7/6/94	1125.61	55.28	1070.33	
BW-WD	8/4/94	1125.61	56.65	1068.96	
BW-WD	9/9/94	1125.61	56.72	1068.89	
BW-WD	10/13/94	1125.61	58.18	1067.43	
BW-WD	11/4/94	1125.61	58.52	1067.09	
BW-WD	12/2/94	1125.61	58.68	1066.93	
BW-WD	1/9/95	1125.61	54.18	1071.43	
BW-WD	2/3/95	1125.61	50.78	1074.83	
BW-WD	3/2/95	1125.61	44.60	1081.01	
BW-WD	4/5/95	1125.61	40.66	1084.95	
BW-WD	5/10/95	1125.61	41.23	1084.38	
BW-WD	6/6/95	1125.61	45.42	1080.19	
BW-WD	7/7/95	1125.61	48.56	1077.05	
BW-WD	8/4/95	1125.61	50.80	1074.81	
BW-WD	9/7/95	1125.61	49.40	1076.21	
BW-WD	10/6/95	1125.61	47.68	1077.93	
BW-WD	11/10/95	1125.61	47.57	1078.04	
BW-WD	12/9/95	1125.61	50.15	1075.46	Well will not be measured in future
BW-WD	6/2/97	1125.61	65.28	1060.33	
BW-WS	1/12/88	1125.61	ND		Dry (top of pad to TOC-1.08')
BW-WS	3/4/88	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	6/14/88	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	7/22/88	1125.61	61.97	1063.64	Erroneous data, cement in gravel pack?
BW-WS	8/25/88	1125.61	61.92	1063.69	Erroneous data, cement in gravel pack?
BW-WS	9/24/88	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	10/21/88	1125.61	62.06	1063.55	Erroneous data, cement in gravel pack?
BW-WS	12/16/88	1125.61	60.42	1065.19	Erroneous data, cement in gravel pack?
BW-WS	1/19/89	1125.61	61.92	1063.69	Erroneous data, cement in gravel pack?
BW-WS	4/4/89	1125.61	64.88	1060.73	Erroneous data, cement in gravel pack?
BW-WS	5/8/89	1125.61	66.05	1059.56	Erroneous data, cement in gravel pack?
BW-WS	5/30/89	1125.61	65.84	1059.77	Erroneous data, cement in gravel pack?
BW-WS	6/30/89	1125.61	66.02	1059.59	Erroneous data, cement in gravel pack?
BW-WS	7/27/89	1125.61	66.35	1059.26	Erroneous data, cement in gravel pack?
BW-WS	9/5/89	1125.61	66.42	1059.19	Erroneous data, cement in gravel pack?
BW-WS	9/28/89	1125.61	66.40	1059.21	Erroneous data, cement in gravel pack?
BW-WS	11/6/89	1125.61	66.28	1059.33	Erroneous data, cement in gravel pack?
BW-WS	12/1/89	1125.61	66.25	1059.36	Erroneous data, cement in gravel pack?
BW-WS	1/8/90	1125.61	66.25	1059.36	Erroneous data, cement in gravel pack?
BW-WS	2/5/90	1125.61	66.26	1059.35	Erroneous data, cement in gravel pack?
BW-WS	3/5/90	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	4/6/90	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	5/8/90	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	6/5/90	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	7/6/90	1125.61	ND		Erroneous data, cement in gravel pack?

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-WS	8/7/90	1125.61	66.29	1059.32	Erroneous data, cement in gravel pack?
BW-WS	9/11/90	1125.61	66.30	1059.31	Erroneous data, cement in gravel pack?
BW-WS	10/8/90	1125.61	66.30	1059.31	Erroneous data, cement in gravel pack?
BW-WS	11/1/90	1125.61	66.74	1058.87	Erroneous data, cement in gravel pack?
BW-WS	12/3/90	1125.61	66.75	1058.86	Erroneous data, cement in gravel pack?
BW-WS	1/8/91	1125.61	66.72	1058.89	Erroneous data, cement in gravel pack?
BW-WS	2/4/91	1125.61	66.32	1059.29	Erroneous data, cement in gravel pack?
BW-WS	3/4/91	1125.61	66.77	1058.84	Erroneous data, cement in gravel pack?
BW-WS	4/4/91	1125.61	66.55	1059.06	Erroneous data, cement in gravel pack?
BW-WS	4/22/91	1125.61	66.75	1058.86	Erroneous data, cement in gravel pack?
BW-WS	6/3/91	1125.61	66.32	1059.29	Erroneous data, cement in gravel pack?
BW-WS	7/5/91	1125.61	66.66	1058.95	Erroneous data, cement in gravel pack?
BW-WS	8/6/91	1125.61	66.24	1059.37	Erroneous data, cement in gravel pack?
BW-WS	9/6/91	1125.61	67.19	1058.42	Erroneous data, cement in gravel pack?
BW-WS	10/8/91	1125.61	66.13	1059.48	Erroneous data, cement in gravel pack?
BW-WS	11/6/91	1125.61	66.30	1059.31	Erroneous data, cement in gravel pack?
BW-WS	12/5/91	1125.61	66.24	1059.37	Erroneous data, cement in gravel pack?
BW-WS	1/2/92	1125.61	66.26	1059.35	Erroneous data, cement in gravel pack?
BW-WS	1/24/92	1125.61	62.24	1063.37	Erroneous data, cement in gravel pack?
BW-WS	2/7/92	1125.61	66.10	1059.51	Erroneous data, cement in gravel pack?
BW-WS	2/14/92	1125.61	65.36	1060.25	Erroneous data, cement in gravel pack?
BW-WS	2/21/92	1125.61	65.20	1060.41	Erroneous data, cement in gravel pack?
BW-WS	2/28/92	1125.61	65.10	1060.51	Erroneous data, cement in gravel pack?
BW-WS	3/9/92	1125.61	65.09	1060.52	Erroneous data, cement in gravel pack?
BW-WS	3/20/92	1125.61	63.41	1062.20	Erroneous data, cement in gravel pack?
BW-WS	4/3/92	1125.61	45.21	1080.40	Erroneous data, cement in gravel pack?
BW-WS	5/1/92	1125.61	44.31	1081.30	Erroneous data, cement in gravel pack?
BW-WS	6/1/92	1125.61	41.74	1083.87	Erroneous data, cement in gravel pack?
BW-WS	6/26/92	1125.61	40.24	1085.37	Erroneous data, cement in gravel pack?
BW-WS	7/10/92	1125.61	40.20	1085.41	Erroneous data, cement in gravel pack?
BW-WS	7/24/92	1125.61	40.50	1085.11	Erroneous data, cement in gravel pack?
BW-WS	8/7/92	1125.61	40.70	1084.91	Erroneous data, cement in gravel pack?
BW-WS	9/4/92	1125.61	41.05	1084.56	Erroneous data, cement in gravel pack?
BW-WS	10/2/92	1125.61	61.03	1064.58	Erroneous data, cement in gravel pack?
BW-WS	11/5/92	1125.61	60.37	1065.24	Erroneous data, cement in gravel pack?
BW-WS	12/1/92	1125.61	61.04	1064.57	Erroneous data, cement in gravel pack?
BW-WS	1/4/93	1125.61	58.73	1066.88	Erroneous data, cement in gravel pack?
BW-WS	1/11/93	1125.61	57.68	1067.93	Erroneous data, cement in gravel pack?
BW-WS	1/18/93	1125.61	59.04	1066.57	Erroneous data, cement in gravel pack?
BW-WS	1/26/93	1125.61	58.99	1066.62	Erroneous data, cement in gravel pack?
BW-WS	2/2/93	1125.61	58.97	1066.64	Erroneous data, cement in gravel pack?
BW-WS	2/9/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	2/16/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	3/1/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	3/15/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	4/1/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	4/26/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	5/3/93	1125.61	ND		Erroneous data, cement in gravel pack?
BW-WS	10/6/93	1125.61	53.70	1071.91	Erroneous data, cement in gravel pack?
BW-WS	11/9/93	1125.61	54.45	1071.16	Erroneous data, cement in gravel pack?
BW-WS	12/6/93	1125.61	53.42	1072.19	Erroneous data, cement in gravel pack?
BW-WS	1/4/94	1125.61	54.21	1071.40	Erroneous data, cement in gravel pack?
BW-WS	2/3/94	1125.61	47.59	1078.02	Erroneous data, cement in gravel pack?
BW-WS	9/9/94	1125.61	ND		Well has grout intrusion
BW-WS	10/13/94	1125.61	50.88	1074.73	Well has grout intrusion
BW-WS	11/4/94	1125.61	50.99	1074.62	Well has grout intrusion
BW-WS	12/2/94	1125.61	51.11	1074.50	Well has grout intrusion

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
BW-WS	1/9/95	1125.61	51.25	1074.36	Well has grout intrusion
BW-WS	5/10/95	1125.61	50.49	1075.12	Well has grout intrusion
BW-WS	6/6/95	1125.61	50.39	1075.22	Well has grout intrusion
BW-WS	7/7/95	1125.61	50.32	1075.29	Well has grout intrusion
BW-WS	8/4/95	1125.61	50.37	1075.24	Well has grout intrusion
BW-WS	9/7/95	1125.61	50.28	1075.33	Well has grout intrusion
BW-WS	10/6/95	1125.61	49.04	1076.57	Well has grout intrusion
BW-WS	11/10/95	1125.61	50.32	1075.29	Well has grout intrusion
BW-WS	12/9/95	1125.61	50.28	1075.33	Well will not be measured in future
BW-WS	6/2/97	1125.61	61.37	1064.24	
EW-1	4/3/89	1120.47	65.32	1055.15	Measured from well seal
EW-1	5/8/89	1120.47	66.09	1054.38	
EW-1	5/30/89	1120.47	66.46	1054.01	
EW-1	6/30/89	1120.47	ND		Too much condensation
EW-1	7/27/89	1120.47	67.68	1052.79	
EW-1	9/5/89	1120.47	67.70	1052.77	
EW-1	9/28/89	1120.47	67.59	1052.88	
EW-1	11/6/89	1120.47	67.91	1052.56	
EW-1	12/1/89	1120.47	ND		Unable to get measurement
EW-1	1/8/90	1120.47	ND		Unable to get measurement
EW-1	1/25/90	1120.47	70.48	1049.99	
EW-1	2/5/90	1120.47	70.50	1049.97	
EW-1	3/5/90	1120.47	71.08	1049.39	
EW-1	4/6/90	1120.47	71.59	1048.88	
EW-1	5/8/90	1120.47	72.15	1048.32	
EW-1	6/5/90	1120.47	72.85	1047.62	
EW-1	7/6/90	1120.47	73.48	1046.99	
EW-1	7/30/90	1120.47	72.01	1048.46	
EW-1	8/7/90	1120.47	70.52	1049.95	
EW-1	9/11/90	1120.47	66.67	1053.80	
EW-1	10/8/90	1120.47	68.34	1052.13	Attempt 15 times, not good cut
EW-1	11/1/90	1120.47	70.21	1050.26	
EW-1	12/3/90	1120.47	71.97	1048.50	
EW-1	1/8/91	1120.47	72.36	1048.11	
EW-1	2/4/91	1120.47	74.03	1046.44	
EW-1	3/4/91	1120.47	74.71	1045.76	
EW-1	3/27/91	1120.47	70.14	1050.33	
EW-1	4/2/91	1120.47	64.30	1056.17	
EW-1	4/3/91	1120.47	63.60	1056.87	
EW-1	4/4/91	1120.47	62.67	1057.80	
EW-1	4/5/91	1120.47	61.68	1058.79	
EW-1	4/8/91	1120.47	60.45	1060.02	
EW-1	4/9/91	1120.47	59.62	1060.85	
EW-1	4/10/91	1120.47	58.63	1061.84	
EW-1	4/11/91	1120.47	58.43	1062.04	
EW-1	4/12/91	1120.47	58.19	1062.28	
EW-1	4/15/91	1120.47	57.51	1062.96	
EW-1	4/16/91	1120.47	57.65	1062.82	
EW-1	4/17/91	1120.47	57.65	1062.82	
EW-1	4/18/91	1120.47	57.88	1062.59	
EW-1	4/22/91	1120.47	58.75	1061.72	
EW-1	4/25/91	1120.47	59.68	1060.79	
EW-1	4/27/91	1120.47	60.40	1060.07	
EW-1	4/29/91	1120.47	61.12	1059.35	
EW-1	5/1/91	1120.47	61.74	1058.73	
EW-1	5/3/91	1120.47	61.54	1058.93	
EW-1	5/4/91	1120.47	62.86	1057.61	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-1	5/5/91	1120.47	63.13	1057.34	
EW-1	5/6/91	1120.47	63.32	1057.15	
EW-1	5/7/91	1120.47	63.52	1056.95	
EW-1	5/8/91	1120.47	63.94	1056.53	
EW-1	5/9/91	1120.47	64.11	1056.36	
EW-1	5/10/91	1120.47	64.42	1056.05	
EW-1	5/12/91	1120.47	64.83	1055.64	
EW-1	5/13/91	1120.47	65.02	1055.45	
EW-1	5/15/91	1120.47	65.51	1054.96	
EW-1	5/17/91	1120.47	65.76	1054.71	
EW-1	5/20/91	1120.47	66.16	1054.31	
EW-1	5/23/91	1120.47	66.70	1053.77	
EW-1	5/27/91	1120.47	67.18	1053.29	
EW-1	5/29/91	1120.47	68.35	1052.12	
EW-1	6/1/91	1120.47	67.61	1052.86	
EW-1	6/3/91	1120.47	67.83	1052.64	
EW-1	6/5/91	1120.47	67.97	1052.50	
EW-1	6/6/91	1120.47	68.09	1052.38	
EW-1	6/7/91	1120.47	68.16	1052.31	
EW-1	6/8/91	1120.47	68.24	1052.23	
EW-1	6/9/91	1120.47	68.35	1052.12	
EW-1	6/10/91	1120.47	68.45	1052.02	
EW-1	6/11/91	1120.47	68.62	1051.85	
EW-1	7/5/91	1120.47	70.27	1050.20	
EW-1	8/6/91	1120.47	72.05	1048.42	
EW-1	9/6/91	1120.47	73.42	1047.05	
EW-1	10/8/91	1120.47	74.32	1046.15	
EW-1	11/6/91	1120.47	74.24	1046.23	
EW-1	12/5/91	1120.47	73.11	1047.36	
EW-1	12/30/91	1120.47	72.55	1047.92	
EW-1	12/31/91	1120.47	72.62	1047.85	
EW-1	1/2/92	1120.47	72.68	1047.79	
EW-1	1/24/92	1120.47	61.94	1058.53	
EW-1	1/31/92	1120.47	58.52	1061.95	
EW-1	2/7/92	1120.47	56.61	1063.86	
EW-1	2/14/92	1120.47	53.30	1067.17	
EW-1	2/21/92	1120.47	50.45	1070.02	
EW-1	2/28/92	1120.47	49.90	1070.57	
EW-1	3/9/92	1120.47	45.99	1074.48	
EW-1	3/20/92	1120.47	43.34	1077.13	
EW-1	4/3/92	1120.47	40.81	1079.66	
EW-1	5/1/92	1120.47	38.86	1081.61	
EW-1	6/1/92	1120.47	36.12	1084.35	
EW-1	6/26/92	1120.47	40.65	1079.82	
EW-1	7/10/92	1120.47	45.08	1075.39	
EW-1	7/24/92	1120.47	46.83	1073.64	
EW-1	8/7/92	1120.47	44.94	1075.53	
EW-1	9/4/92	1120.47	37.64	1082.83	
EW-1	10/2/92	1120.47	45.45	1075.02	
EW-1	11/5/92	1120.47	51.51	1068.96	
EW-1	12/1/92	1120.47	54.89	1065.58	
EW-1	1/4/93	1120.47	47.52	1072.95	
EW-1	1/11/93	1120.47	38.44	1082.03	
EW-1	1/18/93	1120.47	35.05	1085.42	
EW-1	1/26/93	1120.47	35.06	1085.41	
EW-1	2/2/93	1120.47	35.86	1084.61	
EW-1	2/9/93	1120.47	35.32	1085.15	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-1	2/16/93	1120.47	34.19	1086.28	
EW-1	3/1/93	1120.47	33.06	1087.41	
EW-1	3/15/93	1120.47	34.33	1086.14	
EW-1	4/1/93	1120.47	33.79	1086.68	
EW-1	4/26/93	1120.47	35.57	1084.90	
EW-1	5/3/93	1120.47	34.36	1086.11	
EW-1	6/1/93	1120.47	35.50	1084.97	
EW-1	6/11/93	1120.47	36.12	1084.35	
EW-1	7/1/93	1120.47	38.37	1082.10	
EW-1	8/6/93	1120.47	44.94	1075.53	
EW-1	9/7/93	1120.47	43.42	1077.05	
EW-1	10/6/93	1120.47	49.90	1070.57	
EW-1	11/9/93	1120.47	50.53	1069.94	
EW-1	12/6/93	1120.47	46.30	1074.17	
EW-1	1/4/94	1120.47	48.56	1071.91	
EW-1	2/3/94	1120.47	52.72	1067.75	
EW-1	3/7/94	1120.47	54.60	1065.87	
EW-1	4/6/94	1120.47	55.19	1065.28	
EW-1	5/6/94	1120.47	56.69	1063.78	
EW-1	6/7/94	1120.47	58.04	1062.43	
EW-1	7/6/94	1120.47	59.49	1060.98	
EW-1	8/4/94	1120.47	60.65	1059.82	
EW-1	9/9/94	1120.47	60.55	1059.92	
EW-1	10/12/94	1120.47	61.95	1058.52	
EW-1	11/4/94	1120.47	62.22	1058.25	
EW-1	12/2/94	1120.47	62.39	1058.08	
EW-1	1/9/95	1120.47	56.78	1063.69	
EW-1	2/3/95	1120.47	53.80	1066.67	
EW-1	3/2/95	1120.47	45.31	1075.16	
EW-1	4/5/95	1120.47	40.92	1079.55	
EW-1	5/10/95	1120.47	44.02	1076.45	
EW-1	6/6/95	1120.47	49.32	1071.15	
EW-1	7/7/95	1120.47	52.70	1067.77	
EW-1	8/4/95	1120.47	54.88	1065.59	
EW-1	9/7/95	1120.47	53.26	1067.21	
EW-1	10/6/95	1120.47	50.26	1070.21	
EW-1	11/10/95	1120.47	50.74	1069.73	
EW-1	12/9/95	1120.47	54.72	1065.75	
EW-1	1/11/96	1120.47	57.78	1062.69	
EW-1	2/10/96	1120.47	57.45	1063.02	
EW-1	3/8/96	1120.47	58.02	1062.45	New building on Tanner; area leveled
EW-1	4/6/96	1120.47	58.72	1061.75	
EW-1	5/7/96	1120.47	59.24	1061.23	
EW-1	6/5/96	1120.47	59.86	1060.61	
EW-1	7/8/96	1120.47	60.20	1060.27	
EW-1	8/2/96	1120.47	59.66	1060.81	
EW-1	9/9/96	1120.47	60.00	1060.47	
EW-1	10/4/96	1120.47	60.99	1059.48	
EW-1	11/1/96	1120.47	62.00	1058.47	
EW-1	12/5/96	1120.47	63.21	1057.26	
EW-1	4/7/97	1120.47	66.79	1053.68	
EW-1	6/2/97	1120.47	68.55	1051.92	
EW-1	9/10/97	1120.47	69.51	1050.96	
EW-1	12/11/97	1120.47	71.65	1048.82	
EW-1	3/13/98	1120.47	65.04	1055.43	
EW-1	6/22/98	1120.47	64.70	1055.77	
EW-1	9/22/98	1120.47	65.60	1054.87	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-1	6/8/99	1120.47	68.87	1051.60	
EW-2	3/30/89	1107.96	41.53	1066.43	Measured from well seal
EW-2	5/8/89	1107.96	42.22	1065.74	
EW-2	5/30/89	1107.96	42.70	1065.26	
EW-2	6/30/89	1107.96	43.31	1064.65	
EW-2	7/27/89	1107.96	43.73	1064.23	
EW-2	9/5/89	1107.96	44.02	1063.94	
EW-2	9/28/89	1107.96	44.51	1063.45	
EW-2	11/6/89	1107.96	45.19	1062.77	
EW-2	12/1/89	1107.96	45.72	1062.24	
EW-2	1/8/90	1107.96	46.93	1061.03	
EW-2	2/5/90	1107.96	47.47	1060.49	
EW-2	3/5/90	1107.96	48.04	1059.92	
EW-2	4/6/90	1107.96	48.95	1059.01	
EW-2	5/8/90	1107.96	49.59	1058.37	
EW-2	6/5/90	1107.96	50.51	1057.45	
EW-2	7/6/90	1107.96	51.09	1056.87	
EW-2	7/24/90	1107.96	51.21	1056.75	
EW-2	7/27/90	1107.96	50.37	1057.59	
EW-2	7/30/90	1107.96	48.69	1059.27	
EW-2	8/7/90	1107.96	46.92	1061.04	
EW-2	8/15/90	1107.96	46.39	1061.57	
EW-2	8/16/90	1107.96	45.55	1062.41	Flow in river ~150 cfs
EW-2	8/17/90	1107.96	45.03	1062.93	Very slight flow in river
EW-2	8/20/90	1107.96	43.52	1064.44	No flow in river
EW-2	8/22/90	1107.96	43.04	1064.92	
EW-2	9/6/90	1107.96	42.87	1065.09	
EW-2	9/11/90	1107.96	41.63	1066.33	
EW-2	10/8/90	1107.96	43.63	1064.33	
EW-2	11/1/90	1107.96	45.20	1062.76	
EW-2	12/3/90	1107.96	46.76	1061.20	
EW-2	1/8/91	1107.96	47.38	1060.58	
EW-2	2/4/91	1107.96	49.69	1058.27	
EW-2	3/4/91	1107.96	50.61	1057.35	
EW-2	3/27/91	1107.96	43.03	1064.93	
EW-2	4/1/91	1107.96	36.18	1071.78	
EW-2	4/2/91	1107.96	35.66	1072.30	
EW-2	4/3/91	1107.96	34.97	1072.99	
EW-2	4/4/91	1107.96	34.06	1073.90	
EW-2	4/5/91	1107.96	33.41	1074.55	
EW-2	4/8/91	1107.96	32.71	1075.25	
EW-2	4/9/91	1107.96	31.71	1076.25	
EW-2	4/10/91	1107.96	30.79	1077.17	
EW-2	4/11/91	1107.96	30.76	1077.20	
EW-2	4/12/91	1107.96	30.64	1077.32	
EW-2	4/15/91	1107.96	30.04	1077.92	
EW-2	4/16/91	1107.96	30.06	1077.90	
EW-2	4/17/91	1107.96	30.00	1077.96	Could not get good cut on tape
EW-2	4/18/91	1107.96	30.11	1077.85	
EW-2	4/22/91	1107.96	30.75	1077.21	
EW-2	4/25/91	1107.96	31.57	1076.39	
EW-2	4/27/91	1107.96	32.20	1075.76	
EW-2	4/29/91	1107.96	32.89	1075.07	
EW-2	5/1/91	1107.96	33.79	1074.17	Good cut
EW-2	5/3/91	1107.96	33.14	1074.82	Poor cut
EW-2	5/4/91	1107.96	34.42	1073.54	Good cut
EW-2	5/5/91	1107.96	34.26	1073.70	Poor cut

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-2	5/6/91	1107.96	34.78	1073.18	Good cut
EW-2	5/7/91	1107.96	35.11	1072.85	
EW-2	5/8/91	1107.96	35.30	1072.66	
EW-2	5/9/91	1107.96	35.49	1072.47	
EW-2	5/10/91	1107.96	35.91	1072.05	
EW-2	5/12/91	1107.96	36.35	1071.61	
EW-2	5/13/91	1107.96	36.52	1071.44	
EW-2	5/15/91	1107.96	37.05	1070.91	
EW-2	5/17/91	1107.96	37.47	1070.49	
EW-2	5/20/91	1107.96	38.03	1069.93	
EW-2	5/23/91	1107.96	38.74	1069.22	
EW-2	5/27/91	1107.96	39.52	1068.44	
EW-2	5/29/91	1107.96	39.84	1068.12	
EW-2	6/1/91	1107.96	40.58	1067.38	
EW-2	6/3/91	1107.96	40.76	1067.20	
EW-2	6/5/91	1107.96	41.34	1066.62	
EW-2	6/6/91	1107.96	41.55	1066.41	
EW-2	6/7/91	1107.96	41.69	1066.27	
EW-2	6/8/91	1107.96	41.82	1066.14	
EW-2	6/9/91	1107.96	42.04	1065.92	
EW-2	6/10/91	1107.96	41.87	1066.09	
EW-2	6/11/91	1107.96	41.98	1065.98	
EW-2	7/5/91	1107.96	44.47	1063.49	
EW-2	8/6/91	1107.96	46.58	1061.38	
EW-2	9/6/91	1107.96	48.38	1059.58	
EW-2	10/8/91	1107.96	49.33	1058.63	
EW-2	11/6/91	1107.96	49.12	1058.84	Double check
EW-2	12/5/91	1107.96	47.64	1060.32	
EW-2	1/2/92	1107.96	47.25	1060.71	
EW-2	1/24/92	1107.96	35.79	1072.17	
EW-2	2/7/92	1107.96	31.02	1076.94	
EW-2	2/14/92	1107.96	28.09	1079.87	
EW-2	2/21/92	1107.96	25.53	1082.43	
EW-2	2/28/92	1107.96	24.56	1083.40	
EW-2	3/9/92	1107.96	22.01	1085.95	
EW-2	3/20/92	1107.96	20.26	1087.70	
EW-2	4/3/92	1107.96	18.00	1089.96	
EW-2	5/1/92	1107.96	16.46	1091.50	
EW-2	6/1/92	1107.96	14.52	1093.44	Needs plug for WL hole
EW-2	6/26/92	1107.96	16.62	1091.34	
EW-2	7/10/92	1107.96	19.35	1088.61	
EW-2	7/24/92	1107.96	20.68	1087.28	
EW-2	8/7/92	1107.96	18.55	1089.41	
EW-2	9/4/92	1107.96	14.11	1093.85	
EW-2	10/2/92	1107.96	18.85	1089.11	
EW-2	11/5/92	1107.96	23.91	1084.05	
EW-2	12/1/92	1107.96	28.13	1079.83	
EW-2	1/4/93	1107.96	19.79	1088.17	
EW-2	1/11/93	1107.96	ND		No access, surrounded by water.
EW-2	1/18/93	1107.96	ND		No access, surrounded by water.
EW-2	1/26/93	1107.96	ND		No access, vault full of mud.
EW-2	2/2/93	1107.96	11.09	1096.87	
EW-2	2/9/93	1107.96	10.81	1097.15	
EW-2	2/16/93	1107.96	10.14	1097.82	
EW-2	3/1/93	1107.96	9.36	1098.60	
EW-2	3/15/93	1107.96	10.47	1097.49	
EW-2	4/1/93	1107.96	10.18	1097.78	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-2	4/26/93	1107.96	12.11	1095.85	
EW-2	5/3/93	1107.96	10.93	1097.03	
EW-2	6/1/93	1107.96	12.17	1095.79	
EW-2	6/11/93	1107.96	12.17	1095.79	
EW-2	7/1/93	1107.96	13.55	1094.41	
EW-2	8/6/93	1107.96	17.34	1090.62	
EW-2	9/7/93	1107.96	ND		Couldn't get plug out. No access.
EW-2	10/7/93	1107.96	19.13	1088.83	
EW-2	11/9/93	1107.96	21.85	1086.11	
EW-2	12/6/93	1107.96	18.42	1089.54	
EW-2	1/4/94	1107.96	20.03	1087.93	
EW-2	2/3/94	1107.96	23.94	1084.02	
EW-2	3/7/94	1107.96	26.42	1081.54	
EW-2	4/6/94	1107.96	27.67	1080.29	
EW-2	5/6/94	1107.96	29.35	1078.61	
EW-2	6/7/94	1107.96	30.98	1076.98	
EW-2	7/6/94	1107.96	32.77	1075.19	
EW-2	8/4/94	1107.96	34.18	1073.78	
EW-2	9/9/94	1107.96	34.38	1073.58	
EW-2	10/12/94	1107.96	35.48	1072.48	
EW-2	11/4/94	1107.96	35.52	1072.44	
EW-2	12/2/94	1107.96	35.79	1072.17	
EW-2	1/9/95	1107.96	31.35	1076.61	
EW-2	2/3/95	1107.96	25.87	1082.09	
EW-2	3/2/95	1107.96	18.94	1089.02	
EW-2	4/5/95	1107.96	ND		Could not remove well seal plug
EW-2	5/10/95	1107.96	17.59	1090.37	
EW-2	6/6/95	1107.96	21.68	1086.28	
EW-2	7/7/95	1107.96	25.44	1082.52	
EW-2	8/4/95	1107.96	27.88	1080.08	
EW-2	9/7/95	1107.96	25.49	1082.47	
EW-2	10/6/95	1107.96	22.77	1085.19	
EW-2	11/10/95	1107.96	21.67	1086.29	
EW-2	12/9/95	1107.96	26.19	1081.77	
EW-2	1/11/96	1107.96	27.99	1079.97	
EW-2	2/10/96	1107.96	30.54	1077.42	
EW-2	3/8/96	1107.96	31.83	1076.13	
EW-2	4/6/96	1107.96	33.30	1074.66	
EW-2	5/7/96	1107.94	34.67	1073.27	Pump removed, elevation -0.02 feet.
EW-2	6/5/96	1107.94	35.81	1072.13	
EW-2	7/8/96	1107.94	36.67	1071.27	
EW-2	8/2/96	1107.94	36.59	1071.35	
EW-2	9/9/96	1107.94	36.84	1071.10	
EW-2	10/4/96	1107.94	37.36	1070.58	
EW-2	11/1/96	1107.94	38.06	1069.88	
EW-2	12/5/96	1107.94	39.00	1068.94	
EW-2	4/7/97	1107.96	42.67	1065.29	
EW-2	6/2/97	1107.96	44.34	1063.62	
EW-2	9/10/97	1107.96	45.27	1062.69	
EW-2	12/11/97	1107.96	45.8	1062.16	
EW-2	3/13/98	1107.96	39.17	1068.79	
EW-2	6/22/98	1107.96	36.72	1071.24	
EW-2	9/22/98	1107.96	36.25	1071.71	
EW-3	3/29/89	1128.07	48.46	1079.61	Measured from well seal
EW-3	5/8/89	1128.07	50.09	1077.98	
EW-3	5/30/89	1128.07	50.37	1077.70	
EW-3	6/30/89	1128.07	51.09	1076.98	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-3	7/27/89	1128.07	51.43	1076.64	
EW-3	9/5/89	1128.07	52.49	1075.58	
EW-3	9/28/89	1128.07	52.95	1075.12	
EW-3	11/6/89	1128.07	53.90	1074.17	
EW-3	12/1/89	1128.07	54.72	1073.35	
EW-3	1/8/90	1128.07	55.97	1072.10	
EW-3	2/5/90	1128.07	56.60	1071.47	
EW-3	3/5/90	1128.07	57.38	1070.69	
EW-3	4/6/90	1128.07	58.65	1069.42	
EW-3	5/8/90	1128.07	59.82	1068.25	
EW-3	6/5/90	1128.07	60.65	1067.42	
EW-3	7/6/90	1128.07	61.39	1066.68	
EW-3	7/30/90	1128.07	59.19	1068.88	
EW-3	8/7/90	1128.07	59.02	1069.05	
EW-3	9/11/90	1128.07	51.69	1076.38	
EW-3	10/8/90	1128.07	51.50	1076.57	
EW-3	11/1/90	1128.07	52.71	1075.36	
EW-3	12/3/90	1128.07	54.11	1073.96	
EW-3	1/8/91	1128.07	57.17	1070.90	
EW-3	2/4/91	1128.07	59.65	1068.42	
EW-3	3/4/91	1128.07	59.41	1068.66	
EW-3	3/27/91	1128.07	51.36	1076.71	
EW-3	4/4/91	1128.07	43.00	1085.07	
EW-3	4/22/91	1128.07	37.06	1091.01	
EW-3	6/3/91	1128.07	48.22	1079.85	
EW-3	7/5/91	1128.07	52.10	1075.97	
EW-3	8/6/91	1128.07	54.34	1073.73	
EW-3	9/6/91	1128.07	56.35	1071.72	
EW-3	10/8/91	1128.07	57.38	1070.69	
EW-3	11/6/91	1128.07	57.25	1070.82	
EW-3	12/5/91	1128.07	56.25	1071.82	Measured to TOC, pump out
EW-3	12/30/91	1128.07	54.91	1073.16	
EW-3	12/31/91	1128.07	54.97	1073.10	
EW-3	1/2/92	1128.07	54.95	1073.12	
EW-3	1/24/92	1128.07	41.91	1086.16	
EW-3	1/31/92	1128.07	36.15	1091.92	
EW-3	2/7/92	1128.07	33.55	1094.52	
EW-3	2/14/92	1128.07	31.59	1096.48	
EW-3	2/21/92	1128.07	29.76	1098.31	
EW-3	2/28/92	1128.07	29.44	1098.63	
EW-3	3/9/92	1128.07	28.09	1099.98	
EW-3	3/20/92	1128.07	26.65	1101.42	
EW-3	4/3/92	1128.07	25.97	1102.10	
EW-3	5/1/92	1128.07	26.02	1102.05	
EW-3	6/1/92	1128.07	25.18	1102.89	
EW-3	6/26/92	1128.07	25.97	1102.10	
EW-3	7/10/92	1128.07	27.26	1100.81	
EW-3	7/24/92	1128.07	27.32	1100.75	
EW-3	8/7/92	1128.07	26.10	1101.97	
EW-3	9/4/92	1128.07	24.46	1103.61	
EW-3	10/2/92	1128.07	26.96	1101.11	
EW-3	11/5/92	1128.07	29.30	1098.77	
EW-3	12/1/92	1128.07	31.19	1096.88	
EW-3	1/4/93	1128.07	26.13	1101.94	
EW-3	1/11/93	1128.07	21.73	1106.34	
EW-3	1/18/93	1128.07	19.88	1108.19	
EW-3	1/26/93	1128.07	19.99	1108.08	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-3	2/2/93	1128.07	20.78	1107.29	
EW-3	2/9/93	1128.07	20.82	1107.25	
EW-3	2/16/93	1128.07	20.40	1107.67	
EW-3	3/1/93	1128.07	19.90	1108.17	
EW-3	3/15/93	1128.07	20.89	1107.18	
EW-3	4/1/93	1128.07	20.75	1107.32	
EW-3	4/26/93	1128.07	22.71	1105.36	
EW-3	5/3/93	1128.07	21.69	1106.38	
EW-3	6/1/93	1128.07	22.89	1105.18	
EW-3	6/11/93	1128.07	23.48	1104.59	
EW-3	7/1/93	1128.07	23.89	1104.18	
EW-3	8/6/93	1128.07	25.23	1102.84	
EW-3	9/7/93	1128.07	24.52	1103.55	
EW-3	10/7/93	1128.07	25.63	1102.44	
EW-3	11/9/93	1128.07	27.22	1100.85	
EW-3	12/6/93	1128.07	25.67	1102.40	
EW-3	1/4/94	1128.07	26.59	1101.48	
EW-3	2/3/94	1128.07	28.29	1099.78	
EW-3	3/7/94	1128.07	30.04	1098.03	
EW-3	4/6/94	1128.07	29.88	1098.19	
EW-3	5/6/94	1128.07	31.15	1096.92	
EW-3	6/7/94	1128.07	32.61	1095.46	
EW-3	7/6/94	1128.07	34.47	1093.60	
EW-3	8/4/94	1128.07	36.03	1092.04	
EW-3	9/9/94	1128.07	36.68	1091.39	
EW-3	10/12/94	1128.07	36.55	1091.52	
EW-3	11/4/94	1128.07	35.53	1092.54	
EW-3	12/2/94	1128.07	36.41	1091.66	
EW-3	1/9/95	1128.07	29.95	1098.12	
EW-3	2/3/95	1128.07	28.49	1099.58	
EW-3	3/2/95	1128.07	24.21	1103.86	
EW-3	4/5/95	1128.07	24.02	1104.05	
EW-3	5/10/95	1128.07	25.24	1102.83	
EW-3	6/6/95	1128.07	26.28	1101.79	
EW-3	7/7/95	1128.07	28.46	1099.61	
EW-3	8/4/95	1128.07	30.11	1097.96	
EW-3	9/7/95	1128.07	27.76	1100.31	
EW-3	10/6/95	1128.07	27.33	1100.74	
EW-3	11/10/95	1128.07	26.63	1101.44	
EW-3	12/9/95	1128.07	28.60	1099.47	
EW-3	1/11/96	1128.07	30.50	1097.57	
EW-3	2/10/96	1128.07	32.21	1095.86	
EW-3	3/8/96	1128.07	33.56	1094.51	
EW-3	4/6/96	1128.07	35.18	1092.89	
EW-3	5/7/96	1128.07	37.03	1091.04	
EW-3	6/5/96	1128.07	38.31	1089.76	
EW-3	7/8/96	1128.07	39.80	1088.27	
EW-3	8/2/96	1128.07	39.94	1088.13	
EW-3	9/9/96	1128.07	40.59	1087.48	
EW-3	10/4/96	1128.07	40.63	1087.44	
EW-3	11/1/96	1128.07	40.41	1087.66	
EW-3	12/5/96	1128.07	42.71	1085.36	
EW-3	4/7/97	1128.07	47.16	1080.91	
EW-3	6/2/97	1128.07	46.85	1081.22	
EW-3	9/10/97	1128.07	49.55	1078.52	
EW-3	12/11/97	1128.07	47.03	1081.04	
EW-3	3/13/98	1128.07	38.71	1089.36	

Estes Landfill
Remedial Investigation
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-3	6/22/98	1128.07	35.10	1092.97	
EW-3	9/22/98	1128.07	31.55	1096.52	
EW-4	4/3/89	1118.04	60.33	1057.71	Measured from well seal
EW-4	5/8/89	1118.04	61.40	1056.64	
EW-4	5/30/89	1118.04	62.04	1056.00	
EW-4	6/25/89	1118.04	61.95	1056.09	One week apart
EW-4	6/30/89	1118.04	62.89	1055.15	
EW-4	7/27/89	1118.04	63.39	1054.65	
EW-4	9/5/89	1118.04	63.03	1055.01	
EW-4	9/28/89	1118.04	62.26	1055.78	
EW-4	11/6/89	1118.04	63.26	1054.78	
EW-4	12/1/89	1118.04	63.51	1054.53	
EW-4	1/8/90	1118.04	65.14	1052.90	
EW-4	2/5/90	1118.04	65.10	1052.94	
EW-4	3/5/90	1118.04	65.92	1052.12	
EW-4	4/6/90	1118.04	66.62	1051.42	
EW-4	5/8/90	1118.04	66.86	1051.18	
EW-4	6/6/90	1118.04	67.99	1050.05	
EW-4	7/6/90	1118.04	68.31	1049.73	
EW-4	7/30/90	1118.04	ND		Not taken
EW-4	8/7/90	1118.04	64.30	1053.74	
EW-4	9/11/90	1118.04	60.63	1057.41	
EW-4	10/8/90	1118.04	63.09	1054.95	
EW-4	11/1/90	1118.04	64.93	1053.11	
EW-4	12/3/90	1118.04	66.35	1051.69	
EW-4	1/8/91	1118.04	67.35	1050.69	
EW-4	2/4/91	1118.04	68.29	1049.75	
EW-4	3/4/91	1118.04	68.61	1049.43	
EW-4	3/27/91	1118.04	63.20	1054.84	
EW-4	3/28/91	1118.04	63.19	1054.85	
EW-4	3/29/91	1118.04	61.88	1056.16	
EW-4	4/1/91	1118.04	58.69	1059.35	
EW-4	4/2/91	1118.04	56.95	1061.09	
EW-4	4/3/91	1118.04	56.10	1061.94	
EW-4	4/4/91	1118.04	55.06	1062.98	
EW-4	4/5/91	1118.04	54.11	1063.93	
EW-4	4/8/91	1118.04	52.92	1065.12	
EW-4	4/9/91	1118.04	51.99	1066.05	
EW-4	4/10/91	1118.04	50.94	1067.10	
EW-4	4/11/91	1118.04	50.81	1067.23	
EW-4	4/12/91	1118.04	50.58	1067.46	
EW-4	4/15/91	1118.04	49.90	1068.14	
EW-4	4/16/91	1118.04	50.02	1068.02	
EW-4	4/17/91	1118.04	49.99	1068.05	
EW-4	4/18/91	1118.04	50.25	1067.79	
EW-4	4/22/91	1118.04	51.06	1066.98	
EW-4	4/25/91	1118.04	52.15	1065.89	
EW-4	4/27/91	1118.04	53.01	1065.03	
EW-4	4/29/91	1118.04	53.87	1064.17	
EW-4	5/1/91	1118.04	54.69	1063.35	
EW-4	5/3/91	1118.04	55.60	1062.44	
EW-4	5/4/91	1118.04	55.97	1062.07	
EW-4	5/5/91	1118.04	56.31	1061.73	
EW-4	5/6/91	1118.04	56.49	1061.55	
EW-4	5/7/91	1118.04	56.83	1061.21	
EW-4	5/8/91	1118.04	57.19	1060.85	
EW-4	5/9/91	1118.04	57.41	1060.63	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-4	5/10/91	1118.04	ND		
EW-4	5/12/91	1118.04	58.19	1059.85	
EW-4	5/13/91	1118.04	58.40	1059.64	
EW-4	5/15/91	1118.04	58.88	1059.16	
EW-4	5/17/91	1118.04	59.25	1058.79	
EW-4	5/20/91	1118.04	59.71	1058.33	
EW-4	5/23/91	1118.04	60.40	1057.64	
EW-4	5/27/91	1118.04	60.97	1057.07	
EW-4	5/29/91	1118.04	61.05	1056.99	
EW-4	6/1/91	1118.04	61.41	1056.63	
EW-4	6/3/91	1118.04	61.73	1056.31	
EW-4	6/5/91	1118.04	61.92	1056.12	
EW-4	6/6/91	1118.04	ND		
EW-4	6/7/91	1118.04	62.10	1055.94	
EW-4	6/8/91	1118.04	62.19	1055.85	
EW-4	6/9/91	1118.04	62.32	1055.72	
EW-4	6/10/91	1118.04	62.46	1055.58	
EW-4	6/11/91	1118.04	62.63	1055.41	
EW-4	7/5/91	1118.04	64.39	1053.65	Need 1/2" cap
EW-4	8/6/91	1118.04	66.20	1051.84	
EW-4	9/6/91	1118.04	67.50	1050.54	
EW-4	10/8/91	1118.04	68.40	1049.64	
EW-4	11/6/91	1118.04	67.51	1050.53	
EW-4	12/5/91	1118.04	65.63	1052.41	
EW-4	1/2/92	1118.04	65.89	1052.15	
EW-4	1/24/92	1118.04	56.00	1062.04	
EW-4	2/7/92	1118.04	50.44	1067.60	
EW-4	2/14/92	1118.04	47.44	1070.60	
EW-4	2/21/92	1118.04	44.49	1073.55	
EW-4	2/28/92	1118.04	43.18	1074.86	
EW-4	3/9/92	1118.04	40.42	1077.62	
EW-4	3/20/92	1118.04	37.88	1080.16	
EW-4	4/3/92	1118.04	35.55	1082.49	
EW-4	5/1/92	1118.04	33.58	1084.46	
EW-4	6/1/92	1118.04	31.08	1086.96	
EW-4	6/26/92	1118.04	34.46	1083.58	
EW-4	7/10/92	1118.04	39.00	1079.04	
EW-4	7/24/92	1118.04	41.05	1076.99	
EW-4	8/7/92	1118.04	38.86	1079.18	
EW-4	9/4/92	1118.04	32.41	1085.63	
EW-4	10/2/92	1118.04	39.07	1078.97	
EW-4	11/5/92	1118.04	45.15	1072.89	
EW-4	12/1/92	1118.04	48.53	1069.51	
EW-4	1/4/93	1118.04	46.23	1071.81	
EW-4	1/11/93	1118.04	32.95	1085.09	
EW-4	1/18/93	1118.04	29.65	1088.39	
EW-4	1/26/93	1118.04	29.32	1088.72	
EW-4	2/2/93	1118.04	30.11	1087.93	
EW-4	2/9/93	1118.04	29.67	1088.37	
EW-4	2/16/93	1118.04	28.78	1089.26	
EW-4	3/1/93	1118.04	27.68	1090.36	
EW-4	3/15/93	1118.04	28.87	1089.17	
EW-4	4/1/93	1118.04	28.43	1089.61	
EW-4	4/26/93	1118.04	29.95	1088.09	
EW-4	5/3/93	1118.04	28.95	1089.09	
EW-4	6/1/93	1118.04	29.86	1088.18	
EW-4	6/11/93	1118.04	30.39	1087.65	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-4	7/1/93	1118.04	31.81	1086.23	
EW-4	8/6/93	1118.04	38.22	1079.82	
EW-4	9/7/93	1118.04	36.40	1081.64	
EW-4	10/7/93	1118.04	40.44	1077.60	
EW-4	11/9/93	1118.04	43.59	1074.45	
EW-4	12/6/93	1118.04	38.62	1079.42	
EW-4	1/4/94	1118.04	40.89	1077.15	
EW-4	2/3/94	1118.04	45.91	1072.13	
EW-4	3/7/94	1118.04	48.00	1070.04	
EW-4	4/6/94	1118.04	48.52	1069.52	
EW-4	5/6/94	1118.04	50.26	1067.78	
EW-4	6/7/94	1118.04	51.55	1066.49	
EW-4	7/6/94	1118.04	53.18	1064.86	
EW-4	8/4/94	1118.04	54.32	1063.72	
EW-4	9/9/94	1118.04	53.60	1064.44	
EW-4	10/12/94	1118.04	55.78	1062.26	
EW-4	11/4/94	1118.04	56.01	1062.03	
EW-4	12/2/94	1118.04	56.08	1061.96	
EW-4	1/9/95	1118.04	49.78	1068.26	
EW-4	2/3/95	1118.04	46.83	1071.21	
EW-4	3/2/95	1118.04	39.15	1078.89	
EW-4	4/5/95	1118.04	35.27	1082.77	
EW-4	5/10/95	1118.04	36.28	1081.76	
EW-4	6/6/95	1118.04	42.88	1075.16	
EW-4	7/7/95	1118.04	46.36	1071.68	
EW-4	8/4/95	1118.04	48.49	1069.55	
EW-4	9/7/95	1118.04	46.76	1071.28	
EW-4	10/6/95	1118.04	43.96	1074.08	
EW-4	11/10/95	1118.04	43.84	1074.20	
EW-4	12/9/95	1118.04	48.02	1070.02	
EW-4	1/11/96	1118.04	50.31	1067.73	
EW-4	2/10/96	1118.04	50.87	1067.17	
EW-4	3/8/96	1118.04	51.62	1066.42	
EW-4	4/5/96	1118.04	52.59	1065.45	
EW-4	5/7/96	1118.04	53.30	1064.74	
EW-4	6/5/96	1118.04	54.10	1063.94	
EW-4	7/8/96	1118.04	54.49	1063.55	
EW-4	8/2/96	1118.02	53.62	1064.40	TD=98.75
EW-4	9/9/96	1118.02	53.69	1064.33	
EW-4	10/4/96	1118.04	55.22	1062.82	Pump back in well
EW-4	11/1/96	1118.04	55.92	1062.12	
EW-4	12/5/96	1118.04	57.23	1060.81	
EW-4	4/7/97	1118.04	60.85	1057.19	
EW-4	6/2/97	1118.04	62.45	1055.59	
EW-4	9/10/97	1118.04	63.29	1054.75	
EW-4	12/11/97	1118.04	65.2	1052.84	
EW-4	3/13/98	1118.04	58.73	1059.31	
EW-4	6/22/98	1118.04	58.15	1059.89	
EW-4	9/22/98	1118.04		1118.04	VEHICLE PARKED ON WELLHEAD
EW-4	6/8/99	1118.04	62.61	1055.43	
EW-5	3/31/89	1124.41	65.34	1059.07	Measured from well seal
EW-5	5/8/89	1124.41	65.44	1058.97	
EW-5	5/30/89	1124.41	66.28	1058.13	
EW-5	6/30/89	1124.41	67.26	1057.15	
EW-5	7/27/89	1124.41	67.78	1056.63	
EW-5	9/5/89	1124.41	66.90	1057.51	
EW-5	9/28/89	1124.41	66.90	1057.51	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-5	11/6/89	1124.41	68.05	1056.36	
EW-5	12/1/89	1124.41	68.35	1056.06	
EW-5	1/8/90	1124.41	68.73	1055.68	
EW-5	2/5/90	1124.41	69.78	1054.63	
EW-5	3/5/90	1124.41	70.75	1053.66	
EW-5	4/6/90	1124.41	72.20	1052.21	
EW-5	5/8/90	1124.41	71.75	1052.66	
EW-5	6/5/90	1124.41	72.71	1051.70	
EW-5	7/6/90	1124.41	73.40	1051.01	
EW-5	7/30/90	1124.41	69.20	1055.21	
EW-5	8/7/90	1124.41	68.98	1055.43	
EW-5	9/11/90	1124.41	65.37	1059.04	
EW-5	10/8/90	1124.41	68.04	1056.37	
EW-5	11/1/90	1124.41	69.61	1054.80	
EW-5	12/3/90	1124.41	71.17	1053.24	
EW-5	1/8/91	1124.41	71.60	1052.81	
EW-5	2/4/91	1124.41	73.04	1051.37	
EW-5	3/4/91	1124.41	72.79	1051.62	
EW-5	3/27/91	1124.41	67.64	1056.77	
EW-5	3/28/91	1124.41	67.23	1057.18	
EW-5	3/29/91	1124.41	65.70	1058.71	
EW-5	4/1/91	1124.41	62.72	1061.69	
EW-5	4/2/91	1124.41	62.05	1062.36	
EW-5	4/3/91	1124.41	61.55	1062.86	
EW-5	4/4/91	1124.41	60.73	1063.68	
EW-5	4/5/91	1124.41	60.12	1064.29	
EW-5	4/8/91	1124.41	59.26	1065.15	
EW-5	4/9/91	1124.41	58.40	1066.01	
EW-5	4/10/91	1124.41	57.64	1066.77	
EW-5	4/11/91	1124.41	57.53	1066.88	
EW-5	4/12/91	1124.41	57.41	1067.00	
EW-5	4/15/91	1124.41	56.69	1067.72	
EW-5	4/16/91	1124.41	56.74	1067.67	
EW-5	4/17/91	1124.41	56.68	1067.73	
EW-5	4/18/91	1124.41	56.78	1067.63	
EW-5	4/22/91	1124.41	57.29	1067.12	
EW-5	4/25/91	1124.41	58.10	1066.31	
EW-5	4/27/91	1124.41	58.71	1065.70	
EW-5	4/29/91	1124.41	59.34	1065.07	
EW-5	5/1/91	1124.41	59.87	1064.54	
EW-5	5/3/91	1124.41	60.56	1063.85	
EW-5	5/4/91	1124.41	60.88	1063.53	
EW-5	5/5/91	1124.41	61.11	1063.30	
EW-5	5/6/91	1124.41	61.35	1063.06	
EW-5	5/7/91	1124.41	61.61	1062.80	
EW-5	5/8/91	1124.41	61.89	1062.52	
EW-5	5/9/91	1124.41	62.10	1062.31	
EW-5	5/10/91	1124.41	62.46	1061.95	
EW-5	5/12/91	1124.41	62.83	1061.58	
EW-5	5/13/91	1124.41	63.03	1061.38	
EW-5	5/15/91	1124.41	63.50	1060.91	
EW-5	5/17/91	1124.41	63.82	1060.59	
EW-5	5/20/91	1124.41	64.23	1060.18	
EW-5	5/23/91	1124.41	64.87	1059.54	
EW-5	5/27/91	1124.41	65.46	1058.95	
EW-5	5/29/91	1124.41	65.55	1058.86	
EW-5	6/1/91	1124.41	66.01	1058.40	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-5	6/3/91	1124.41	66.27	1058.14	
EW-5	6/5/91	1124.41	66.52	1057.89	
EW-5	6/6/91	1124.41	66.70	1057.71	
EW-5	6/7/91	1124.41	66.77	1057.64	
EW-5	6/8/91	1124.41	66.87	1057.54	
EW-5	6/9/91	1124.41	67.02	1057.39	
EW-5	6/10/91	1124.41	66.98	1057.43	
EW-5	6/11/91	1124.41	67.18	1057.23	
EW-5	7/5/91	1124.41	68.94	1055.47	
EW-5	8/6/91	1124.41	70.98	1053.43	
EW-5	9/6/91	1124.41	72.14	1052.27	
EW-5	10/8/91	1124.41	72.96	1051.45	
EW-5	11/6/91	1124.41	71.90	1052.51	Drilling EW-RW2
EW-5	12/5/91	1124.41	69.74	1054.67	
EW-5	12/30/91	1124.41	69.91	1054.50	
EW-5	12/31/91	1124.41	70.00	1054.41	
EW-5	1/2/92	1124.41	70.34	1054.07	
EW-5	1/24/92	1124.41	61.65	1062.76	
EW-5	1/31/92	1124.41	58.69	1065.72	
EW-5	2/7/92	1124.41	57.01	1067.40	
EW-5	2/14/92	1124.41	54.32	1070.09	
EW-5	2/21/92	1124.41	51.84	1072.57	
EW-5	2/28/92	1124.41	50.54	1073.87	
EW-5	3/9/92	1124.41	48.00	1076.41	
EW-5	3/20/92	1124.41	45.51	1078.90	
EW-5	4/3/92	1124.41	43.10	1081.31	
EW-5	5/1/92	1124.41	40.81	1083.60	
EW-5	6/1/92	1124.41	38.21	1086.20	
EW-5	6/26/92	1124.41	40.78	1083.63	
EW-5	7/10/92	1124.41	44.06	1080.35	
EW-5	7/24/92	1124.41	45.67	1078.74	
EW-5	8/7/92	1124.41	43.75	1080.66	
EW-5	9/4/92	1124.41	38.67	1085.74	
EW-5	10/2/92	1124.41	43.83	1080.58	
EW-5	11/5/92	1124.41	49.26	1075.15	
EW-5	12/1/92	1124.41	55.50	1068.91	
EW-5	1/4/93	1124.41	45.94	1078.47	
EW-5	1/11/93	1124.41	39.22	1085.19	
EW-5	1/18/93	1124.41	36.08	1088.33	
EW-5	1/26/93	1124.41	35.61	1088.80	
EW-5	2/2/93	1124.41	36.17	1088.24	
EW-5	2/9/93	1124.41	35.70	1088.71	
EW-5	2/16/93	1124.41	34.88	1089.53	
EW-5	3/1/93	1124.41	33.82	1090.59	
EW-5	3/15/93	1124.41	34.66	1089.75	
EW-5	4/1/93	1124.41	34.23	1090.18	
EW-5	4/26/93	1124.41	35.53	1088.88	
EW-5	5/3/93	1124.41	34.73	1089.68	
EW-5	6/1/93	1124.41	35.42	1088.99	
EW-5	6/11/93	1124.41	35.76	1088.65	
EW-5	7/1/93	1124.41	37.05	1087.36	
EW-5	8/6/93	1124.41	42.17	1082.24	
EW-5	9/7/93	1124.41	40.66	1083.75	
EW-5	10/7/93	1124.41	44.32	1080.09	
EW-5	11/9/93	1124.41	47.37	1077.04	
EW-5	12/6/93	1124.41	45.22	1079.19	
EW-5	1/4/94	1124.41	45.15	1079.26	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-5	2/3/94	1124.41	49.65	1074.76	
EW-5	3/7/94	1124.41	51.80	1072.61	
EW-5	4/6/94	1124.41	52.46	1071.95	
EW-5	5/6/94	1124.41	54.18	1070.23	
EW-5	6/7/94	1124.41	55.52	1068.89	
EW-5	7/6/94	1124.41	57.10	1067.31	
EW-5	8/4/94	1124.41	58.36	1066.05	
EW-5	9/9/94	1124.41	57.92	1066.49	
EW-5	10/12/94	1124.41	59.79	1064.62	
EW-5	11/4/94	1124.41	60.16	1064.25	
EW-5	12/2/94	1124.41	60.18	1064.23	
EW-5	1/9/95	1124.41	55.12	1069.29	
EW-5	2/3/95	1124.41	53.65	1070.76	
EW-5	3/2/95	1124.41	45.18	1079.23	
EW-5	4/5/95	1124.41	41.48	1082.93	
EW-5	5/10/95	1124.41	42.40	1082.01	
EW-5	6/6/95	1124.41	47.25	1077.16	
EW-5	7/7/95	1124.41	50.48	1073.93	
EW-5	8/4/95	1124.41	52.57	1071.84	
EW-5	9/7/95	1124.41	51.06	1073.35	
EW-5	10/6/95	1124.41	48.38	1076.03	
EW-5	11/10/95	1124.41	48.20	1076.21	
EW-5	12/9/95	1124.41	52.13	1072.28	
EW-5	1/11/96	1124.41	54.34	1070.07	
EW-5	2/10/96	1124.41	55.08	1069.33	
EW-5	3/8/96	1124.41	55.92	1068.49	
EW-5	4/6/96	1124.41	56.82	1067.59	
EW-5	5/7/96	1124.39	57.53	1066.86	Pump removed for Troll (-0.02 elev)
EW-5	6/7/96	1124.39	58.45	1065.94	
EW-5	7/8/96	1124.39	58.94	1065.45	
EW-5	8/2/96	1124.39	58.38	1066.01	
EW-5	9/9/96	1124.39	58.45	1065.94	
EW-5	10/4/96	1124.39	59.76	1064.63	
EW-5	11/1/96	1124.39	60.51	1063.88	
EW-5	12/5/96	1124.39	61.71	1062.68	
EW-5	4/7/97	1124.39	65.30	1059.09	
EW-5	6/2/97	1124.41	67.13	1057.28	
EW-5	9/10/97	1124.41	68	1056.41	
EW-5	12/11/97	1124.41	69.58	1054.83	
EW-5	3/13/98	1124.41	63.86	1060.55	
EW-5	6/22/98	1124.41	62.36	1062.05	
EW-5	9/22/98	1124.41	62.68	1061.73	
EW-6	3/30/89	1124.17	56.72	1067.45	Measured from well seal
EW-6	5/8/89	1124.17	57.67	1066.50	
EW-6	5/30/89	1124.17	58.39	1065.78	
EW-6	6/30/89	1124.17	58.93	1065.24	
EW-6	7/27/89	1124.17	59.41	1064.76	
EW-6	9/5/89	1124.17	59.58	1064.59	
EW-6	9/28/89	1124.17	59.92	1064.25	
EW-6	11/6/89	1124.17	60.82	1063.35	
EW-6	12/1/89	1124.17	61.43	1062.74	
EW-6	1/8/90	1124.17	62.38	1061.79	
EW-6	2/5/90	1124.17	62.89	1061.28	
EW-6	3/5/90	1124.17	63.54	1060.63	
EW-6	4/6/90	1124.17	64.47	1059.70	
EW-6	5/8/90	1124.17	64.92	1059.25	
EW-6	6/5/90	1124.17	65.76	1058.41	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-6	7/6/90	1124.17	66.40	1057.77	
EW-6	7/30/90	1124.17	64.11	1060.06	
EW-6	8/7/90	1124.17	62.78	1061.39	
EW-6	8/15/90	1124.17	62.31	1061.86	
EW-6	8/16/90	1124.17	61.59	1062.58	
EW-6	8/17/90	1124.17	61.25	1062.92	
EW-6	8/20/90	1124.17	60.17	1064.00	
EW-6	8/22/90	1124.17	59.83	1064.34	
EW-6	9/6/90	1124.17	60.07	1064.10	
EW-6	9/11/90	1124.17	58.60	1065.57	
EW-6	10/8/90	1124.17	60.32	1063.85	
EW-6	11/1/90	1124.17	61.77	1062.40	
EW-6	12/3/90	1124.17	63.11	1061.06	
EW-6	1/8/91	1124.17	63.98	1060.19	
EW-6	2/4/91	1124.17	65.63	1058.54	
EW-6	3/4/91	1124.17	66.19	1057.98	
EW-6	3/7/91	1124.17	64.12	1060.05	
EW-6	3/8/91	1124.17	63.22	1060.95	
EW-6	3/11/91	1124.17	61.79	1062.38	
EW-6	3/14/91	1124.17	60.91	1063.26	
EW-6	3/16/91	1124.17	60.48	1063.69	
EW-6	3/27/91	1124.17	59.88	1064.29	
EW-6	3/28/91	1124.17	59.73	1064.44	
EW-6	3/29/91	1124.17	58.47	1065.70	
EW-6	4/1/91	1124.17	55.69	1068.48	
EW-6	4/2/91	1124.17	54.93	1069.24	
EW-6	4/3/91	1124.17	54.35	1069.82	
EW-6	4/4/91	1124.17	53.53	1070.64	
EW-6	4/5/91	1124.17	52.99	1071.18	
EW-6	4/8/91	1124.17	51.65	1072.52	
EW-6	4/9/91	1124.17	50.90	1073.27	
EW-6	4/10/91	1124.17	50.09	1074.08	
EW-6	4/11/91	1124.17	49.88	1074.29	
EW-6	4/12/91	1124.17	49.65	1074.52	
EW-6	4/15/91	1124.17	48.80	1075.37	
EW-6	4/16/91	1124.17	48.76	1075.41	
EW-6	4/17/91	1124.17	48.60	1075.57	
EW-6	4/18/91	1124.17	48.62	1075.55	
EW-6	4/22/91	1124.17	48.80	1075.37	
EW-6	4/25/91	1124.17	49.23	1074.94	
EW-6	4/27/91	1124.17	49.60	1074.57	
EW-6	4/29/91	1124.17	50.07	1074.10	
EW-6	5/1/91	1124.17	50.49	1073.68	
EW-6	5/3/91	1124.17	51.03	1073.14	
EW-6	5/4/91	1124.17	51.35	1072.82	
EW-6	5/5/91	1124.17	51.59	1072.58	
EW-6	5/6/91	1124.17	51.67	1072.50	
EW-6	5/7/91	1124.17	52.85	1071.32	
EW-6	5/8/91	1124.17	53.07	1071.10	
EW-6	5/9/91	1124.17	53.23	1070.94	
EW-6	5/10/91	1124.17	53.58	1070.59	
EW-6	5/12/91	1124.17	54.03	1070.14	
EW-6	5/13/91	1124.17	54.20	1069.97	
EW-6	5/15/91	1124.17	54.68	1069.49	
EW-6	5/17/91	1124.17	55.08	1069.09	
EW-6	5/20/91	1124.17	55.58	1068.59	
EW-6	5/23/91	1124.17	56.23	1067.94	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-6	5/27/91	1124.17	56.89	1067.28	
EW-6	5/29/91	1124.17	57.14	1067.03	
EW-6	6/1/91	1124.17	60.69	1063.48	
EW-6	6/3/91	1124.17	58.02	1066.15	
EW-6	6/5/91	1124.17	64.31	1059.86	Aquifer test
EW-6	6/6/91	1124.17	65.31	1058.86	Aquifer test
EW-6	6/7/91	1124.17	65.09	1059.08	Aquifer test
EW-6	6/8/91	1124.17	65.07	1059.10	Aquifer test
EW-6	6/9/91	1124.17	65.34	1058.83	Aquifer test
EW-6	6/10/91	1124.17	59.45	1064.72	Aquifer test
EW-6	6/11/91	1124.17	59.40	1064.77	Aquifer test
EW-6	7/5/91	1124.17	60.49	1063.68	
EW-6	8/6/91	1124.17	62.52	1061.65	
EW-6	9/6/91	1124.17	64.04	1060.13	
EW-6	10/8/91	1124.17	64.80	1059.37	
EW-6	11/6/91	1124.17	64.33	1059.84	
EW-6	12/5/91	1124.17	62.74	1061.43	
EW-6	1/2/92	1124.17	62.61	1061.56	
EW-6	1/24/92	1124.17	54.22	1069.95	
EW-6	2/7/92	1124.17	49.10	1075.07	
EW-6	2/14/92	1124.17	46.58	1077.59	
EW-6	2/21/92	1124.17	44.18	1079.99	
EW-6	2/28/92	1124.17	42.89	1081.28	
EW-6	3/9/92	1124.17	40.53	1083.64	
EW-6	3/20/92	1124.17	38.10	1086.07	
EW-6	4/3/92	1124.17	35.92	1088.25	
EW-6	5/1/92	1124.17	34.05	1090.12	
EW-6	6/1/92	1124.17	31.94	1092.23	
EW-6	6/26/92	1124.17	33.33	1090.84	
EW-6	7/10/92	1124.17	35.73	1088.44	
EW-6	7/24/92	1124.17	37.15	1087.02	
EW-6	8/7/92	1124.17	34.48	1089.69	
EW-6	9/4/92	1124.17	31.77	1092.40	
EW-6	10/2/92	1124.17	35.12	1089.05	
EW-6	11/5/92	1124.17	39.79	1084.38	
EW-6	12/1/92	1124.17	42.78	1081.39	
EW-6	1/4/93	1124.17	37.48	1086.69	
EW-6	1/11/93	1124.17	31.95	1092.22	
EW-6	1/18/93	1124.17	28.84	1095.33	
EW-6	1/26/93	1124.17	28.02	1096.15	
EW-6	2/2/93	1124.17	28.37	1095.80	
EW-6	2/9/93	1124.17	28.08	1096.09	
EW-6	2/16/93	1124.17	27.44	1096.73	
EW-6	3/1/93	1124.17	26.56	1097.61	
EW-6	3/15/93	1124.17	27.20	1096.97	
EW-6	4/1/93	1124.17	26.94	1097.23	
EW-6	4/26/93	1124.17	28.16	1096.01	
EW-6	5/3/93	1124.17	27.56	1096.61	
EW-6	6/1/93	1124.17	28.28	1095.89	
EW-6	6/11/93	1124.17	28.77	1095.40	
EW-6	7/1/93	1124.17	29.64	1094.53	
EW-6	8/6/93	1124.17	33.03	1091.14	
EW-6	9/7/93	1124.17	32.16	1092.01	
EW-6	10/7/93	1124.17	34.42	1089.75	
EW-6	11/9/93	1124.17	36.94	1087.23	
EW-6	12/6/93	1124.17	34.98	1089.19	
EW-6	1/4/94	1124.17	35.27	1088.90	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-6	2/3/94	1124.17	38.98	1085.19	
EW-6	3/7/94	1124.17	41.53	1082.64	
EW-6	4/6/94	1124.17	42.58	1081.59	
EW-6	5/6/94	1124.17	44.22	1079.95	
EW-6	6/7/94	1124.17	45.62	1078.55	
EW-6	7/6/94	1124.17	47.23	1076.94	
EW-6	8/4/94	1124.17	48.56	1075.61	
EW-6	9/9/94	1124.17	48.93	1075.24	
EW-6	10/12/94	1124.17	50.06	1074.11	
EW-6	11/4/94	1124.17	50.38	1073.79	
EW-6	12/2/94	1124.17	50.64	1073.53	
EW-6	1/9/95	1124.17	45.44	1078.73	
EW-6	2/3/95	1124.17	42.68	1081.49	
EW-6	3/2/95	1124.17	36.35	1087.82	
EW-6	4/5/95	1124.17	32.99	1091.18	
EW-6	5/10/95	1124.17	33.73	1090.44	
EW-6	6/6/95	1124.17	37.40	1086.77	
EW-6	7/7/95	1124.17	40.45	1083.72	
EW-6	8/4/95	1124.17	42.40	1081.77	
EW-6	9/7/95	1124.17	41.00	1083.17	
EW-6	10/6/95	1124.17	39.24	1084.93	
EW-6	11/10/95	1124.17	38.70	1085.47	
EW-6	12/9/95	1124.17	41.52	1082.65	
EW-6	1/11/96	1124.17	44.00	1080.17	
EW-6	2/10/96	1124.17	45.25	1078.92	
EW-6	3/8/96	1124.17	46.35	1077.82	
EW-6	4/6/96	1124.17	47.52	1076.65	
EW-6	5/7/96	1124.17	48.62	1075.55	
EW-6	6/5/96	1124.17	49.79	1074.38	
EW-6	7/8/96	1124.17	50.57	1073.60	
EW-6	8/2/96	1124.17	50.42	1073.75	
EW-6	9/9/96	1124.17	50.72	1073.45	
EW-6	10/4/96	1124.17	51.47	1072.70	
EW-6	11/1/96	1124.17	52.17	1072.00	
EW-6	12/5/96	1124.17	53.14	1071.03	
EW-6	4/7/97	1124.17	56.78	1067.39	
EW-6	6/2/97	1124.17	58.45	1065.72	
EW-6	9/10/97	1124.17	59.45	1064.72	
EW-6	12/11/97	1124.17	60.01	1064.16	
EW-6	3/13/98	1124.17	54.47	1069.70	
EW-6	6/22/98	1124.17	51.73	1072.44	
EW-6	9/22/98	1124.17	51.48	1072.69	
EW-7	2/4/91	1117.54	68.62	1048.92	Measured from well seal
EW-7	3/4/91	1117.54	69.00	1048.54	
EW-7	3/6/91	1117.54	68.24	1049.30	
EW-7	3/8/91	1117.54	67.34	1050.20	
EW-7	3/11/91	1117.54	66.62	1050.92	
EW-7	3/14/91	1117.54	65.38	1052.16	
EW-7	3/16/91	1117.54	65.99	1051.55	
EW-7	3/27/91	1117.54	65.58	1051.96	
EW-7	3/28/91	1117.54	65.56	1051.98	
EW-7	3/29/91	1117.54	64.87	1052.67	
EW-7	4/1/91	1117.54	63.05	1054.49	
EW-7	4/2/91	1117.54	62.32	1055.22	
EW-7	4/3/91	1117.54	61.85	1055.69	
EW-7	4/4/91	1117.54	62.27	1055.27	
EW-7	4/5/91	1117.54	60.66	1056.88	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-7	4/8/91	1117.54	59.63	1057.91	
EW-7	4/9/91	1117.54	59.03	1058.51	
EW-7	4/10/91	1117.54	58.36	1059.18	
EW-7	4/11/91	1117.54	58.14	1059.40	
EW-7	4/12/91	1117.54	57.92	1059.62	
EW-7	4/15/91	1117.54	57.14	1060.40	
EW-7	4/16/91	1117.54	57.05	1060.49	
EW-7	4/17/91	1117.54	56.86	1060.68	
EW-7	4/18/91	1117.54	57.66	1059.88	
EW-7	4/22/91	1117.54	57.09	1060.45	
EW-7	4/25/91	1117.54	57.39	1060.15	
EW-7	4/27/91	1117.54	57.72	1059.82	
EW-7	4/29/91	1117.54	58.01	1059.53	
EW-7	5/1/91	1117.54	58.32	1059.22	
EW-7	5/3/91	1117.54	58.82	1058.72	
EW-7	5/4/91	1117.54	59.10	1058.44	
EW-7	5/5/91	1117.54	59.32	1058.22	
EW-7	5/6/91	1117.54	59.32	1058.22	
EW-7	5/7/91	1117.54	59.70	1057.84	
EW-7	5/8/91	1117.54	59.65	1057.89	
EW-7	5/9/91	1117.54	59.76	1057.78	
EW-7	5/10/91	1117.54	60.08	1057.46	
EW-7	5/12/91	1117.54	60.24	1057.30	
EW-7	5/13/91	1117.54	60.37	1057.17	
EW-7	5/15/91	1117.54	60.65	1056.89	
EW-7	5/17/91	1117.54	60.95	1056.59	
EW-7	5/20/91	1117.54	61.14	1056.40	
EW-7	5/23/91	1117.54	61.75	1055.79	
EW-7	5/27/91	1117.54	62.16	1055.38	
EW-7	5/29/91	1117.54	62.07	1055.47	
EW-7	6/1/91	1117.54	62.41	1055.13	
EW-7	6/3/91	1117.54	62.74	1054.80	
EW-7	6/5/91	1117.54	62.97	1054.57	
EW-7	6/6/91	1117.54	62.86	1054.68	
EW-7	6/7/91	1117.54	62.88	1054.66	
EW-7	6/8/91	1117.54	63.06	1054.48	
EW-7	6/9/91	1117.54	63.09	1054.45	
EW-7	6/10/91	1117.54	63.12	1054.42	
EW-7	6/11/91	1117.54	63.52	1054.02	
EW-7	7/5/91	1117.54	64.79	1052.75	Well was unlocked
EW-7	8/6/91	1117.54	66.43	1051.11	
EW-7	9/6/91	1117.54	67.66	1049.88	
EW-7	10/8/91	1117.54	68.92	1048.62	Tanner pumping
EW-7	11/6/91	1117.54	68.13	1049.41	
EW-7	12/5/91	1117.54	67.39	1050.15	
EW-7	1/2/92	1117.54	67.04	1050.50	
EW-7	1/24/92	1117.54	60.32	1057.22	
EW-7	2/7/92	1117.54	55.87	1061.67	
EW-7	2/14/92	1117.54	53.52	1064.02	
EW-7	2/21/92	1117.54	51.07	1066.47	
EW-7	2/28/92	1117.54	49.51	1068.03	
EW-7	3/9/92	1117.54	46.84	1070.70	
EW-7	3/20/92	1117.54	44.04	1073.50	
EW-7	4/3/92	1117.54	41.38	1076.16	
EW-7	5/1/92	1117.54	38.55	1078.99	
EW-7	6/1/92	1117.54	35.76	1081.78	
EW-7	6/26/92	1117.54	37.77	1079.77	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-7	7/10/92	1117.54	40.71	1076.83	
EW-7	7/24/92	1117.54	42.45	1075.09	
EW-7	8/7/92	1117.54	41.03	1076.51	
EW-7	9/4/92	1117.54	36.87	1080.67	
EW-7	10/2/92	1117.54	40.70	1076.84	
EW-7	11/5/92	1117.54	45.69	1071.85	
EW-7	12/1/92	1117.54	48.90	1068.64	
EW-7	1/4/93	1117.54	44.67	1072.87	
EW-7	1/11/93	1117.54	38.47	1079.07	
EW-7	1/18/93	1117.54	35.12	1082.42	
EW-7	1/26/93	1117.54	33.81	1083.73	
EW-7	2/2/93	1117.54	33.88	1083.66	
EW-7	2/9/93	1117.54	33.33	1084.21	
EW-7	2/16/93	1117.54	32.39	1085.15	
EW-7	3/1/93	1117.54	31.05	1086.49	
EW-7	3/15/93	1117.54	31.52	1086.02	
EW-7	4/1/93	1117.54	31.01	1086.53	
EW-7	4/26/93	1117.54	32.03	1085.51	
EW-7	5/3/93	1117.54	31.45	1086.09	
EW-7	6/1/93	1117.54	32.07	1085.47	
EW-7	6/11/93	1117.54	32.57	1084.97	
EW-7	7/1/93	1117.54	34.32	1083.22	
EW-7	8/6/93	1117.54	39.17	1078.37	
EW-7	9/7/93	1117.54	39.25	1078.29	
EW-7	10/7/93	1117.54	42.09	1075.45	
EW-7	11/9/93	1117.54	44.36	1073.18	
EW-7	12/6/93	1117.54	41.24	1076.30	
EW-7	1/4/94	1117.54	42.93	1074.61	
EW-7	2/3/94	1117.54	46.45	1071.09	
EW-7	3/7/94	1117.54	48.27	1069.27	
EW-7	4/6/94	1117.54	48.97	1068.57	
EW-7	5/6/94	1117.54	50.43	1067.11	
EW-7	6/7/94	1117.54	51.78	1065.76	
EW-7	7/6/94	1117.54	53.25	1064.29	
EW-7	8/4/94	1117.54	54.40	1063.14	
EW-7	9/9/94	1117.54	54.49	1063.05	
EW-7	10/11/94	1117.54	55.68	1061.86	
EW-7	11/4/94	1117.54	57.05	1060.49	
EW-7	12/2/94	1117.54	56.22	1061.32	
EW-7	1/9/95	1117.54	52.16	1065.38	
EW-7	2/3/95	1117.54	49.45	1068.09	
EW-7	3/2/95	1117.54	43.50	1074.04	
EW-7	4/5/95	1117.54	38.96	1078.58	
EW-7	5/10/95	1117.54	39.87	1077.67	
EW-7	6/6/95	1117.54	43.70	1073.84	
EW-7	7/7/95	1117.54	46.70	1070.84	
EW-7	8/4/95	1117.54	48.71	1068.83	
EW-7	9/7/95	1117.54	47.58	1069.96	
EW-7	10/6/95	1117.54	48.78	1068.76	
EW-7	11/10/95	1117.54	45.97	1071.57	
EW-7	12/9/95	1117.54	48.62	1068.92	
EW-7	1/11/96	1117.54	50.61	1066.93	
EW-7	2/10/96	1117.54	51.33	1066.21	
EW-7	3/8/96	1117.54	51.93	1065.61	
EW-7	4/5/96	1117.54	52.53	1065.01	
EW-7	5/7/96	1117.54	53.11	1064.43	
EW-7	6/5/96	1117.54	53.74	1063.80	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-7	7/8/96	1117.54	54.07	1063.47	
EW-7	8/2/96	1117.54	53.70	1063.84	
EW-7	9/9/96	1117.54	ND		Landscaped over
EW-7	10/4/96	1117.54	54.98	1062.56	
EW-7	11/1/96	1117.54	55.97	1061.57	
EW-7	12/5/96	1117.54	57.15	1060.39	
EW-7	4/7/97	1117.54	60.82	1056.72	
EW-7	6/2/97	1117.54	62.49	1055.05	
EW-7	9/10/97	1117.54	63.41	1054.13	
EW-7	12/12/97	1117.54	65.43	1052.11	
EW-7	3/13/98	1117.54	60.47	1057.07	
EW-7	6/22/98	1117.54	58.38	1059.16	
EW-7	9/22/98	1117.54	58.98	1058.56	
EW-8	1/8/91	1123.64	71.38	1052.26	Top of 4" casing, well not developed
EW-8	2/4/91	1123.64	72.72	1050.92	Measured from well seal
EW-8	3/4/91	1123.64	72.85	1050.79	
EW-8	3/27/91	1123.64	68.01	1055.63	
EW-8	3/28/91	1123.64	67.93	1055.71	
EW-8	3/29/91	1123.64	66.88	1056.76	
EW-8	4/1/91	1123.64	64.08	1059.56	
EW-8	4/2/91	1123.64	63.47	1060.17	
EW-8	4/3/91	1123.64	62.92	1060.72	
EW-8	4/4/91	1123.64	62.17	1061.47	
EW-8	4/5/91	1123.64	61.59	1062.05	
EW-8	4/8/91	1123.64	60.52	1063.12	
EW-8	4/9/91	1123.64	59.85	1063.79	
EW-8	4/10/91	1123.64	59.06	1064.58	
EW-8	4/11/91	1123.64	58.80	1064.84	
EW-8	4/12/91	1123.64	58.69	1064.95	
EW-8	4/15/91	1123.64	57.88	1065.76	
EW-8	4/16/91	1123.64	57.93	1065.71	
EW-8	4/17/91	1123.64	57.65	1065.99	
EW-8	4/18/91	1123.64	57.87	1065.77	
EW-8	4/22/91	1123.64	58.14	1065.50	
EW-8	4/25/91	1123.64	58.75	1064.89	
EW-8	4/27/91	1123.64	59.14	1064.50	
EW-8	4/29/91	1123.64	59.74	1063.90	
EW-8	5/1/91	1123.64	60.30	1063.34	
EW-8	5/3/91	1123.64	60.86	1062.78	
EW-8	5/4/91	1123.64	61.03	1062.61	
EW-8	5/5/91	1123.64	61.26	1062.38	
EW-8	5/6/91	1123.64	61.46	1062.18	
EW-8	5/7/91	1123.64	61.75	1061.89	
EW-8	5/8/91	1123.64	62.02	1061.62	
EW-8	5/9/91	1123.64	62.18	1061.46	
EW-8	5/10/91	1123.64	62.62	1061.02	
EW-8	5/12/91	1123.64	62.78	1060.86	
EW-8	5/13/91	1123.64	63.02	1060.62	
EW-8	5/15/91	1123.64	63.44	1060.20	
EW-8	5/17/91	1123.64	63.82	1059.82	
EW-8	5/20/91	1123.64	64.12	1059.52	
EW-8	5/23/91	1123.64	64.72	1058.92	
EW-8	5/27/91	1123.64	65.16	1058.48	
EW-8	5/29/91	1123.64	65.37	1058.27	
EW-8	6/1/91	1123.64	65.65	1057.99	
EW-8	6/3/91	1123.64	65.91	1057.73	
EW-8	6/5/91	1123.64	66.35	1057.29	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-8	6/6/91	1123.64	66.43	1057.21	
EW-8	6/7/91	1123.64	66.45	1057.19	
EW-8	6/8/91	1123.64	66.39	1057.25	
EW-8	6/9/91	1123.64	66.50	1057.14	
EW-8	6/10/91	1123.64	66.80	1056.84	
EW-8	6/11/91	1123.64	67.00	1056.64	
EW-8	7/5/91	1123.64	68.50	1055.14	
EW-8	8/6/91	1123.64	70.48	1053.16	
EW-8	9/6/91	1123.64	71.66	1051.98	
EW-8	10/8/91	1123.64	72.67	1050.97	
EW-8	11/6/91	1123.64	71.75	1051.89	Drilling EW-RW2
EW-8	12/5/91	1123.64	69.62	1054.02	
EW-8	1/2/92	1123.64	69.95	1053.69	
EW-8	1/24/92	1123.64	61.67	1061.97	
EW-8	1/31/92	1123.64	58.76	1064.88	
EW-8	2/7/92	1123.64	56.94	1066.70	
EW-8	2/14/92	1123.64	54.48	1069.16	
EW-8	2/21/92	1123.64	51.97	1071.67	
EW-8	2/28/92	1123.64	50.50	1073.14	
EW-8	3/9/92	1123.64	47.83	1075.81	
EW-8	3/20/92	1123.64	45.40	1078.24	
EW-8	4/3/92	1123.64	42.95	1080.69	
EW-8	5/1/92	1123.64	40.49	1083.15	
EW-8	6/1/92	1123.64	37.96	1085.68	
EW-8	6/26/92	1123.64	40.28	1083.36	
EW-8	7/10/92	1123.64	43.38	1080.26	
EW-8	7/24/92	1123.64	45.20	1078.44	
EW-8	8/7/92	1123.64	43.26	1080.38	
EW-8	9/4/92	1123.64	38.51	1085.13	
EW-8	10/2/92	1123.64	43.10	1080.54	
EW-8	11/5/92	1123.64	48.50	1075.14	
EW-8	12/1/92	1123.64	51.78	1071.86	
EW-8	1/4/93	1123.64	46.10	1077.54	
EW-8	1/11/93	1123.64	39.44	1084.20	
EW-8	1/18/93	1123.64	36.29	1087.35	
EW-8	1/26/93	1123.64	35.45	1088.19	
EW-8	2/2/93	1123.64	35.83	1087.81	
EW-8	2/9/93	1123.64	35.45	1088.19	
EW-8	2/16/93	1123.64	34.59	1089.05	
EW-8	3/1/93	1123.64	33.41	1090.23	
EW-8	3/15/93	1123.64	34.13	1089.51	
EW-8	4/1/93	1123.64	33.78	1089.86	
EW-8	4/26/93	1123.64	34.99	1088.65	
EW-8	5/3/93	1123.64	34.30	1089.34	
EW-8	6/1/93	1123.64	34.19	1089.45	
EW-8	6/11/93	1123.64	35.46	1088.18	
EW-8	7/1/93	1123.64	36.80	1086.84	
EW-8	8/6/93	1123.64	41.81	1081.83	
EW-8	9/7/93	1123.64	40.74	1082.90	
EW-8	10/7/93	1123.64	44.05	1079.59	
EW-8	11/9/93	1123.64	46.68	1076.96	
EW-8	12/6/93	1123.64	42.80	1080.84	
EW-8	1/4/94	1123.64	44.56	1079.08	
EW-8	2/3/94	1123.64	48.93	1074.71	
EW-8	3/7/94	1123.64	49.71	1073.93	
EW-8	4/6/94	1123.64	51.74	1071.90	
EW-8	5/6/94	1123.64	53.45	1070.19	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-8	6/7/94	1123.64	54.82	1068.82	
EW-8	7/6/94	1123.64	56.49	1067.15	
EW-8	8/4/94	1123.64	57.67	1065.97	
EW-8	9/9/94	1123.64	57.36	1066.28	
EW-8	10/12/94	1123.64	59.11	1064.53	
EW-8	11/4/94	1123.64	59.44	1064.20	
EW-8	12/2/94	1123.64	59.56	1064.08	
EW-8	1/9/95	1123.64	54.12	1069.52	
EW-8	2/3/95	1123.64	51.31	1072.33	
EW-8	3/2/95	1123.64	44.98	1078.66	
EW-8	4/5/95	1123.64	41.18	1082.46	
EW-8	5/10/95	1123.64	41.95	1081.69	
EW-8	6/6/95	1123.64	46.50	1077.14	
EW-8	7/7/95	1123.64	49.76	1073.88	
EW-8	8/4/95	1123.64	51.86	1071.78	
EW-8	9/7/95	1123.64	50.46	1073.18	
EW-8	10/6/95	1123.64	48.06	1075.58	
EW-8	11/10/95	1123.64	47.81	1075.83	
EW-8	12/9/95	1123.64	51.40	1072.24	
EW-8	1/11/96	1123.64	53.60	1070.04	
EW-8	2/10/96	1123.64	54.37	1069.27	
EW-8	3/8/96	1123.64	55.21	1068.43	
EW-8	4/6/96	1123.64	56.16	1067.48	
EW-8	5/7/96	1123.64	56.88	1066.76	
EW-8	6/5/96	1123.64	57.78	1065.86	
EW-8	7/8/96	1123.64	54.27	1069.37	
EW-8	8/2/96	1123.64	57.72	1065.92	
EW-8	9/9/96	1123.64	57.93	1065.71	
EW-8	10/4/96	1123.64	59.03	1064.61	
EW-8	11/1/96	1123.64	59.85	1063.79	
EW-8	12/5/96	1123.64	61.02	1062.62	
EW-8	4/7/97	1123.64	64.63	1059.01	
EW-8	6/2/97	1123.64	66.37	1057.27	
EW-8	9/10/97	1123.64	67.29	1056.35	
EW-8	12/12/97	1123.64	68.91	1054.73	
EW-8	3/13/98	1123.64	63.37	1060.27	
EW-8	6/22/98	1123.64	61.74	1061.90	
EW-8	9/22/98	1123.64	62.07	1061.57	
EW-8	6/8/99	1123.64	66.30	1057.34	
EW-9	12/3/90	1108.17	52.50	1055.67	From top of 4" casing
EW-9	1/8/91	1108.17	50.57	1057.60	From top of 4" casing
EW-9	2/4/91	1108.17	54.38	1053.79	Measured from well seal
EW-9	3/4/91	1108.17	52.78	1055.39	
EW-9	3/27/91	1108.17	43.14	1065.03	
EW-9	3/28/91	1108.17	41.75	1066.42	
EW-9	3/29/91	1108.17	38.02	1070.15	
EW-9	4/1/91	1108.17	32.36	1075.81	
EW-9	4/2/91	1108.17	31.61	1076.56	
EW-9	4/3/91	1108.17	31.04	1077.13	
EW-9	4/4/91	1108.17	29.91	1078.26	
EW-9	4/5/91	1108.17	29.37	1078.80	
EW-9	4/8/91	1108.17	29.40	1078.77	
EW-9	4/9/91	1108.17	27.89	1080.28	
EW-9	4/10/91	1108.17	26.97	1081.20	
EW-9	4/11/91	1108.17	27.31	1080.86	
EW-9	4/12/91	1108.17	27.45	1080.72	
EW-9	4/15/91	1108.17	27.34	1080.83	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-9	4/16/91	1108.17	27.58	1080.59	
EW-9	4/17/91	1108.17	27.71	1080.46	
EW-9	4/18/91	1108.17	28.01	1080.16	
EW-9	4/22/91	1108.17	29.76	1078.41	
EW-9	4/25/91	1108.17	31.42	1076.75	
EW-9	4/27/91	1108.17	32.52	1075.65	
EW-9	4/29/91	1108.17	33.66	1074.51	
EW-9	5/1/91	1108.17	34.58	1073.59	
EW-9	5/3/91	1108.17	35.55	1072.62	
EW-9	5/4/91	1108.17	36.04	1072.13	
EW-9	5/5/91	1108.17	36.54	1071.63	
EW-9	5/6/91	1108.17	36.89	1071.28	
EW-9	5/7/91	1108.17	37.52	1070.65	
EW-9	5/8/91	1108.17	37.50	1070.67	Not good cut
EW-9	5/9/91	1108.17	38.35	1069.82	
EW-9	5/10/91	1108.17	39.01	1069.16	
EW-9	5/12/91	1108.17	39.80	1068.37	
EW-9	5/13/91	1108.17	40.09	1068.08	
EW-9	5/15/91	1108.17	40.75	1067.42	
EW-9	5/17/91	1108.17	41.29	1066.88	
EW-9	5/20/91	1108.17	42.20	1065.97	
EW-9	5/23/91	1108.17	43.22	1064.95	
EW-9	5/27/91	1108.17	44.29	1063.88	
EW-9	5/29/91	1108.17	44.72	1063.45	
EW-9	6/1/91	1108.17	45.41	1062.76	
EW-9	6/3/91	1108.17	45.72	1062.45	
EW-9	6/5/91	1108.17	46.18	1061.99	
EW-9	6/6/91	1108.17	46.44	1061.73	
EW-9	6/7/91	1108.17	46.61	1061.56	
EW-9	6/8/91	1108.17	46.81	1061.36	
EW-9	6/9/91	1108.17	47.04	1061.13	
EW-9	6/10/91	1108.17	47.14	1061.03	
EW-9	6/11/91	1108.17	47.15	1061.02	
EW-9	7/5/91	1108.17	49.89	1058.28	
EW-9	8/6/91	1108.17	51.90	1056.27	
EW-9	9/6/91	1108.17	53.61	1054.56	
EW-9	10/8/91	1108.17	54.18	1053.99	
EW-9	11/6/91	1108.17	49.53	1058.64	
EW-9	12/5/91	1108.17	46.39	1061.78	
EW-9	12/30/91	1108.17	47.64	1060.53	
EW-9	12/31/91	1108.17	47.98	1060.19	
EW-9	1/2/92	1108.17	48.67	1059.50	
EW-9	1/24/92	1108.17	33.20	1074.97	
EW-9	1/31/92	1108.17	30.33	1077.84	
EW-9	2/7/92	1108.17	29.33	1078.84	
EW-9	2/14/92	1108.17	25.77	1082.40	
EW-9	2/21/92	1108.17	23.85	1084.32	
EW-9	2/28/92	1108.17	23.37	1084.80	
EW-9	3/9/92	1108.17	20.86	1087.31	
EW-9	3/20/92	1108.17	19.40	1088.77	
EW-9	4/3/92	1108.17	17.82	1090.35	
EW-9	5/1/92	1108.17	16.94	1091.23	
EW-9	6/1/92	1108.17	14.94	1093.23	
EW-9	6/26/92	1108.17	18.89	1089.28	
EW-9	7/10/92	1108.17	22.92	1085.25	
EW-9	7/24/92	1108.17	24.09	1084.08	
EW-9	8/7/92	1108.17	21.16	1087.01	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-9	9/4/92	1108.17	14.58	1093.59	
EW-9	10/2/92	1108.17	22.83	1085.34	
EW-9	11/5/92	1108.17	29.42	1078.75	
EW-9	12/1/92	1108.17	33.19	1074.98	
EW-9	1/4/93	1108.17	19.54	1088.63	
EW-9	1/11/93	1108.17	ND		No access, surrounded by water.
EW-9	1/18/93	1108.17	ND		No access, surrounded by water.
EW-9	1/26/93	1108.17	ND		No access, vault full of mud.
EW-9	2/2/93	1108.17	13.29	1094.88	
EW-9	2/9/93	1108.17	12.89	1095.28	
EW-9	2/16/93	1108.17	12.14	1096.03	
EW-9	3/1/93	1108.17	11.62	1096.55	
EW-9	3/15/93	1108.17	13.21	1094.96	
EW-9	4/1/93	1108.17	12.85	1095.32	
EW-9	4/26/93	1108.17	15.06	1093.11	
EW-9	5/3/93	1108.17	13.65	1094.52	
EW-9	6/1/93	1108.17	15.18	1092.99	
EW-9	6/11/93	1108.17	16.62	1091.55	
EW-9	7/1/93	1108.17	16.38	1091.79	
EW-9	8/6/93	1108.17	22.38	1085.79	
EW-9	9/7/93	1108.17	18.47	1089.70	
EW-9	10/7/93	1108.17	21.78	1086.39	
EW-9	11/9/93	1108.17	26.99	1081.18	
EW-9	12/6/93	1108.17	21.00	1087.17	
EW-9	1/4/94	1108.17	23.36	1084.81	
EW-9	2/3/94	1108.17	29.83	1078.34	
EW-9	3/7/94	1108.17	32.38	1075.79	
EW-9	4/6/94	1108.17	32.89	1075.28	
EW-9	5/6/94	1108.17	35.03	1073.14	
EW-9	6/7/94	1108.17	36.38	1071.79	
EW-9	7/6/94	1108.17	38.25	1069.92	
EW-9	8/4/94	1108.17	39.58	1068.59	
EW-9	9/9/94	1108.17	37.59	1070.58	
EW-9	10/12/94	1108.17	41.07	1067.10	
EW-9	11/4/94	1108.17	41.42	1066.75	
EW-9	12/2/94	1108.17	41.72	1066.45	
EW-9	1/9/95	1108.17	30.04	1078.13	
EW-9	2/3/95	1108.17	27.79	1080.38	
EW-9	3/2/95	1108.17	20.29	1087.88	
EW-9	4/5/95	1108.17	18.40	1089.77	
EW-9	5/10/95	1108.17	21.78	1086.39	
EW-9	6/6/95	1108.17	27.64	1080.53	
EW-9	7/7/95	1108.17	30.87	1077.30	
EW-9	8/4/95	1108.17	33.42	1074.75	
EW-9	9/7/95	1108.17	30.46	1077.71	
EW-9	10/6/95	1108.17	26.40	1081.77	
EW-9	11/10/95	1108.17	24.75	1083.42	
EW-9	12/9/95	1108.17	32.19	1075.98	
EW-9	1/11/96	1108.17	34.94	1073.23	
EW-9	2/10/96	1108.17	35.39	1072.78	
EW-9	3/8/96	1108.17	36.73	1071.44	
EW-9	4/6/96	1108.17	37.79	1070.38	
EW-9	5/7/96	1108.17	38.78	1069.39	
EW-9	6/5/96	1108.17	40.03	1068.14	
EW-9	7/8/96	1108.17	40.29	1067.88	
EW-9	8/2/96	1108.17	39.36	1068.81	
EW-9	9/9/96	1108.17	39.23	1068.94	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-9	10/4/96	1108.17	41.44	1066.73	
EW-9	11/1/96	1108.17	42.15	1066.02	Steel tape
EW-9	12/5/96	1108.17	43.12	1065.05	
EW-9	4/7/97	1108.17	46.91	1061.26	
EW-9	6/2/97	1108.17	49.14	1059.03	
EW-9	9/10/97	1108.17	48.64	1059.53	
EW-9	12/12/97	1108.17	49.80	1058.37	
EW-9	3/12/98	1108.17	41.80	1066.37	
EW-9	6/22/98	1108.17	42.20	1065.97	
EW-9	9/22/98	1108.17	41.62	1066.55	
EW-9	6/8/99	1108.17	48.02	1060.15	
EW-10	2/4/91	1123.18	72.11	1051.07	Needs sampling "T"
EW-10	3/4/91	1123.18	72.98	1050.20	Measured from well seal
EW-10	3/27/91	1123.18	70.72	1052.46	
EW-10	3/28/91	1123.18	70.72	1052.46	
EW-10	3/29/91	1123.18	70.56	1052.62	
EW-10	4/1/91	1123.18	70.17	1053.01	
EW-10	4/2/91	1123.18	69.69	1053.49	
EW-10	4/3/91	1123.18	69.62	1053.56	
EW-10	4/4/91	1123.18	69.49	1053.69	
EW-10	4/5/91	1123.18	69.18	1054.00	
EW-10	4/8/91	1123.18	68.19	1054.99	
EW-10	4/9/91	1123.18	67.82	1055.36	
EW-10	4/10/91	1123.18	67.35	1055.83	
EW-10	4/11/91	1123.18	67.16	1056.02	
EW-10	4/12/91	1123.18	66.82	1056.36	
EW-10	4/15/91	1123.18	65.94	1057.24	
EW-10	4/16/91	1123.18	65.59	1057.59	
EW-10	4/17/91	1123.18	65.30	1057.88	
EW-10	4/18/91	1123.18	65.14	1058.04	
EW-10	4/22/91	1123.18	64.42	1058.76	
EW-10	4/25/91	1123.18	64.23	1058.95	
EW-10	4/27/91	1123.18	64.10	1059.08	
EW-10	4/29/91	1123.18	64.06	1059.12	
EW-10	5/1/91	1123.18	64.05	1059.13	
EW-10	5/3/91	1123.18	64.22	1058.96	
EW-10	5/4/91	1123.18	64.50	1058.68	
EW-10	5/5/91	1123.18	64.66	1058.52	
EW-10	5/6/91	1123.18	64.38	1058.80	
EW-10	5/7/91	1123.18	64.39	1058.79	
EW-10	5/8/91	1123.18	64.52	1058.66	
EW-10	5/9/91	1123.18	64.54	1058.64	
EW-10	5/10/91	1123.18	64.67	1058.51	
EW-10	5/12/91	1123.18	65.08	1058.10	
EW-10	5/13/91	1123.18	64.89	1058.29	
EW-10	5/15/91	1123.18	65.11	1058.07	
EW-10	5/17/91	1123.18	65.26	1057.92	
EW-10	5/20/91	1123.18	65.42	1057.76	
EW-10	5/23/91	1123.18	65.72	1057.46	
EW-10	5/27/91	1123.18	66.08	1057.10	
EW-10	5/29/91	1123.18	66.17	1057.01	
EW-10	6/1/91	1123.18	66.39	1056.79	
EW-10	6/3/91	1123.18	66.58	1056.60	
EW-10	6/5/91	1123.18	66.64	1056.54	
EW-10	6/6/91	1123.18	66.75	1056.43	
EW-10	6/7/91	1123.18	66.75	1056.43	
EW-10	6/8/91	1123.18	66.86	1056.32	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-10	6/9/91	1123.18	66.97	1056.21	
EW-10	6/10/91	1123.18	67.02	1056.16	
EW-10	6/11/91	1123.18	67.09	1056.09	
EW-10	7/5/91	1123.18	68.51	1054.67	
EW-10	8/6/91	1123.18	69.91	1053.27	
EW-10	9/6/91	1123.18	70.94	1052.24	
EW-10	10/8/91	1123.18	71.58	1051.60	
EW-10	11/6/91	1123.18	72.05	1051.13	
EW-10	12/5/91	1123.18	71.43	1051.75	
EW-10	1/2/92	1123.18	71.01	1052.17	
EW-10	1/24/92	1123.18	68.26	1054.92	
EW-10	2/7/92	1123.18	63.97	1059.21	
EW-10	2/14/92	1123.18	62.02	1061.16	
EW-10	2/21/92	1123.18	59.70	1063.48	
EW-10	2/28/92	1123.18	57.93	1065.25	
EW-10	3/9/92	1123.18	55.21	1067.97	
EW-10	3/20/92	1123.18	52.11	1071.07	
EW-10	4/3/92	1123.18	49.14	1074.04	
EW-10	5/1/92	1123.18	45.39	1077.79	
EW-10	6/1/92	1123.18	42.48	1080.70	
EW-10	6/26/92	1123.18	42.54	1080.64	
EW-10	7/10/92	1123.18	44.55	1078.63	
EW-10	7/24/92	1123.18	46.27	1076.91	
EW-10	8/7/92	1123.18	45.65	1077.53	
EW-10	9/4/92	1123.18	43.73	1079.45	
EW-10	10/2/92	1123.18	44.46	1078.72	
EW-10	11/5/92	1123.18	48.86	1074.32	
EW-10	12/1/92	1123.18	51.93	1071.25	
EW-10	1/4/93	1123.18	50.94	1072.24	
EW-10	1/11/93	1123.18	47.27	1075.91	
EW-10	1/18/93	1123.18	43.66	1079.52	
EW-10	1/26/93	1123.18	41.09	1082.09	
EW-10	2/2/93	1123.18	40.26	1082.92	
EW-10	2/9/93	1123.18	39.54	1083.64	
EW-10	2/16/93	1123.18	38.73	1084.45	
EW-10	3/1/93	1123.18	37.10	1086.08	
EW-10	3/15/93	1123.18	36.65	1086.53	
EW-10	4/1/93	1123.18	36.00	1087.18	
EW-10	4/26/93	1123.18	36.29	1086.89	
EW-10	5/3/93	1123.18	36.15	1087.03	
EW-10	6/1/93	1123.18	36.29	1086.89	
EW-10	6/11/93	1123.18	36.70	1086.48	
EW-10	7/1/93	1123.18	38.14	1085.04	
EW-10	8/6/93	1123.18	41.99	1081.19	
EW-10	9/7/93	1123.18	43.86	1079.32	
EW-10	10/6/93	1123.18	45.86	1077.32	
EW-10	11/9/93	1123.18	47.31	1075.87	
EW-10	12/6/93	1123.18	45.71	1077.47	
EW-10	1/4/94	1123.18	46.88	1076.30	
EW-10	2/3/94	1123.18	48.99	1074.19	
EW-10	3/7/94	1123.18	50.24	1072.94	
EW-10	4/6/94	1123.18	52.21	1070.97	
EW-10	5/6/94	1123.18	53.48	1069.70	
EW-10	6/7/94	1123.18	54.89	1068.29	
EW-10	7/6/94	1123.18	56.22	1066.96	
EW-10	8/4/94	1123.18	57.52	1065.66	
EW-10	9/9/94	1123.18	58.27	1064.91	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-10	10/11/94	1123.18	58.88	1064.30	
EW-10	11/4/94	1123.18	59.24	1063.94	
EW-10	12/2/94	1123.18	59.42	1063.76	
EW-10	1/9/95	1123.18	57.37	1065.81	
EW-10	2/3/95	1123.18	54.74	1068.44	
EW-10	3/2/95	1123.18	50.21	1072.97	
EW-10	4/5/95	1123.18	44.78	1078.40	
EW-10	5/11/95	1123.18	44.44	1078.74	
EW-10	6/6/95	1123.18	46.82	1076.36	
EW-10	7/7/95	1123.18	49.66	1073.52	
EW-10	8/4/95	1123.18	51.61	1071.57	
EW-10	9/7/95	1123.18	50.98	1072.20	
EW-10	10/6/95	1123.18	50.55	1072.63	
EW-10	11/10/95	1123.18	50.60	1072.58	
EW-10	12/9/95	1123.18	51.77	1071.41	
EW-10	1/11/96	1123.18	53.63	1069.55	
EW-10	2/10/96	1123.18	54.57	1068.61	
EW-10	3/8/96	1123.18	55.13	1068.05	
EW-10	4/5/96	1123.18	55.60	1067.58	
EW-10	5/7/96	1123.18	56.15	1067.03	
EW-10	6/5/96	1123.18	56.77	1066.41	
EW-10	7/8/96	1123.18	57.03	1066.15	
EW-10	8/2/96	1123.18	56.92	1066.26	
EW-10	9/9/96	1123.18	57.30	1065.88	
EW-10	10/4/96	1123.18	57.81	1065.37	
EW-10	11/1/96	1123.18	58.88	1064.30	
EW-10	12/5/96	1123.18	60.19	1062.99	
EW-10	4/7/97	1123.18	63.95	1059.23	
EW-10	6/2/97	1123.18	65.65	1057.53	
EW-10	9/10/97	1123.18	66.81	1056.37	
EW-10	12/12/97	1123.18	68.66	1054.52	
EW-10	3/13/98	1123.18	64.82	1058.36	
EW-10	6/23/98	1123.18	61.71	1061.47	
EW-10	9/22/98	1123.18		1123.18	VEHICLE PARKED ON WELLHEAD
EW-11	2/4/91	1104.01	55.72	1048.29	Measured from well seal
EW-11	3/4/91	1104.01	ND		Channel flooded
EW-11	3/8/91	1104.01	50.47	1053.54	
EW-11	3/27/91	1104.01	49.05	1054.96	Not good cut
EW-11	4/4/91	1104.01	ND		6" - 8" showing
EW-11	4/22/91	1104.01	39.41	1064.60	
EW-11	6/3/91	1104.01	48.99	1055.02	
EW-11	7/5/91	1104.01	51.45	1052.56	
EW-11	8/6/91	1104.01	53.39	1050.62	
EW-11	9/6/91	1104.01	54.86	1049.15	
EW-11	10/8/91	1104.01	55.87	1048.14	
EW-11	11/6/91	1104.01	53.87	1050.14	
EW-11	12/5/91	1104.01	50.81	1053.20	
EW-11	1/2/92	1104.01	52.34	1051.67	
EW-11	1/24/92	1104.01	ND		No access, flow in river
EW-11	2/7/92	1104.01	ND		No access, flow in river
EW-11	2/14/92	1104.01	ND		No access, flow in river
EW-11	2/21/92	1104.01	ND		No access, flow in river
EW-11	2/28/92	1104.01	ND		No access, flow in river
EW-11	3/9/92	1104.01	ND		No access, flow in river
EW-11	3/20/92	1104.01	ND		No access, flow in river
EW-11	4/3/92	1104.01	ND		No access, flow in river
EW-11	4/26/92	1104.01	20.46	1083.55	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-11	5/1/92	1104.01	20.35	1083.66	
EW-11	6/1/92	1104.01	ND		No access, flow in river
EW-11	6/26/92	1104.01	21.82	1082.19	
EW-11	7/10/92	1104.01	25.80	1078.21	
EW-11	7/24/92	1104.01	ND		No access, river running 3-4'.
EW-11	8/7/92	1104.01	24.79	1079.22	
EW-11	9/4/92	1104.01	ND		Surrounded by river.
EW-11	10/2/92	1104.01	25.78	1078.23	
EW-11	11/5/92	1104.01	31.84	1072.17	
EW-11	12/1/92	1104.01	35.53	1068.48	
EW-11	1/4/93	1104.01	ND		No access, river flowing.
EW-11	1/11/93	1104.01	ND		No access, river flowing.
EW-11	1/18/93	1104.01	ND		No access, river flowing.
EW-11	1/26/93	1104.01	ND		No access, river flowing.
EW-11	2/2/93	1104.01	ND		No access, river flowing.
EW-11	2/9/93	1104.01	ND		No access, river flowing.
EW-11	2/16/93	1104.01	ND		No access, river flowing.
EW-11	3/1/93	1104.01	ND		No access, river flowing.
EW-11	3/15/93	1104.01	ND		No access, river flowing.
EW-11	4/1/93	1104.01	ND		No access, river flowing
EW-11	4/26/93	1104.01	16.97	1087.04	
EW-11	5/3/93	1104.01	ND		No access, river flowing
EW-11	6/1/93	1104.01	17.26	1086.75	
EW-11	6/11/93	1104.01	17.45	1086.56	
EW-11	7/1/93	1104.01	18.71	1085.30	
EW-11	8/6/93	1104.01	25.04	1078.97	
EW-11	9/7/93	1104.01	22.04	1081.97	
EW-11	10/6/93	1104.01	ND		No access, river flowing.
EW-11	11/9/93	1104.01	30.57	1073.44	
EW-11	12/6/93	1104.01	25.19	1078.82	
EW-11	1/4/94	1104.01	27.65	1076.36	
EW-11	2/3/94	1104.01	32.63	1071.38	
EW-11	3/7/94	1104.01	34.31	1069.70	
EW-11	4/6/94	1104.01	35.58	1068.43	
EW-11	5/6/94	1104.01	37.19	1066.82	
EW-11	6/7/94	1104.01	39.03	1064.98	
EW-11	7/6/94	1104.01	39.98	1064.03	
EW-11	8/4/94	1104.01	41.25	1062.76	
EW-11	9/9/94	1104.01	39.49	1064.52	
EW-11	10/12/94	1104.01	42.66	1061.35	
EW-11	11/4/94	1104.01	43.01	1061.00	
EW-11	12/2/94	1104.01	43.21	1060.80	
EW-11	1/26/95	1104.01	34.89	1069.12	
EW-11	2/3/95	1104.01	32.33	1071.68	
EW-11	3/2/95	1104.01	ND		No access due to river flow
EW-11	4/5/95	1104.01	ND		No access due to river flow
EW-11	5/10/95	1104.01	ND		Vault full of sand
EW-11	6/6/95	1104.01	29.75	1074.26	
EW-11	7/7/95	1104.01	33.25	1070.76	
EW-11	8/4/95	1104.01	35.50	1068.51	
EW-11	9/7/95	1104.01	33.42	1070.59	Road to well site in bad condition
EW-11	10/6/95	1104.01	29.47	1074.54	
EW-11	11/10/95	1104.01	28.83	1075.18	
EW-11	12/9/95	1104.01	34.92	1069.09	Road has been repaired
EW-11	1/11/96	1104.01	37.24	1066.77	
EW-11	2/10/96	1104.01	37.72	1066.29	Road OK
EW-11	3/8/96	1104.01	39.66	1064.35	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-11	4/6/96	1104.01	40.86	1063.15	Road poor, but passable
EW-11	5/7/96	1104.01	40.42	1063.59	
EW-11	6/5/96	1104.01	41.41	1062.60	
EW-11	7/8/96	1104.01	41.88	1062.13	
EW-11	8/2/96	1104.01	41.03	1062.98	
EW-11	9/9/96	1104.01	40.74	1063.27	
EW-11	10/4/96	1104.01	43.10	1060.91	
EW-11	11/1/96	1104.01	43.49	1060.52	
EW-11	12/5/96	1104.01	44.75	1059.26	Pump OK
EW-11	4/7/97	1104.01	48.19	1055.82	
EW-11	6/2/97	1104.01	50.13	1053.88	
EW-11	9/10/97	1104.01	50.85	1053.16	
EW-11	12/12/97	1104.01	52.29	1051.72	
EW-11	3/12/98	1104.01	45.55	1058.46	
EW-11	6/22/98	1104.01	45.02	1058.99	
EW-11	9/22/98	1104.01	45.44	1058.57	
EW-11	6/8/99	1104.01	50.12	1053.89	
EW-12	2/4/91	1110.44	65.21	1045.23	Measured from well seal
EW-12	3/4/91	1110.44	66.20	1044.24	
EW-12	3/27/91	1110.44	59.45	1050.99	
EW-12	4/4/91	1110.44	59.14	1051.30	
EW-12	4/22/91	1110.44	57.27	1053.17	
EW-12	6/3/91	1110.44	59.14	1051.30	
EW-12	7/5/91	1110.44	61.37	1049.07	
EW-12	8/6/91	1110.44	63.12	1047.32	
EW-12	9/6/91	1110.44	64.38	1046.06	
EW-12	10/8/91	1110.44	65.14	1045.30	
EW-12	11/6/91	1110.44	65.49	1044.95	
EW-12	12/5/91	1110.44	64.89	1045.55	
EW-12	1/2/92	1110.44	64.11	1046.33	
EW-12	1/24/92	1110.44	56.84	1053.60	
EW-12	2/7/92	1110.44	51.62	1058.82	
EW-12	2/14/92	1110.44	49.01	1061.43	
EW-12	2/21/92	1110.44	45.95	1064.49	
EW-12	2/28/92	1110.44	44.24	1066.20	
EW-12	3/9/92	1110.44	41.28	1069.16	
EW-12	3/20/92	1110.44	38.15	1072.29	
EW-12	4/3/92	1110.44	35.37	1075.07	
EW-12	5/1/92	1110.44	32.77	1077.67	
EW-12	6/1/92	1110.44	29.99	1080.45	
EW-12	6/26/92	1110.44	32.77	1077.67	
EW-12	7/10/92	1110.44	36.25	1074.19	
EW-12	7/24/92	1110.44	38.38	1072.06	
EW-12	8/7/92	1110.44	36.96	1073.48	
EW-12	9/4/92	1110.44	31.93	1078.51	
EW-12	10/2/92	1110.44	36.75	1073.69	
EW-12	11/5/92	1110.44	42.46	1067.98	
EW-12	12/1/92	1110.44	45.91	1064.53	
EW-12	1/4/93	1110.44	41.16	1069.28	
EW-12	1/11/93	1110.44	33.17	1077.27	
EW-12	1/18/93	1110.44	29.55	1080.89	
EW-12	1/26/93	1110.44	28.39	1082.05	
EW-12	2/2/93	1110.44	28.70	1081.74	
EW-12	2/9/93	1110.44	28.15	1082.29	
EW-12	2/16/93	1110.44	27.07	1083.37	
EW-12	3/1/93	1110.44	25.70	1084.74	
EW-12	3/15/93	1110.44	26.49	1083.95	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-12	4/1/93	1110.44	26.07	1084.37	
EW-12	4/26/93	1110.44	27.48	1082.96	
EW-12	5/3/93	1110.44	26.76	1083.68	
EW-12	6/1/93	1110.44	27.58	1082.86	
EW-12	6/11/93	1110.44	28.26	1082.18	
EW-12	7/1/93	1110.44	30.69	1079.75	
EW-12	8/6/93	1110.44	36.20	1074.24	
EW-12	9/7/93	1110.44	37.15	1073.29	
EW-12	10/7/93	1110.44	40.18	1070.26	
EW-12	11/9/93	1110.44	41.86	1068.58	
EW-12	12/6/93	1110.44	39.08	1071.36	
EW-12	1/4/94	1110.44	40.84	1069.60	
EW-12	2/3/94	1110.44	44.02	1066.42	
EW-12	3/7/94	1110.44	45.78	1064.66	
EW-12	4/6/94	1110.44	46.49	1063.95	
EW-12	5/6/94	1110.44	47.84	1062.60	
EW-12	6/7/94	1110.44	49.24	1061.20	
EW-12	7/6/94	1110.44	50.64	1059.80	
EW-12	8/4/94	1110.44	51.80	1058.64	
EW-12	9/9/94	1110.44	52.37	1058.07	
EW-12	10/11/94	1110.44	53.06	1057.38	
EW-12	11/4/94	1110.44	53.39	1057.05	
EW-12	12/2/94	1110.44	53.51	1056.93	
EW-12	1/9/95	1110.44	49.87	1060.57	
EW-12	2/3/95	1110.44	46.92	1063.52	
EW-12	3/2/95	1110.44	39.33	1071.11	
EW-12	4/5/95	1110.44	34.44	1076.00	
EW-12	5/11/95	1110.44	36.57	1073.87	
EW-12	6/6/95	1110.44	40.38	1070.06	
EW-12	7/7/95	1110.44	43.66	1066.78	
EW-12	8/4/95	1110.44	45.96	1064.48	
EW-12	9/7/95	1110.44	45.55	1064.89	
EW-12	10/6/95	1110.44	42.68	1067.76	
EW-12	11/10/95	1110.44	43.15	1067.29	
EW-12	12/9/95	1110.44	45.89	1064.55	
EW-12	1/11/96	1110.44	47.93	1062.51	
EW-12	2/10/96	1110.44	48.68	1061.76	
EW-12	3/8/96	1110.44	49.13	1061.31	
EW-12	4/5/96	1110.44	49.56	1060.88	
EW-12	5/7/96	1110.44	49.91	1060.53	
EW-12	6/5/96	1110.44	50.46	1059.98	
EW-12	7/8/96	1110.44	50.60	1059.84	
EW-12	8/2/96	1110.44	50.34	1060.10	
EW-12	9/9/96	1110.44	50.79	1059.65	
EW-12	10/4/96	1110.44	51.57	1058.87	
EW-12	11/1/96	1110.44	52.70	1057.74	
EW-12	12/5/96	1110.44	54.08	1056.36	Pump OK, after many tries
EW-12	4/7/97	1110.44	57.78	1052.66	
EW-12	6/2/97	1110.44	57.78	1052.66	
EW-12	9/10/97	1110.44	60.37	1050.07	
EW-12	12/12/97	1110.44	62.85	1047.59	
EW-12	3/13/98	1110.44	57.30	1053.14	
EW-12	6/22/98	1110.44	55.82	1054.62	
EW-12	9/22/98	1110.44	56.61	1053.83	
EW-13	2/4/91	1124.94	69.42	1055.52	Measured from well seal
EW-13	3/4/91	1124.94	70.36	1054.58	
EW-13	3/27/91	1124.94	67.64	1057.30	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-13	4/4/91	1124.94	66.31	1058.63	
EW-13	4/22/91	1124.94	62.19	1062.75	
EW-13	6/3/91	1124.94	63.01	1061.93	
EW-13	7/5/91	1124.94	64.83	1060.11	Well was unlocked
EW-13	8/6/91	1124.94	66.41	1058.53	
EW-13	9/6/91	1124.94	68.05	1056.89	
EW-13	10/8/91	1124.94	69.20	1055.74	
EW-13	11/6/91	1124.94	69.49	1055.45	
EW-13	12/5/91	1124.94	68.65	1056.29	
EW-13	1/2/92	1124.94	68.24	1056.70	
EW-13	1/24/92	1124.94	65.56	1059.38	
EW-13	2/7/92	1124.94	61.90	1063.04	
EW-13	2/14/92	1124.94	60.29	1064.65	Covered by truck
EW-13	2/21/92	1124.94	60.11	1064.83	
EW-13	2/28/92	1124.94	57.08	1067.86	
EW-13	3/9/92	1124.94	54.88	1070.06	
EW-13	3/20/92	1124.94	51.68	1073.26	
EW-13	4/3/92	1124.94	48.90	1076.04	
EW-13	5/1/92	1124.94	45.12	1079.82	
EW-13	6/1/92	1124.94	42.20	1082.74	
EW-13	6/26/92	1124.94	41.77	1083.17	
EW-13	7/10/92	1124.94	43.20	1081.74	
EW-13	7/24/92	1124.94	44.56	1080.38	
EW-13	8/7/92	1124.94	44.04	1080.90	
EW-13	9/4/92	1124.94	42.53	1082.41	
EW-13	10/2/92	1124.94	42.72	1082.22	
EW-13	11/5/92	1124.94	46.24	1078.70	
EW-13	12/1/92	1124.94	48.97	1075.97	
EW-13	1/4/93	1124.94	48.50	1076.44	
EW-13	1/11/93	1124.94	45.80	1079.14	
EW-13	1/18/93	1124.94	42.59	1082.35	
EW-13	1/26/93	1124.94	40.33	1084.61	
EW-13	2/2/93	1124.94	39.44	1085.50	
EW-13	2/9/93	1124.94	38.68	1086.26	
EW-13	2/16/93	1124.94	ND		No access, car parked on vault.
EW-13	3/1/93	1124.94	36.28	1088.66	
EW-13	3/15/93	1124.94	35.68	1089.26	
EW-13	4/1/93	1124.94	34.86	1090.08	
EW-13	4/26/93	1124.94	34.94	1090.00	
EW-13	5/3/93	1124.94	34.77	1090.17	
EW-13	6/1/93	1124.94	34.80	1090.14	
EW-13	6/11/93	1124.94	35.15	1089.79	
EW-13	7/1/93	1124.94	36.34	1088.60	
EW-13	8/6/93	1124.94	39.41	1085.53	
EW-13	9/8/93	1124.94	40.92	1084.02	No access 9/7/93. Returned 9/8.
EW-13	10/6/93	1124.94	43.04	1081.90	
EW-13	11/9/93	1124.94	44.44	1080.50	
EW-13	12/6/93	1124.94	42.98	1081.96	
EW-13	1/4/94	1124.94	43.98	1080.96	
EW-13	2/3/94	1124.94	46.23	1078.71	
EW-13	3/7/94	1124.94	48.14	1076.80	
EW-13	4/6/94	1124.94	49.2	1075.74	
EW-13	5/6/94	1124.94	50.60	1074.34	
EW-13	6/7/94	1124.94	52.01	1072.93	
EW-13	7/6/94	1124.94	53.34	1071.60	
EW-13	8/4/94	1124.94	54.81	1070.13	
EW-13	9/9/94	1124.94	55.31	1069.63	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-13	10/11/94	1124.94	55.89	1069.05	
EW-13	11/4/94	1124.94	56.17	1068.77	
EW-13	12/2/94	1124.94	56.34	1068.60	
EW-13	1/9/95	1124.94	54.66	1070.28	
EW-13	2/3/95	1124.94	52.56	1072.38	
EW-13	3/2/95	1124.94	48.72	1076.22	
EW-13	4/5/95	1124.94	43.68	1081.26	
EW-13	5/10/95	1124.94	42.78	1082.16	
EW-13	6/6/95	1124.94	44.69	1080.25	
EW-13	7/7/95	1124.94	ND		No access, car parked over vault
EW-13	8/4/95	1124.94	48.98	1075.96	
EW-13	9/7/95	1124.94	48.63	1076.31	
EW-13	10/6/95	1124.94	48.26	1076.68	
EW-13	11/10/95	1124.94	48.06	1076.88	
EW-13	12/9/95	1124.94	48.93	1076.01	
EW-13	1/11/96	1124.94	50.78	1074.16	
EW-13	2/10/96	1124.94	51.85	1073.09	Steel tape
EW-13	3/8/96	1124.94	52.48	1072.46	Steel tape
EW-13	4/5/96	1124.94	53.08	1071.86	Blue sounder
EW-13	5/7/96	1124.94	ND		Car parked over vault.
EW-13	6/5/96	1124.94	ND		Car parked over vault.
EW-13	7/8/96	1124.94	54.87	1070.07	
EW-13	8/2/96	1124.94	ND		Car parked over vault.
EW-13	9/9/96	1124.94	55.12	1069.82	
EW-13	10/4/96	1124.94	55.55	1069.39	Steel tape
EW-13	11/1/96	1124.94	ND		Car parked over vault
EW-13	12/5/96	1124.94	57.34	1067.60	Pump OK
EW-13	4/7/97	1124.94	60.61	1064.33	
EW-13	6/2/97	1124.94	62.03	1062.91	
EW-13	9/10/97	1124.94	63.5	1061.44	
EW-13	12/12/97	1124.94	64.99	1059.95	
EW-13	3/13/98	1124.94	61.62	1063.32	
EW-13	6/22/98	1124.94	58.47	1066.47	
EW-13	9/22/98	1124.94		1124.94	VEHICLE PARKED ON WELLHEAD
EW-14	2/4/91	1117.81	68.35	1049.46	Measured from well seal
EW-14	3/4/91	1117.81	68.68	1049.13	
EW-14	3/6/91	1117.81	68.08	1049.73	
EW-14	3/8/91	1117.81	67.05	1050.76	
EW-14	3/11/91	1117.81	66.02	1051.79	
EW-14	3/14/91	1117.81	66.08	1051.73	
EW-14	3/16/91	1117.81	65.10	1052.71	
EW-14	3/27/91	1117.81	64.98	1052.83	
EW-14	3/28/91	1117.81	64.87	1052.94	
EW-14	3/29/91	1117.81	64.28	1053.53	
EW-14	4/1/91	1117.81	62.48	1055.33	
EW-14	4/2/91	1117.81	61.67	1056.14	
EW-14	4/3/91	1117.81	61.11	1056.70	
EW-14	4/4/91	1117.81	60.43	1057.38	
EW-14	4/5/91	1117.81	59.61	1058.20	
EW-14	4/8/91	1117.81	58.29	1059.52	
EW-14	4/9/91	1117.81	58.52	1059.29	
EW-14	4/10/91	1117.81	56.82	1060.99	
EW-14	4/11/91	1117.81	56.53	1061.28	
EW-14	4/12/91	1117.81	56.19	1061.62	
EW-14	4/15/91	1117.81	55.07	1062.74	
EW-14	4/16/91	1117.81	54.95	1062.86	
EW-14	4/17/91	1117.81	54.72	1063.09	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-14	4/18/91	1117.81	54.82	1062.99	
EW-14	4/22/91	1117.81	54.77	1063.04	
EW-14	4/25/91	1117.81	55.21	1062.60	
EW-14	4/27/91	1117.81	55.66	1062.15	
EW-14	4/29/91	1117.81	56.08	1061.73	
EW-14	5/1/91	1117.81	56.56	1061.25	
EW-14	5/3/91	1117.81	57.19	1060.62	
EW-14	5/4/91	1117.81	57.44	1060.37	
EW-14	5/5/91	1117.81	57.68	1060.13	
EW-14	5/6/91	1117.81	57.80	1060.01	
EW-14	5/7/91	1117.81	58.05	1059.76	
EW-14	5/8/91	1117.81	58.26	1059.55	
EW-14	5/9/91	1117.81	58.41	1059.40	
EW-14	5/10/91	1117.81	58.77	1059.04	
EW-14	5/12/91	1117.81	59.10	1058.71	
EW-14	5/13/91	1117.81	59.21	1058.60	
EW-14	5/15/91	1117.81	59.59	1058.22	
EW-14	5/17/91	1117.81	59.96	1057.85	
EW-14	5/20/91	1117.81	60.23	1057.58	
EW-14	5/23/91	1117.81	60.90	1056.91	
EW-14	5/27/91	1117.81	61.37	1056.44	
EW-14	5/29/91	1117.81	61.49	1056.32	
EW-14	6/1/91	1117.81	61.80	1056.01	
EW-14	6/3/91	1117.81	62.06	1055.75	
EW-14	6/5/91	1117.81	62.18	1055.63	
EW-14	6/6/91	1117.81	62.31	1055.50	
EW-14	6/7/91	1117.81	62.36	1055.45	
EW-14	6/8/91	1117.81	62.37	1055.44	
EW-14	6/9/91	1117.81	62.54	1055.27	
EW-14	6/10/91	1117.81	62.65	1055.16	
EW-14	6/11/91	1117.81	62.82	1054.99	
EW-14	7/5/91	1117.81	64.46	1053.35	Well was unlocked
EW-14	8/6/91	1117.81	66.17	1051.64	
EW-14	9/6/91	1117.81	67.46	1050.35	
EW-14	10/8/91	1117.81	68.31	1049.50	
EW-14	11/6/91	1117.81	68.13	1049.68	
EW-14	12/5/91	1117.81	66.86	1050.95	
EW-14	1/2/92	1117.81	66.61	1051.20	
EW-14	1/24/92	1117.81	59.89	1057.92	
EW-14	2/7/92	1117.81	54.50	1063.31	
EW-14	2/14/92	1117.81	52.08	1065.73	
EW-14	2/21/92	1117.81	49.20	1068.61	
EW-14	2/28/92	1117.81	47.39	1070.42	
EW-14	3/9/92	1117.81	44.55	1073.26	
EW-14	3/20/92	1117.81	41.46	1076.35	
EW-14	4/3/92	1117.81	38.72	1079.09	
EW-14	5/1/92	1117.81	36.03	1081.78	
EW-14	6/1/92	1117.81	33.30	1084.51	
EW-14	6/26/92	1117.81	35.46	1082.35	
EW-14	7/10/92	1117.81	39.28	1078.53	
EW-14	7/24/92	1117.81	41.51	1076.30	
EW-14	8/7/92	1117.81	39.92	1077.89	
EW-14	9/4/92	1117.81	35.47	1082.34	
EW-14	10/2/92	1117.81	39.41	1078.40	
EW-14	11/5/92	1117.81	44.86	1072.95	
EW-14	12/1/92	1117.81	48.13	1069.68	
EW-14	1/4/93	1117.81	44.61	1073.20	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-14	1/11/93	1117.81	37.10	1080.71	
EW-14	1/18/93	1117.81	33.09	1084.72	
EW-14	1/26/93	1117.81	31.48	1086.33	
EW-14	2/2/93	1117.81	31.75	1086.06	
EW-14	2/9/93	1117.81	31.34	1086.47	
EW-14	2/16/93	1117.81	30.46	1087.35	
EW-14	3/1/93	1117.81	29.27	1088.54	
EW-14	3/15/93	1117.81	29.86	1087.95	
EW-14	4/1/93	1117.81	29.50	1088.31	
EW-14	4/26/93	1117.81	30.53	1087.28	
EW-14	5/3/93	1117.81	29.99	1087.82	
EW-14	6/1/93	1117.81	31.48	1086.33	
EW-14	6/11/93	1117.81	31.04	1086.77	
EW-14	7/1/93	1117.81	32.56	1085.25	
EW-14	8/6/93	1117.81	38.17	1079.64	
EW-14	9/7/93	1117.81	38.33	1079.48	
EW-14	10/7/93	1117.81	41.54	1076.27	
EW-14	11/9/93	1117.81	43.70	1074.11	
EW-14	12/6/93	1117.81	40.18	1077.63	
EW-14	1/4/94	1117.81	42.02	1075.79	
EW-14	2/3/94	1117.81	45.98	1071.83	
EW-14	3/7/94	1117.81	48.00	1069.81	
EW-14	4/6/94	1117.81	48.74	1069.07	
EW-14	5/6/94	1117.81	50.21	1067.60	
EW-14	6/7/94	1117.81	51.55	1066.26	
EW-14	7/6/94	1117.81	53.06	1064.75	
EW-14	8/4/94	1117.81	54.28	1063.53	
EW-14	9/9/94	1117.81	54.38	1063.43	
EW-14	10/11/94	1117.81	55.58	1062.23	
EW-14	11/4/94	1117.81	56.92	1060.89	
EW-14	12/2/94	1117.81	56.01	1061.80	
EW-14	1/9/95	1117.81	51.75	1066.06	
EW-14	2/3/95	1117.81	48.71	1069.10	
EW-14	3/2/95	1117.81	42.00	1075.81	
EW-14	4/5/95	1117.81	37.14	1080.67	
EW-14	5/10/95	1117.81	38.20	1079.61	
EW-14	6/6/95	1117.81	42.70	1075.11	
EW-14	7/7/95	1117.81	46.22	1071.59	
EW-14	8/4/95	1117.81	48.29	1069.52	
EW-14	9/7/95	1117.81	46.88	1070.93	
EW-14	10/6/95	1117.81	48.02	1069.79	
EW-14	11/10/95	1117.81	45.28	1072.53	
EW-14	12/9/95	1117.81	48.06	1069.75	
EW-14	1/11/96	1117.81	50.27	1067.54	
EW-14	2/10/96	1117.81	50.99	1066.82	Steel tape
EW-14	3/8/96	1117.81	51.64	1066.17	
EW-14	4/5/96	1117.81	52.43	1065.38	
EW-14	5/7/96	1117.81	53.06	1064.75	
EW-14	6/5/96	1117.81	53.64	1064.17	
EW-14	7/8/96	1117.81	54.10	1063.71	Well cover within vault coverd by dirt
EW-14	8/2/96	1117.81	53.53	1064.28	
EW-14	9/9/96	1117.81	ND		Landscaped over
EW-14	10/4/96	1117.81	54.78	1063.03	
EW-14	11/1/96	1117.81	55.78	1062.03	
EW-14	12/5/96	1117.81	56.86	1060.95	Pump OK
EW-14	4/7/97	1117.81	60.48	1057.33	
EW-14	6/2/97	1117.81	62.13	1055.68	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-14	9/10/97	1117.81	62.98	1054.83	
EW-14	12/12/97	1117.81	64.97	1052.84	
EW-14	3/13/98	1117.81	59.47	1058.34	
EW-14	6/22/98	1117.81	58.00	1059.81	
EW-14	9/22/98	1117.81	58.22	1059.59	
EW-15	12/6/93	1126.06	36.46	1089.60	Measure Point .13' above seal.
EW-15	1/4/94	1126.06	37.98	1088.08	
EW-15	2/3/94	1126.06	41.61	1084.45	
EW-15	3/7/94	1126.06	44.11	1081.95	
EW-15	4/6/94	1126.06	45.14	1080.92	
EW-15	5/6/94	1126.06	47.78	1078.28	
EW-15	6/7/94	1126.06	48.22	1077.84	
EW-15	7/6/94	1126.06	49.82	1076.24	
EW-15	8/4/94	1126.06	51.14	1074.92	
EW-15	9/9/94	1126.06	51.43	1074.63	
EW-15	10/12/94	1126.06	52.60	1073.46	
EW-15	11/4/94	1126.06	52.88	1073.18	
EW-15	12/2/94	1126.06	53.10	1072.96	
EW-15	1/9/95	1126.06	47.98	1078.08	
EW-15	2/3/95	1126.06	44.87	1081.19	
EW-15	3/2/95	1126.06	38.96	1087.10	
EW-15	4/5/95	1126.06	35.53	1090.53	
EW-15	5/10/95	1126.06	36.21	1089.85	
EW-15	6/6/95	1126.06	39.80	1086.26	
EW-15	7/7/95	1126.06	42.86	1083.20	
EW-15	8/4/95	1126.06	44.94	1081.12	
EW-15	9/7/95	1126.06	43.52	1082.54	
EW-15	10/6/95	1126.06	41.77	1084.29	
EW-15	11/10/95	1126.06	41.29	1084.77	
EW-15	12/9/95	1126.06	44.16	1081.90	
EW-15	1/11/96	1126.06	46.57	1079.49	
EW-15	2/10/96	1126.06	47.79	1078.27	
EW-15	3/8/96	1126.06	48.85	1077.21	
EW-15	4/6/96	1126.06	50.02	1076.04	
EW-15	5/7/96	1126.06	51.09	1074.97	
EW-15	6/5/96	1126.06	52.13	1073.93	
EW-15	7/8/96	1126.06	52.85	1073.21	
EW-15	8/2/96	1126.06	52.68	1073.38	
EW-15	9/9/96	1126.06	52.94	1073.12	
EW-15	10/4/96	1126.06	53.72	1072.34	
EW-15	11/1/96	1126.06	54.46	1071.60	
EW-15	12/5/96	1126.06	55.26	1070.80	
EW-15	4/7/97	1126.06	59.17	1066.89	
EW-15	6/2/97	1126.06	59.28	1066.78	
EW-15	9/10/97	1126.06	61.82	1064.24	
EW-15	12/11/97	1126.06	62.32	1063.74	
EW-15	3/13/98	1126.06	56.85	1069.21	
EW-15	6/22/98	1126.06	54.27	1071.79	
EW-15	9/22/98	1126.06	53.94	1072.12	
EW-15	6/9/99	1126.06	60.00	1066.06	
EW-16	12/6/93	1109.11	14.36	1094.75	Measure Point .12' above seal.
EW-16	1/4/94	1109.11	16.10	1093.01	
EW-16	2/3/94	1109.11	19.74	1089.37	
EW-16	3/7/94	1109.11	22.43	1086.68	
EW-16	4/6/94	1109.11	23.54	1085.57	
EW-16	5/6/94	1109.11	25.00	1084.11	
EW-16	6/7/94	1109.11	26.62	1082.49	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-16	7/6/94	1109.11	28.44	1080.67	
EW-16	8/4/94	1109.11	30.02	1079.09	
EW-16	9/9/94	1109.11	30.13	1078.98	
EW-16	10/12/94	1109.11	31.42	1077.69	
EW-16	11/4/94	1109.11	31.23	1077.88	
EW-16	12/2/94	1109.11	31.50	1077.61	
EW-16	1/9/95	1109.11	26.03	1083.08	
EW-16	2/3/95	1109.11	17.35	1091.76	
EW-16	3/2/95	1109.11	11.75	1097.36	
EW-16	4/5/95	1109.11	11.95	1097.16	
EW-16	5/10/95	1109.11	13.61	1095.50	
EW-16	6/6/95	1109.11	17.50	1091.61	
EW-16	7/7/95	1109.11	20.34	1088.77	
EW-16	8/4/95	1109.11	22.96	1086.15	
EW-16	9/7/95	1109.11	20.02	1089.09	Only one guard post remains
EW-16	10/6/95	1109.11	17.76	1091.35	
EW-16	11/10/95	1109.11	16.63	1092.48	
EW-16	12/9/95	1109.11	20.89	1088.22	
EW-16	1/11/96	1109.11	24.15	1084.96	
EW-16	2/10/96	1109.11	26.06	1083.05	
EW-16	3/8/96	1109.11	27.52	1081.59	
EW-16	4/6/96	1109.11	29.23	1079.88	
EW-16	5/7/96	1108.96	30.88	1078.08	Pump removed, elevation -0.15 feet.
EW-16	6/5/96	1108.96	31.69	1077.27	
EW-16	7/8/96	1108.96	32.69	1076.27	
EW-16	8/2/96	1108.96	33.01	1075.95	
EW-16	9/9/96	1108.96	33.33	1075.63	
EW-16	10/4/96	1108.96	33.53	1075.43	
EW-16	11/1/96	1108.96	34.20	1074.76	
EW-16	12/5/96	1108.96	34.94	1074.02	
EW-16	4/7/97	1109.11	36.95	1072.16	
EW-16	6/2/97	1109.11	38.64	1070.47	
EW-16	9/10/97	1109.11	41.63	1067.48	
EW-16	12/11/97	1109.11	40.75	1068.36	
EW-16	3/12/98	1109.21	31.48	1077.73	
EW-16	6/22/98	1109.21	30.60	1078.61	
EW-16	9/22/98	1109.21	29.47	1079.74	
EW-17	12/6/93	1121.04	37.49	1083.55	Measure point .11' above seal.
EW-17	1/4/94	1121.04	39.79	1081.25	
EW-17	2/3/94	1121.04	42.88	1078.16	
EW-17	3/7/94	1121.04	ND		
EW-17	4/6/94	1121.04	46.40	1074.64	
EW-17	5/6/94	1121.04	47.92	1073.12	
EW-17	6/7/94	1121.04	49.30	1071.74	
EW-17	7/6/94	1121.04	50.65	1070.39	
EW-17	8/4/94	1121.04	49.90	1071.14	
EW-17	9/9/94	1121.04	52.21	1068.83	
EW-17	10/11/94	1121.04	53.04	1068.00	
EW-17	11/4/94	1121.04	53.39	1067.65	
EW-17	12/2/94	1121.04	53.54	1067.50	
EW-17	1/9/95	1121.04	50.63	1070.41	
EW-17	2/3/95	1121.04	47.75	1073.29	
EW-17	3/2/95	1121.04	42.88	1078.16	
EW-17	4/5/95	1121.04	38.17	1082.87	
EW-17	5/10/95	1121.04	38.00	1083.04	
EW-17	6/6/95	1121.04	40.98	1080.06	
EW-17	7/7/95	1121.04	44.16	1076.88	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-17	8/4/95	1121.04	ND		can't measure, vehicle parked on cover
EW-17	9/7/95	1121.04	45.10	1075.94	
EW-17	10/6/95	1121.04	44.14	1076.90	
EW-17	11/10/95	1121.04	44.34	1076.70	
EW-17	12/9/95	1121.04	ND		Mobile home parked over well
EW-17	1/11/96	1121.04	47.87	1073.17	
EW-17	2/10/96	1121.04	ND		Mobile home parked over well
EW-17	3/8/96	1121.04	49.47	1071.57	
EW-17	4/5/96	1121.04	50.24	1070.80	
EW-17	5/7/96	1121.04	50.84	1070.20	
EW-17	6/5/96	1121.04	51.63	1069.41	
EW-17	7/8/96	1121.04	52.04	1069.00	
EW-17	8/2/96	1121.04	51.86	1069.18	Bailed vault
EW-17	9/9/96	1121.04	52.15	1068.89	Bailed water from vault
EW-17	10/4/96	1121.04	52.73	1068.31	
EW-17	11/1/96	1121.04	53.61	1067.43	
EW-17	12/5/96	1121.04	54.79	1066.25	
EW-17	4/7/97	1121.04	58.34	1062.70	
EW-17	6/2/97	1121.04	59.93	1061.11	
EW-17	9/10/97	1121.04	61.15	1059.89	
EW-17	12/11/97	1121.04	62.76	1058.28	
EW-17	3/13/98	1121.04	58.20	1062.84	
EW-17	6/22/98	1121.04	55.65	1065.39	
EW-17	9/22/98	1121.04	55.81	1065.23	
EW-18	12/6/93	1125.95	39.32	1086.63	Measure point .12' above seal.
EW-18	1/4/94	1125.95	40.95	1085.00	
EW-18	2/3/94	1125.95	45.72	1080.23	
EW-18	3/7/94	1125.95	48.29	1077.66	
EW-18	4/6/94	1125.95	49.03	1076.92	
EW-18	5/6/94	1125.95	50.95	1075.00	
EW-18	6/7/94	1125.95	52.27	1073.68	
EW-18	7/6/94	1125.95	54.18	1071.77	
EW-18	8/4/94	1125.95	55.24	1070.71	
EW-18	9/9/94	1125.95	55.80	1070.15	
EW-18	10/12/94	1125.95	57.08	1068.87	
EW-18	11/4/94	1125.95	57.38	1068.57	
EW-18	12/2/94	1125.95	57.48	1068.47	
EW-18	1/9/95	1125.95	52.45	1073.50	
EW-18	2/3/95	1125.95	49.20	1076.75	
EW-18	3/2/95	1125.95	43.59	1082.36	
EW-18	4/5/95	1125.95	37.80	1088.15	
EW-18	5/10/95	1125.95	38.54	1087.41	
EW-18	6/6/95	1125.95	43.28	1082.67	
EW-18	7/7/95	1125.95	47.03	1078.92	
EW-18	8/4/95	1125.95	49.33	1076.62	
EW-18	9/7/95	1125.95	47.89	1078.06	
EW-18	10/6/95	1125.95	45.96	1079.99	
EW-18	11/10/95	1125.95	45.61	1080.34	
EW-18	12/9/95	1125.95	48.46	1077.49	
EW-18	1/11/96	1125.95	51.06	1074.89	
EW-18	2/10/96	1125.95	51.94	1074.01	
EW-18	3/8/96	1125.95	52.79	1073.16	
EW-18	4/5/96	1125.95	53.94	1072.01	
EW-18	5/7/96	1125.95	54.98	1070.97	
EW-18	6/5/96	1125.80	56.02	1069.78	
EW-18	7/8/96	1125.80	56.48	1069.32	
EW-18	8/2/96	1125.80	55.89	1069.91	TD=98.45

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-18	9/9/96	1125.80	56.22	1069.58	
EW-18	10/4/96	1125.95	57.32	1068.63	Pump back in well
EW-18	11/1/96	1125.95	58.11	1067.84	
EW-18	12/5/96	1125.95	59.19	1066.76	
EW-18	4/7/97	1125.95	62.79	1063.16	
EW-18	6/2/97	1125.95	64.51	1061.44	
EW-18	9/10/97	1125.95	65.36	1060.59	
EW-18	12/11/97	1125.95	66.74	1059.21	
EW-18	3/13/98	1125.95	60.56	1065.39	
EW-18	6/22/98	1125.95	58.66	1067.29	
EW-18	9/22/98	1125.95	58.91	1067.04	
EW-18	6/8/99	1125.95	63.47	1062.48	
EW-19	6/5/96	1123.94	55.40	1068.54	Measured from top of seal
EW-19	7/8/96	1123.94	56.24	1067.70	
EW-19	8/2/96	1123.94	55.61	1068.33	
EW-19	9/9/96	1123.94	55.74	1068.20	
EW-19	10/4/96	1123.94	57.05	1066.89	
EW-19	11/1/96	1123.94	57.57	1066.37	
EW-19	12/5/96	1123.94	58.82	1065.12	
EW-19	4/7/97	1123.94	62.40	1061.54	
EW-19	6/2/97	1123.94	64.42	1059.52	
EW-19	9/10/97	1123.94	65.03	1058.91	
EW-19	12/11/97	1123.94	66.15	1057.79	
EW-19	3/13/98	1123.94	59.59	1064.35	
EW-19	6/22/98	1123.94	58.06	1065.88	
EW-19	9/22/98	1123.94	57.86	1066.08	
EW-19	6/9/99	1123.94	63.78	1060.16	
EW-22	8/4/95	1120.98	54.78	1066.20	Measured to TOC
EW-22	9/7/95	1120.98	53.44	1067.54	
EW-22	10/6/95	1120.98	51.51	1069.47	
EW-22	11/10/95	1121.00	50.98	1070.02	Measured to top of well seal (+.02')
EW-22	12/9/95	1121.00	54.50	1066.50	
EW-22	1/11/96	1121.00	56.75	1064.25	
EW-22	2/10/96	1121.00	57.58	1063.42	
EW-22	3/8/96	1121.00	58.40	1062.60	DBG measured
EW-22	4/9/96	1121.00	59.31	1061.69	PRP measured
EW-22	5/9/96	1121.00	60.08	1060.92	DBG measured
EW-22	6/5/96	1121.00	60.97	1060.03	ACC measured
EW-22	7/11/96	1121.00	61.21	1059.79	ACC measured
EW-22	8/2/96	1121.00	61.15	1059.85	ACC measured
EW-22	9/9/96	1121.00	61.43	1059.57	
EW-22	10/4/96	1121.00	62.39	1058.61	
EW-22	10/31/96	1121.00	62.96	1058.04	ACC measured
EW-22	12/6/96	1121.00	64.18	1056.82	GEH measured
EW-22	4/9/97	1121.00	67.66	1053.34	
EW-22	6/2/97	1121.00	ND		Well is temporarily buried
EW-22	9/10/97	1121.00	70.73	1050.27	
EW-22	12/12/97	1121.00	71.97	1049.03	
EW-22	3/12/98	1121.00	66.94	1054.06	
EW-22	6/22/98	1121.00	64.65	1056.35	
EW-22	9/25/98	1121.00	65.08	1055.92	
EW-22*	6/10/99	1122.16	69.79	1052.37	* using new survey data
EW-23	6/10/99	1121.38	70.50	1050.88	
EW-24	6/8/99	1098.72	40.47	1058.25	
EW-25	6/8/99	1106.82	30.77	1076.05	
EW-26	6/9/99	1125.35	58.20	1067.15	
EW-E	4/28/82	1125.44	51.20	1074.24	Data from Graf (1986)

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-E	8/16/82	1125.44	58.10	1067.34	Data from Graf (1986)
EW-E	9/17/82	1125.44	57.62	1067.82	Data from Graf (1986)
EW-E	12/11/82	1125.44	59.73	1065.71	Data from Graf (1986)
EW-E	12/12/82	1125.44	59.45	1065.99	Data from Graf (1986)
EW-E	12/14/82	1125.44	59.42	1066.02	Data from Graf (1986)
EW-E	12/16/82	1125.44	58.62	1066.82	Data from Graf (1986)
EW-E	12/20/82	1125.44	56.29	1069.15	Data from Graf (1986)
EW-E	12/24/82	1125.44	54.67	1070.77	Data from Graf (1986)
EW-E	12/28/82	1125.44	52.86	1072.58	Data from Graf (1986)
EW-E	12/30/82	1125.44	51.52	1073.92	Data from Graf (1986)
EW-E	1/2/83	1125.44	49.82	1075.62	Data from Graf (1986)
EW-E	1/6/83	1125.44	47.76	1077.68	Data from Graf (1986)
EW-E	1/11/83	1125.44	45.93	1079.51	Data from Graf (1986)
EW-E	1/14/83	1125.44	45.38	1080.06	Data from Graf (1986)
EW-E	1/18/83	1125.44	45.19	1080.25	Data from Graf (1986)
EW-E	1/21/83	1125.44	45.32	1080.12	Data from Graf (1986)
EW-E	1/24/83	1125.44	45.30	1080.14	Data from Graf (1986)
EW-E	1/27/83	1125.44	46.16	1079.28	Data from Graf (1986)
EW-E	2/1/83	1125.44	45.05	1080.39	Data from Graf (1986)
EW-E	2/6/83	1125.44	44.71	1080.73	Data from Graf (1986)
EW-E	2/10/83	1125.44	42.02	1083.42	Data from Graf (1986)
EW-E	2/13/83	1125.44	40.28	1085.16	Data from Graf (1986)
EW-E	2/17/83	1125.44	39.26	1086.18	Data from Graf (1986)
EW-E	2/19/83	1125.44	38.12	1087.32	Data from Graf (1986)
EW-E	2/24/83	1125.44	37.13	1088.31	Data from Graf (1986)
EW-E	3/1/83	1125.44	36.22	1089.22	Data from Graf (1986)
EW-E	3/8/83	1125.44	34.00	1091.44	Data from Graf (1986)
EW-E	3/22/83	1125.44	31.53	1093.91	Data from Graf (1986)
EW-E	3/28/83	1125.44	29.82	1095.62	Data from Graf (1986)
EW-E	4/2/83	1125.44	29.19	1096.25	Data from Graf (1986)
EW-E	4/15/83	1125.44	28.65	1096.79	Data from Graf (1986)
EW-E	4/27/83	1125.44	27.60	1097.84	Data from Graf (1986)
EW-E	5/6/83	1125.44	27.60	1097.84	Data from Graf (1986)
EW-E	6/22/83	1125.44	29.20	1096.24	Data from Graf (1986)
EW-E	9/1/83	1125.44	30.84	1094.60	Data from Graf (1986)
EW-E	10/2/83	1125.44	30.75	1094.69	Data from Graf (1986)
EW-E	11/22/83	1125.44	28.85	1096.59	Data from Graf (1986)
EW-E	7/9/84	1125.44	42.02	1083.42	Data from Graf (1986)
EW-E	10/10/84	1125.44	40.32	1085.12	Data from Graf (1986)
EW-E	12/18/84	1125.44	44.88	1080.56	Data from Graf (1986)
EW-E	1/3/85	1125.44	31.32	1094.12	Data from Graf (1986)
EW-E	1/8/85	1125.44	34.00	1091.44	Data from Graf (1986)
EW-E	2/20/85	1125.44	30.47	1094.97	Data from Graf (1986)
EW-E	8/14/85	1125.44	36.21	1089.23	Data from Graf (1986)
EW-E	12/7/86	1125.44	38.00	1087.44	Data from Graf (1986)
EW-E	9/10/87	1125.44	51.44	1074.00	Data from Graf (1986)
EW-E	10/14/87	1125.44	52.05	1073.39	Data from Graf (1986)
EW-E	10/29/87	1125.44	52.33	1073.11	Data from Graf (1986)
EW-E	12/29/87	1125.44	51.60	1073.84	Data from Graf (1986)
EW-E	1/12/88	1125.44	51.82	1073.62	Measured from well seal
EW-E	3/4/88	1125.44	50.59	1074.85	
EW-E	6/14/88	1125.44	50.40	1075.04	
EW-E	7/22/88	1125.44	52.09	1073.35	
EW-E	8/25/88	1125.44	52.97	1072.47	
EW-E	9/24/88	1125.44	53.00	1072.44	
EW-E	10/21/88	1125.44	53.26	1072.18	
EW-E	12/21/88	1125.44	54.49	1070.95	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-E	1/19/89	1125.44	55.20	1070.24	
EW-E	3/30/89	1125.44	56.68	1068.76	
EW-E	5/8/89	1125.44	57.44	1068.00	
EW-E	5/30/89	1125.44	58.10	1067.34	
EW-E	6/30/89	1125.44	58.85	1066.59	
EW-E	7/27/89	1125.44	59.30	1066.14	
EW-E	9/5/89	1125.44	59.57	1065.87	
EW-E	9/28/89	1125.44	59.93	1065.51	
EW-E	11/6/89	1125.44	60.96	1064.48	
EW-E	12/1/89	1125.44	61.26	1064.18	
EW-E	1/8/90	1125.44	62.08	1063.36	
EW-E	2/5/90	1125.44	62.70	1062.74	
EW-E	3/5/90	1125.44	63.20	1062.24	
EW-E	4/6/90	1125.44	63.97	1061.47	
EW-E	5/8/90	1125.44	64.69	1060.75	
EW-E	6/5/90	1125.44	65.38	1060.06	
EW-E	7/6/90	1125.44	66.09	1059.35	
EW-E	7/30/90	1125.44	65.16	1060.28	
EW-E	8/7/90	1125.44	63.34	1062.10	
EW-E	8/15/90	1125.44	62.46	1062.98	
EW-E	8/16/90	1125.44	62.03	1063.41	
EW-E	8/17/90	1125.44	61.98	1063.46	
EW-E	8/20/90	1125.44	60.91	1064.53	
EW-E	8/22/90	1125.44	60.29	1065.15	
EW-E	9/6/90	1125.44	59.29	1066.15	
EW-E	9/11/90	1125.44	58.43	1067.01	
EW-E	10/8/90	1125.44	59.52	1065.92	W/L recorder installed 9/24
EW-E	11/1/90	1125.44	61.17	1064.27	
EW-E	12/3/90	1125.44	62.40	1063.04	
EW-E	1/8/91	1125.44	64.06	1061.38	
EW-E	2/4/91	1125.44	65.50	1059.94	
EW-E	3/4/91	1125.44	66.68	1058.76	
EW-E	3/6/91	1125.44	65.99	1059.45	
EW-E	3/7/91	1125.44	65.53	1059.91	
EW-E	3/8/91	1125.44	64.91	1060.53	
EW-E	3/11/91	1125.44	63.48	1061.96	
EW-E	3/14/91	1125.44	62.00	1063.44	
EW-E	3/16/91	1125.44	61.37	1064.07	
EW-E	3/27/91	1125.44	59.95	1065.49	
EW-E	3/28/91	1125.44	59.96	1065.48	
EW-E	3/29/91	1125.44	59.24	1066.20	
EW-E	4/1/91	1125.44	57.10	1068.34	
EW-E	4/2/91	1125.44	56.27	1069.17	
EW-E	4/3/91	1125.44	55.67	1069.77	
EW-E	4/4/91	1125.44	54.97	1070.47	
EW-E	4/5/91	1125.44	54.16	1071.28	
EW-E	4/8/91	1125.44	53.01	1072.43	
EW-E	4/9/91	1125.44	52.74	1072.70	
EW-E	4/10/91	1125.44	50.38	1075.06	
EW-E	4/11/91	1125.44	49.91	1075.53	
EW-E	4/12/91	1125.44	49.51	1075.93	
EW-E	4/15/91	1125.44	48.30	1077.14	
EW-E	4/16/91	1125.44	48.09	1077.35	
EW-E	4/17/91	1125.44	47.85	1077.59	
EW-E	4/18/91	1125.44	47.74	1077.70	
EW-E	4/22/91	1125.44	47.47	1077.97	
EW-E	4/25/91	1125.44	47.69	1077.75	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-E	4/27/91	1125.44	47.93	1077.51	
EW-E	4/29/91	1125.44	48.28	1077.16	
EW-E	5/1/91	1125.44	48.54	1076.90	
EW-E	5/3/91	1125.44	49.09	1076.35	
EW-E	5/4/91	1125.44	49.39	1076.05	
EW-E	5/5/91	1125.44	49.61	1075.83	
EW-E	5/6/91	1125.44	49.68	1075.76	
EW-E	5/7/91	1125.44	50.00	1075.44	
EW-E	5/8/91	1125.44	50.29	1075.15	
EW-E	5/9/91	1125.44	50.38	1075.06	
EW-E	5/10/91	1125.44	50.74	1074.70	
EW-E	5/12/91	1125.44	51.23	1074.21	
EW-E	5/13/91	1125.44	51.48	1073.96	
EW-E	5/15/91	1125.44	51.96	1073.48	
EW-E	5/17/91	1125.44	52.37	1073.07	
EW-E	5/20/91	1125.44	52.97	1072.47	
EW-E	5/23/91	1125.44	53.78	1071.66	
EW-E	5/27/91	1125.44	54.50	1070.94	
EW-E	5/29/91	1125.44	54.87	1070.57	
EW-E	6/1/91	1125.44	58.88	1066.56	
EW-E	6/3/91	1125.44	56.20	1069.24	
EW-E	6/5/91	1125.44	63.23	1062.21	Aquifer test
EW-E	6/6/91	1125.44	64.18	1061.26	Aquifer test
EW-E	6/7/91	1125.44	64.42	1061.02	Aquifer test
EW-E	6/8/91	1125.44	64.53	1060.91	Aquifer test
EW-E	6/9/91	1125.44	64.82	1060.62	Aquifer test
EW-E	6/10/91	1125.44	58.61	1066.83	Aquifer test
EW-E	6/11/91	1125.44	58.26	1067.18	Aquifer test
EW-E	7/5/91	1125.44	59.85	1065.59	
EW-E	8/6/91	1125.44	62.00	1063.44	
EW-E	9/6/91	1125.44	63.78	1061.66	
EW-E	10/8/91	1125.44	64.66	1060.78	
EW-E	11/6/91	1125.44	64.65	1060.79	
EW-E	12/5/91	1125.44	62.71	1062.73	
EW-E	1/2/92	1125.44	62.30	1063.14	
EW-E	1/24/92	1125.44	55.28	1070.16	
EW-E	2/7/92	1125.44	48.67	1076.77	
EW-E	2/14/92	1125.44	46.19	1079.25	
EW-E	2/21/92	1125.44	43.25	1082.19	
EW-E	2/28/92	1125.44	41.62	1083.82	
EW-E	3/9/92	1125.44	39.40	1086.04	
EW-E	3/20/92	1125.44	36.66	1088.78	
EW-E	4/3/92	1125.44	34.45	1090.99	
EW-E	5/1/92	1125.44	32.68	1092.76	
EW-E	6/1/92	1125.44	31.01	1094.43	
EW-E	6/26/92	1125.44	31.95	1093.49	
EW-E	7/10/92	1125.44	34.22	1091.22	
EW-E	7/24/92	1125.44	35.98	1089.46	
EW-E	8/7/92	1125.44	34.33	1091.11	
EW-E	9/4/92	1125.44	31.09	1094.35	
EW-E	10/2/92	1125.44	33.57	1091.87	
EW-E	11/5/92	1125.44	38.64	1086.80	
EW-E	12/1/92	1125.44	41.87	1083.57	
EW-E	1/4/93	1125.44	37.54	1087.90	
EW-E	1/11/93	1125.44	31.95	1093.49	
EW-E	1/18/93	1125.44	28.16	1097.28	
EW-E	1/26/93	1125.44	26.65	1098.79	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-E	2/2/93	1125.44	26.87	1098.57	
EW-E	2/9/93	1125.44	26.76	1098.68	
EW-E	2/16/93	1125.44	26.16	1099.28	
EW-E	3/1/93	1125.44	25.26	1100.18	
EW-E	3/15/93	1125.44	25.85	1099.59	
EW-E	4/1/93	1125.44	25.83	1099.61	
EW-E	4/26/93	1125.44	27.06	1098.38	
EW-E	5/3/93	1125.44	26.70	1098.74	
EW-E	6/1/93	1125.44	27.34	1098.10	
EW-E	6/11/93	1125.44	27.97	1097.47	
EW-E	7/1/93	1125.44	28.69	1096.75	
EW-E	8/6/93	1125.44	32.02	1093.42	
EW-E	9/7/93	1125.44	31.66	1093.78	
EW-E	10/7/93	1125.44	33.64	1091.80	
EW-E	11/9/93	1125.44	36.52	1088.92	
EW-E	12/6/93	1125.44	33.29	1092.15	
EW-E	1/4/94	1125.44	34.50	1090.94	
EW-E	2/3/94	1125.44	38.35	1087.09	
EW-E	3/7/94	1125.44	40.11	1085.33	
EW-E	4/6/94	1125.44	42.25	1083.19	
EW-E	5/6/94	1125.44	43.96	1081.48	
EW-E	6/7/94	1125.44	45.40	1080.04	
EW-E	7/6/94	1125.44	47.08	1078.36	
EW-E	8/4/94	1125.44	48.54	1076.90	
EW-E	9/9/94	1125.44	49.45	1075.99	
EW-E	10/12/94	1125.44	50.19	1075.25	
EW-E	11/4/94	1125.44	50.51	1074.93	
EW-E	12/2/94	1125.44	51.66	1073.78	
EW-E	1/9/95	1125.44	46.36	1079.08	
EW-E	2/3/95	1125.44	41.72	1083.72	
EW-E	3/2/95	1125.44	35.69	1089.75	
EW-E	4/5/95	1125.44	31.98	1093.46	
EW-E	5/10/95	1125.44	32.80	1092.64	
EW-E	6/6/95	1125.44	36.31	1089.13	
EW-E	7/7/95	1125.44	39.63	1085.81	
EW-E	8/4/95	1125.44	41.93	1083.51	
EW-E	9/7/95	1125.44	40.76	1084.68	
EW-E	10/6/95	1125.44	39.51	1085.93	
EW-E	11/10/95	1125.44	39.15	1086.29	
EW-E	12/9/95	1125.44	40.98	1084.46	
EW-E	1/11/96	1125.44	43.50	1081.94	
EW-E	2/10/96	1125.44	44.89	1080.55	
EW-E	3/8/96	1125.44	46.11	1079.33	
EW-E	4/6/96	1125.44	47.40	1078.04	
EW-E	5/7/96	1125.44	48.55	1076.89	
EW-E	6/5/96	1125.44	49.78	1075.66	
EW-E	7/8/96	1125.44	50.53	1074.91	
EW-E	8/2/96	1125.44	50.53	1074.91	
EW-E	9/9/96	1125.44	50.93	1074.51	
EW-E	10/4/96	1125.44	51.42	1074.02	Steel tape
EW-E	11/1/96	1125.44	52.14	1073.30	
EW-E	12/5/96	1125.44	52.91	1072.53	Pump OK
EW-E	4/7/97	1125.44	56.47	1068.97	
EW-E	6/2/97	1125.44	58.02	1067.42	
EW-E	9/10/97	1125.44	59.17	1066.27	
EW-E	12/11/97	1125.44	59.63	1065.81	
EW-E	3/13/98	1125.44	54.26	1071.18	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-E	6/22/98	1125.44	50.38	1075.06	
EW-E	9/22/98	1125.44	50.83	1074.61	
EW-E	6/9/99	1125.44	56.91	1068.53	
EW-NE	8/16/82	1131.48	52.36	1079.12	Data from Graf (1986)
EW-NE	9/16/82	1131.48	52.40	1079.08	Data from Graf (1986)
EW-NE	12/11/82	1131.48	55.14	1076.34	Data from Graf (1986)
EW-NE	12/12/82	1131.48	54.96	1076.52	Data from Graf (1986)
EW-NE	12/14/82	1131.48	54.12	1077.36	Data from Graf (1986)
EW-NE	12/16/82	1131.48	52.80	1078.68	Data from Graf (1986)
EW-NE	12/20/82	1131.48	50.45	1081.03	Data from Graf (1986)
EW-NE	12/24/82	1131.48	48.53	1082.95	Data from Graf (1986)
EW-NE	12/28/82	1131.48	46.19	1085.29	Data from Graf (1986)
EW-NE	12/30/82	1131.48	45.18	1086.30	Data from Graf (1986)
EW-NE	1/2/83	1131.48	43.63	1087.85	Data from Graf (1986)
EW-NE	1/6/83	1131.48	41.30	1090.18	Data from Graf (1986)
EW-NE	1/11/83	1131.48	40.08	1091.40	Data from Graf (1986)
EW-NE	1/14/83	1131.48	39.58	1091.90	Data from Graf (1986)
EW-NE	1/18/83	1131.48	39.38	1092.10	Data from Graf (1986)
EW-NE	1/21/83	1131.48	39.34	1092.14	Data from Graf (1986)
EW-NE	1/24/83	1131.48	39.33	1092.15	Data from Graf (1986)
EW-NE	1/27/83	1131.48	39.29	1092.19	Data from Graf (1986)
EW-NE	2/1/83	1131.48	39.52	1091.96	Data from Graf (1986)
EW-NE	2/6/83	1131.48	38.29	1093.19	Data from Graf (1986)
EW-NE	2/10/83	1131.48	34.19	1097.29	Data from Graf (1986)
EW-NE	2/13/83	1131.48	32.40	1099.08	Data from Graf (1986)
EW-NE	2/17/83	1131.48	31.28	1100.20	Data from Graf (1986)
EW-NE	2/19/83	1131.48	30.65	1100.83	Data from Graf (1986)
EW-NE	2/24/83	1131.48	29.90	1101.58	Data from Graf (1986)
EW-NE	3/1/83	1131.48	29.59	1101.89	Data from Graf (1986)
EW-NE	3/8/83	1131.48	28.01	1103.47	Data from Graf (1986)
EW-NE	3/22/83	1131.48	27.00	1104.48	Data from Graf (1986)
EW-NE	3/28/83	1131.48	26.25	1105.23	Data from Graf (1986)
EW-NE	4/2/83	1131.48	25.87	1105.61	Data from Graf (1986)
EW-NE	4/15/83	1131.48	25.96	1105.52	Data from Graf (1986)
EW-NE	4/27/83	1131.48	25.03	1106.45	Data from Graf (1986)
EW-NE	5/6/83	1131.48	23.32	1108.16	Data from Graf (1986)
EW-NE	6/22/83	1131.48	26.79	1104.69	Data from Graf (1986)
EW-NE	9/11/83	1131.48	29.28	1102.20	Data from Graf (1986)
EW-NE	10/2/83	1131.48	28.22	1103.26	Data from Graf (1986)
EW-NE	11/22/83	1131.48	26.52	1104.96	Data from Graf (1986)
EW-NE	7/9/84	1131.48	35.85	1095.63	Data from Graf (1986)
EW-NE	10/10/84	1131.48	33.45	1098.03	Data from Graf (1986)
EW-NE	12/18/84	1131.48	37.31	1094.17	Data from Graf (1986)
EW-NE	1/3/85	1131.48	31.20	1100.28	Data from Graf (1986)
EW-NE	1/8/85	1131.48	30.51	1100.97	Data from Graf (1986)
EW-NE	2/20/85	1131.48	27.41	1104.07	Data from Graf (1986)
EW-NE	8/14/85	1131.48	30.50	1100.98	Data from Graf (1986)
EW-NE	1/12/88	1131.48	44.48	1087.00	Measured from well seal
EW-NE	3/4/88	1131.48	43.93	1087.55	
EW-NE	6/14/88	1131.48	44.15	1087.33	
EW-NE	7/22/88	1131.48	45.90	1085.58	
EW-NE	8/25/88	1131.48	47.58	1083.90	
EW-NE	9/24/88	1131.48	47.37	1084.11	
EW-NE	10/21/88	1131.48	46.55	1084.93	
EW-NE	12/21/88	1131.48	47.76	1083.72	
EW-NE	1/19/89	1131.48	49.05	1082.43	
EW-NE	3/29/89	1131.48	52.03	1079.45	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NE	5/8/89	1131.48	53.36	1078.12	
EW-NE	5/30/89	1131.48	53.87	1077.61	
EW-NE	6/30/89	1131.48	54.46	1077.02	
EW-NE	7/27/89	1131.48	54.77	1076.71	
EW-NE	9/5/89	1131.48	55.91	1075.57	
EW-NE	9/28/89	1131.48	56.29	1075.19	
EW-NE	11/6/89	1131.48	57.23	1074.25	
EW-NE	12/1/89	1131.48	58.04	1073.44	
EW-NE	1/8/90	1131.48	59.18	1072.30	
EW-NE	2/5/90	1131.48	59.83	1071.65	
EW-NE	3/5/90	1131.48	60.55	1070.93	
EW-NE	4/6/90	1131.48	61.66	1069.82	
EW-NE	5/8/90	1131.48	62.76	1068.72	
EW-NE	6/5/90	1131.48	63.61	1067.87	
EW-NE	7/6/90	1131.48	64.32	1067.16	
EW-NE	7/30/90	1131.48	62.47	1069.01	
EW-NE	8/7/90	1131.48	61.18	1070.30	
EW-NE	9/11/90	1131.48	55.30	1076.18	
EW-NE	10/8/90	1131.48	55.04	1076.44	
EW-NE	11/1/90	1131.48	56.22	1075.26	
EW-NE	12/3/90	1131.48	57.60	1073.88	
EW-NE	1/8/91	1131.48	61.38	1070.10	
EW-NE	2/4/91	1131.48	62.68	1068.80	
EW-NE	3/4/91	1131.48	62.60	1068.88	
EW-NE	3/27/91	1131.48	54.46	1077.02	
EW-NE	4/2/91	1131.48	47.66	1083.82	
EW-NE	4/3/91	1131.48	47.28	1084.20	
EW-NE	4/4/91	1131.48	46.40	1085.08	
EW-NE	4/5/91	1131.48	45.09	1086.39	
EW-NE	4/8/91	1131.48	45.39	1086.09	
EW-NE	4/9/91	1131.48	44.26	1087.22	
EW-NE	4/10/91	1131.48	43.74	1087.74	
EW-NE	4/11/91	1131.48	43.79	1087.69	
EW-NE	4/12/91	1131.48	43.68	1087.80	
EW-NE	4/15/91	1131.48	43.35	1088.13	
EW-NE	4/16/91	1131.48	43.41	1088.07	
EW-NE	4/17/91	1131.48	43.42	1088.06	
EW-NE	4/18/91	1131.48	43.56	1087.92	
EW-NE	4/22/91	1131.48	44.08	1087.40	
EW-NE	4/25/91	1131.48	44.64	1086.84	
EW-NE	4/27/91	1131.48	45.02	1086.46	
EW-NE	4/29/91	1131.48	45.44	1086.04	
EW-NE	5/1/91	1131.48	45.80	1085.68	
EW-NE	5/3/91	1131.48	46.32	1085.16	
EW-NE	5/4/91	1131.48	46.61	1084.87	
EW-NE	5/5/91	1131.48	46.83	1084.65	
EW-NE	5/6/91	1131.48	46.89	1084.59	
EW-NE	5/7/91	1131.48	47.15	1084.33	
EW-NE	5/8/91	1131.48	47.29	1084.19	
EW-NE	5/9/91	1131.48	47.49	1083.99	
EW-NE	5/10/91	1131.48	47.79	1083.69	
EW-NE	5/12/91	1131.48	48.20	1083.28	
EW-NE	5/13/91	1131.48	48.36	1083.12	
EW-NE	5/15/91	1131.48	48.85	1082.63	
EW-NE	5/17/91	1131.48	49.24	1082.24	
EW-NE	5/20/91	1131.48	49.73	1081.75	
EW-NE	5/23/91	1131.48	50.35	1081.13	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NE	5/27/91	1131.48	50.96	1080.52	
EW-NE	5/29/91	1131.48	51.18	1080.30	
EW-NE	6/1/91	1131.48	51.77	1079.71	
EW-NE	6/3/91	1131.48	52.07	1079.41	
EW-NE	6/5/91	1131.48	52.40	1079.08	
EW-NE	6/6/91	1131.48	52.90	1078.58	
EW-NE	6/7/91	1131.48	52.69	1078.79	
EW-NE	6/8/91	1131.48	52.80	1078.68	
EW-NE	6/9/91	1131.48	53.00	1078.48	
EW-NE	6/10/91	1131.48	53.00	1078.48	
EW-NE	6/11/91	1131.48	53.17	1078.31	
EW-NE	7/5/91	1131.48	55.63	1075.85	
EW-NE	8/6/91	1131.48	57.88	1073.60	
EW-NE	9/6/91	1131.48	59.82	1071.66	
EW-NE	10/8/91	1131.48	64.80	1066.68	
EW-NE	11/6/91	1131.48	60.72	1070.76	
EW-NE	12/5/91	1131.48	60.29	1071.19	
EW-NE	1/2/92	1131.48	59.04	1072.44	
EW-NE	1/24/92	1131.48	46.70	1084.78	
EW-NE	2/7/92	1131.48	42.28	1089.20	
EW-NE	2/14/92	1131.48	39.99	1091.49	
EW-NE	2/21/92	1131.48	38.34	1093.14	
EW-NE	2/28/92	1131.48	37.64	1093.84	
EW-NE	3/9/92	1131.48	35.97	1095.51	
EW-NE	3/20/92	1131.48	34.50	1096.98	
EW-NE	4/3/92	1131.48	33.27	1098.21	
EW-NE	5/1/92	1131.48	32.66	1098.82	
EW-NE	6/1/92	1131.48	31.36	1100.12	
EW-NE	6/26/92	1131.48	32.22	1099.26	
EW-NE	7/10/92	1131.48	33.62	1097.86	
EW-NE	7/24/92	1131.48	33.57	1097.91	
EW-NE	8/7/92	1131.48	32.47	1099.01	
EW-NE	9/4/92	1131.48	30.41	1101.07	
EW-NE	10/2/92	1131.48	33.01	1098.47	
EW-NE	11/5/92	1131.48	35.84	1095.64	
EW-NE	12/1/92	1131.48	38.02	1093.46	
EW-NE	1/4/93	1131.48	32.61	1098.87	
EW-NE	1/11/93	1131.48	28.21	1103.27	
EW-NE	1/18/93	1131.48	27.07	1104.41	
EW-NE	1/26/93	1131.48	26.20	1105.28	
EW-NE	2/2/93	1131.48	26.88	1104.60	
EW-NE	2/9/93	1131.48	26.66	1104.82	
EW-NE	2/16/93	1131.48	26.20	1105.28	
EW-NE	3/1/93	1131.48	25.69	1105.79	
EW-NE	3/15/93	1131.48	26.48	1105.00	
EW-NE	4/1/93	1131.48	26.29	1105.19	
EW-NE	4/26/93	1131.48	28.06	1103.42	
EW-NE	5/3/93	1131.48	27.06	1104.42	
EW-NE	6/1/93	1131.48	28.28	1103.20	
EW-NE	6/11/93	1131.48	28.74	1102.74	
EW-NE	7/1/93	1131.48	29.25	1102.23	
EW-NE	8/6/93	1131.48	31.09	1100.39	
EW-NE	9/7/93	1131.48	30.29	1101.19	
EW-NE	10/7/93	1131.48	31.35	1100.13	
EW-NE	11/9/93	1131.48	33.38	1098.10	
EW-NE	12/6/93	1131.48	31.67	1099.81	
EW-NE	1/4/94	1131.48	32.70	1098.78	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NE	2/3/94	1131.48	34.75	1096.73	
EW-NE	3/7/94	1131.48	36.76	1094.72	
EW-NE	4/6/94	1131.48	37.44	1094.04	
EW-NE	5/6/94	1131.48	38.78	1092.70	
EW-NE	6/7/94	1131.48	40.25	1091.23	
EW-NE	7/6/94	1131.48	41.94	1089.54	
EW-NE	8/4/94	1131.48	43.27	1088.21	
EW-NE	9/9/94	1131.48	43.81	1087.67	
EW-NE	10/12/94	1131.48	44.03	1087.45	
EW-NE	11/4/94	1131.48	43.55	1087.93	
EW-NE	12/2/94	1131.48	44.05	1087.43	
EW-NE	1/9/95	1131.48	37.80	1093.68	
EW-NE	2/3/95	1131.48	36.41	1095.07	
EW-NE	3/2/95	1131.48	31.55	1099.93	
EW-NE	4/5/95	1131.48	30.47	1101.01	
EW-NE	5/10/95	1131.48	31.64	1099.84	
EW-NE	6/6/95	1131.48	33.18	1098.30	
EW-NE	7/7/95	1131.48	35.58	1095.90	
EW-NE	8/4/95	1131.48	37.36	1094.12	
EW-NE	9/7/95	1131.48	35.25	1096.23	
EW-NE	10/6/95	1131.48	34.50	1096.98	Water level estimated-pump not working
EW-NE	11/10/95	1131.48	33.71	1097.77	
EW-NE	12/9/95	1131.48	36.05	1095.43	
EW-NE	1/11/96	1131.48	38.16	1093.32	
EW-NE	2/10/96	1131.48	39.94	1091.54	
EW-NE	3/8/96	1131.48	41.17	1090.31	Steel tape
EW-NE	4/6/96	1131.48	42.94	1088.54	
EW-NE	5/7/96	1131.48	44.37	1087.11	
EW-NE	6/5/96	1131.48	45.64	1085.84	
EW-NE	7/8/96	1131.48	46.81	1084.67	
EW-NE	8/2/96	1131.48	47.00	1084.48	
EW-NE	9/9/96	1131.48	47.36	1084.12	
EW-NE	10/4/96	1131.48	47.52	1083.96	
EW-NE	11/1/96	1131.48	48.29	1083.19	
EW-NE	12/5/96	1131.48	49.30	1082.18	
EW-NE	4/7/97	1131.48	53.49	1077.99	
EW-NE	6/2/97	1131.48	54.82	1076.66	
EW-NE	9/10/97	1131.48	56.01	1075.47	
EW-NE	12/11/97	1131.48	54.14	1077.34	
EW-NE	3/13/98	1131.48	47.23	1084.25	
EW-NE	6/22/98	1131.48	44.12	1087.36	
EW-NE	9/22/98	1131.48	41.80	1089.68	
EW-NE	6/8/99	1131.48	51.52	1079.96	
EW-NW	8/16/82	1125.21	66.02	1059.19	Data from Graf (1986)
EW-NW	9/16/82	1125.21	64.55	1060.66	Data from Graf (1986)
EW-NW	12/11/82	1125.21	65.98	1059.23	Data from Graf (1986)
EW-NW	12/12/82	1125.21	65.51	1059.70	Data from Graf (1986)
EW-NW	12/14/82	1125.21	64.33	1060.88	Data from Graf (1986)
EW-NW	12/16/82	1125.21	61.83	1063.38	Data from Graf (1986)
EW-NW	12/20/82	1125.21	58.10	1067.11	Data from Graf (1986)
EW-NW	12/24/82	1125.21	55.52	1069.69	Data from Graf (1986)
EW-NW	12/28/82	1125.21	52.46	1072.75	Data from Graf (1986)
EW-NW	12/30/82	1125.21	50.17	1075.04	Data from Graf (1986)
EW-NW	1/2/83	1125.21	48.07	1077.14	Data from Graf (1986)
EW-NW	1/6/83	1125.21	46.90	1078.31	Data from Graf (1986)
EW-NW	1/11/83	1125.21	46.29	1078.92	Data from Graf (1986)
EW-NW	1/14/83	1125.21	46.50	1078.71	Data from Graf (1986)

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NW	1/18/83	1125.21	47.05	1078.16	Data from Graf (1986)
EW-NW	1/21/83	1125.21	47.98	1077.23	Data from Graf (1986)
EW-NW	1/24/83	1125.21	48.26	1076.95	Data from Graf (1986)
EW-NW	1/27/83	1125.21	49.17	1076.04	Data from Graf (1986)
EW-NW	2/1/83	1125.21	49.26	1075.95	Data from Graf (1986)
EW-NW	2/5/83	1125.21	48.85	1076.36	Data from Graf (1986)
EW-NW	2/10/83	1125.21	42.33	1082.88	Data from Graf (1986)
EW-NW	2/13/83	1125.21	39.87	1085.34	Data from Graf (1986)
EW-NW	2/17/83	1125.21	39.55	1085.66	Data from Graf (1986)
EW-NW	2/19/83	1125.21	38.89	1086.32	Data from Graf (1986)
EW-NW	2/24/83	1125.21	43.93	1081.28	Data from Graf (1986)
EW-NW	3/1/83	1125.21	38.08	1087.13	Data from Graf (1986)
EW-NW	3/8/83	1125.21	35.17	1090.04	Data from Graf (1986)
EW-NW	3/22/83	1125.21	33.83	1091.38	Data from Graf (1986)
EW-NW	3/28/83	1125.21	32.13	1093.08	Data from Graf (1986)
EW-NW	4/2/83	1125.21	31.82	1093.39	Data from Graf (1986)
EW-NW	4/15/83	1125.21	32.59	1092.62	Data from Graf (1986)
EW-NW	4/27/83	1125.21	31.32	1093.89	Data from Graf (1986)
EW-NW	5/6/83	1125.21	31.97	1093.24	Data from Graf (1986)
EW-NW	6/22/83	1125.21	36.33	1088.88	Data from Graf (1986)
EW-NW	9/1/83	1125.21	38.51	1086.70	Data from Graf (1986)
EW-NW	10/2/83	1125.21	34.13	1091.08	Data from Graf (1986)
EW-NW	11/22/83	1125.21	35.93	1089.28	Data from Graf (1986)
EW-NW	7/9/84	1125.21	51.35	1073.86	Data from Graf (1986)
EW-NW	10/10/84	1125.21	49.11	1076.10	Data from Graf (1986)
EW-NW	12/18/84	1125.21	54.00	1071.21	Data from Graf (1986)
EW-NW	1/3/85	1125.21	38.19	1087.02	Data from Graf (1986)
EW-NW	1/8/85	1125.21	38.40	1086.81	Data from Graf (1986)
EW-NW	2/20/85	1125.21	36.42	1088.79	Data from Graf (1986)
EW-NW	8/14/85	1125.21	47.42	1077.79	Data from Graf (1986)
EW-NW	1/12/88	1125.21	61.61	1063.60	Measured from well seal
EW-NW	3/4/88	1125.21	56.19	1069.02	
EW-NW	6/14/88	1125.21	59.62	1065.59	
EW-NW	7/22/88	1125.21	60.87	1064.34	
EW-NW	8/25/88	1125.21	61.74	1063.47	
EW-NW	9/24/88	1125.21	62.18	1063.03	
EW-NW	10/21/88	1125.21	61.33	1063.88	
EW-NW	12/21/88	1125.21	64.23	1060.98	
EW-NW	1/19/89	1125.21	64.60	1060.61	
EW-NW	3/30/89	1125.21	65.08	1060.13	
EW-NW	5/8/89	1125.21	65.33	1059.88	
EW-NW	5/30/89	1125.21	67.00	1058.21	
EW-NW	6/25/89	1125.21	67.38	1057.83	One week apart
EW-NW	6/30/89	1125.21	67.94	1057.27	
EW-NW	7/27/89	1125.21	68.08	1057.13	
EW-NW	9/5/89	1125.21	67.54	1057.67	
EW-NW	9/28/89	1125.21	68.45	1056.76	
EW-NW	11/6/89	1125.21	69.45	1055.76	
EW-NW	12/1/89	1125.21	69.87	1055.34	
EW-NW	1/8/90	1125.21	70.96	1054.25	
EW-NW	2/5/90	1125.21	71.15	1054.06	
EW-NW	3/5/90	1125.21	71.99	1053.22	
EW-NW	4/6/90	1125.21	72.68	1052.53	
EW-NW	5/8/90	1125.21	72.59	1052.62	
EW-NW	6/5/90	1125.21	73.85	1051.36	
EW-NW	7/6/90	1125.21	74.55	1050.66	
EW-NW	7/24/90	1125.21	73.61	1051.60	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NW	7/27/90	1125.21	70.09	1055.12	
EW-NW	7/30/90	1125.21	67.72	1057.49	
EW-NW	8/7/90	1125.21	65.89	1059.32	
EW-NW	8/15/90	1125.21	66.04	1059.17	Risen slightly
EW-NW	8/16/90	1125.21	63.52	1061.69	
EW-NW	8/17/90	1125.21	62.75	1062.46	
EW-NW	8/20/90	1125.21	61.95	1063.26	
EW-NW	8/22/90	1125.21	62.25	1062.96	
EW-NW	9/6/90	1125.21	62.22	1062.99	
EW-NW	9/11/90	1125.21	62.09	1063.12	
EW-NW	10/8/90	1125.21	68.09	1057.12	6 foot drop from 9/11 ?
EW-NW	11/1/90	1125.21	70.62	1054.59	
EW-NW	12/3/90	1125.21	72.36	1052.85	
EW-NW	1/8/91	1125.21	71.87	1053.34	
EW-NW	2/4/91	1125.21	74.23	1050.98	
EW-NW	3/4/91	1125.21	72.27	1052.94	
EW-NW	3/6/91	1125.21	67.78	1057.43	
EW-NW	3/8/91	1125.21	64.91	1060.30	
EW-NW	3/11/91	1125.21	63.79	1061.42	
EW-NW	3/14/91	1125.21	63.64	1061.57	
EW-NW	3/16/91	1125.21	63.95	1061.26	
EW-NW	3/27/91	1125.21	64.65	1060.56	
EW-NW	3/28/91	1125.21	63.44	1061.77	
EW-NW	3/29/91	1125.21	59.39	1065.82	
EW-NW	4/1/91	1125.21	55.04	1070.17	
EW-NW	4/2/91	1125.21	54.35	1070.86	
EW-NW	4/3/91	1125.21	53.84	1071.37	
EW-NW	4/4/91	1125.21	52.72	1072.49	
EW-NW	4/5/91	1125.21	52.10	1073.11	
EW-NW	4/8/91	1125.21	51.83	1073.38	
EW-NW	4/9/91	1125.21	50.47	1074.74	
EW-NW	4/10/91	1125.21	49.55	1075.66	
EW-NW	4/11/91	1125.21	49.80	1075.41	
EW-NW	4/12/91	1125.21	49.92	1075.29	
EW-NW	4/15/91	1125.21	49.67	1075.54	
EW-NW	4/16/91	1125.21	49.90	1075.31	
EW-NW	4/17/91	1125.21	50.03	1075.18	
EW-NW	4/18/91	1125.21	50.35	1074.86	
EW-NW	4/22/91	1125.21	51.93	1073.28	
EW-NW	4/25/91	1125.21	53.47	1071.74	
EW-NW	4/27/91	1125.21	54.53	1070.68	
EW-NW	4/29/91	1125.21	55.67	1069.54	
EW-NW	5/1/91	1125.21	56.77	1068.44	
EW-NW	5/3/91	1125.21	57.69	1067.52	
EW-NW	5/4/91	1125.21	58.42	1066.79	
EW-NW	5/5/91	1125.21	58.63	1066.58	
EW-NW	5/6/91	1125.21	58.96	1066.25	
EW-NW	5/7/91	1125.21	59.58	1065.63	
EW-NW	5/8/91	1125.21	59.95	1065.26	
EW-NW	5/9/91	1125.21	60.29	1064.92	
EW-NW	5/10/91	1125.21	60.85	1064.36	
EW-NW	5/12/91	1125.21	61.49	1063.72	
EW-NW	5/13/91	1125.21	61.79	1063.42	
EW-NW	5/15/91	1125.21	62.35	1062.86	
EW-NW	5/17/91	1125.21	62.83	1062.38	
EW-NW	5/20/91	1125.21	63.56	1061.65	
EW-NW	5/23/91	1125.21	64.48	1060.73	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NW	5/27/91	1125.21	65.28	1059.93	
EW-NW	5/29/91	1125.21	65.48	1059.73	
EW-NW	6/1/91	1125.21	66.04	1059.17	
EW-NW	6/3/91	1125.21	66.37	1058.84	
EW-NW	6/5/91	1125.21	66.63	1058.58	
EW-NW	6/6/91	1125.21	66.85	1058.36	
EW-NW	6/7/91	1125.21	66.98	1058.23	
EW-NW	6/8/91	1125.21	67.12	1058.09	
EW-NW	6/9/91	1125.21	67.33	1057.88	
EW-NW	6/10/91	1125.21	67.44	1057.77	
EW-NW	6/11/91	1125.21	67.58	1057.63	
EW-NW	7/5/91	1125.21	69.87	1055.34	Needs cover work
EW-NW	8/6/91	1125.21	71.86	1053.35	
EW-NW	9/6/91	1125.21	73.49	1051.72	
EW-NW	10/8/91	1125.21	74.00	1051.21	
EW-NW	11/6/91	1125.21	69.92	1055.29	
EW-NW	12/5/91	1125.21	66.44	1058.77	
EW-NW	12/30/91	1125.21	67.79	1057.42	
EW-NW	12/31/91	1125.21	68.16	1057.05	
EW-NW	1/2/92	1125.21	68.79	1056.42	
EW-NW	1/24/92	1125.21	54.86	1070.35	
EW-NW	1/31/92	1125.21	51.94	1073.27	
EW-NW	2/7/92	1125.21	50.74	1074.47	
EW-NW	2/14/92	1125.21	46.97	1078.24	
EW-NW	2/21/92	1125.21	45.05	1080.16	
EW-NW	2/28/92	1125.21	44.36	1080.85	
EW-NW	3/9/92	1125.21	41.70	1083.51	
EW-NW	3/20/92	1125.21	40.07	1085.14	
EW-NW	4/3/92	1125.21	38.24	1086.97	
EW-NW	5/1/92	1125.21	37.08	1088.13	
EW-NW	6/1/92	1125.21	34.81	1090.40	
EW-NW	6/26/92	1125.21	39.19	1086.02	
EW-NW	7/10/92	1125.21	43.55	1081.66	
EW-NW	7/24/92	1125.21	45.28	1079.93	
EW-NW	8/7/92	1125.21	42.07	1083.14	
EW-NW	9/4/92	1125.21	35.06	1090.15	
EW-NW	10/2/92	1125.21	43.47	1081.74	
EW-NW	11/5/92	1125.21	50.10	1075.11	
EW-NW	12/1/92	1125.21	53.85	1071.36	
EW-NW	1/4/93	1125.21	41.00	1084.21	
EW-NW	1/11/93	1125.21	33.53	1091.68	
EW-NW	1/18/93	1125.21	30.86	1094.35	
EW-NW	1/26/93	1125.21	32.32	1092.89	
EW-NW	2/2/93	1125.21	33.41	1091.80	
EW-NW	2/9/93	1125.21	33.05	1092.16	
EW-NW	2/16/93	1125.21	32.20	1093.01	
EW-NW	3/1/93	1125.21	31.63	1093.58	
EW-NW	3/15/93	1125.21	33.15	1092.06	
EW-NW	4/1/93	1125.21	32.68	1092.53	
EW-NW	4/26/93	1125.21	34.73	1090.48	
EW-NW	5/3/93	1125.21	33.48	1091.73	
EW-NW	6/1/93	1125.21	34.78	1090.43	
EW-NW	6/11/93	1125.21	35.23	1089.98	
EW-NW	7/1/93	1125.21	36.21	1089.00	
EW-NW	8/6/93	1125.21	43.04	1082.17	
EW-NW	9/7/93	1125.21	38.97	1086.24	
EW-NW	10/7/93	1125.21	42.16	1083.05	

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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-NW	11/9/93	1125.21	48.13	1077.08	
EW-NW	12/6/93	1125.21	41.20	1084.01	
EW-NW	1/4/94	1125.21	43.70	1081.51	
EW-NW	2/3/94	1125.21	50.69	1074.52	
EW-NW	3/7/94	1125.21	53.11	1072.10	
EW-NW	4/6/94	1125.21	53.2	1072.01	
EW-NW	5/6/94	1125.21	55.53	1069.68	
EW-NW	6/7/94	1125.21	56.70	1068.51	
EW-NW	7/6/94	1125.21	58.54	1066.67	
EW-NW	8/4/94	1125.21	59.79	1065.42	
EW-NW	9/9/94	1125.21	56.95	1068.26	
EW-NW	10/12/94	1125.21	61.14	1064.07	
EW-NW	11/4/94	1125.21	61.39	1063.82	
EW-NW	12/2/94	1125.21	61.61	1063.60	
EW-NW	1/9/95	1125.21	50.85	1074.36	
EW-NW	2/3/95	1125.21	48.30	1076.91	
EW-NW	3/2/95	1125.21	40.86	1084.35	
EW-NW	4/5/95	1125.21	38.37	1086.84	
EW-NW	5/10/95	1125.21	39.95	1085.26	
EW-NW	6/6/95	1125.21	47.47	1077.74	
EW-NW	7/7/95	1125.21	51.49	1073.72	
EW-NW	8/4/95	1125.21	53.89	1071.32	
EW-NW	9/7/95	1125.21	52.30	1072.91	
EW-NW	10/6/95	1125.21	46.74	1078.47	
EW-NW	11/10/95	1125.21	45.72	1079.49	
EW-NW	12/9/95	1125.21	52.82	1072.39	
EW-NW	1/11/96	1125.21	55.22	1069.99	
EW-NW	2/10/96	1125.21	55.45	1069.76	
EW-NW	3/8/96	1125.21	56.57	1068.64	
EW-NW	4/6/96	1125.21	57.78	1067.43	
EW-NW	5/7/96	1125.21	58.58	1066.63	
EW-NW	6/5/96	1125.21	59.78	1065.43	
EW-NW	7/8/96	1125.21	60.00	1065.21	
EW-NW	8/2/96	1125.21	58.41	1066.80	
EW-NW	9/9/96	1125.21	57.54	1067.67	
EW-NW	10/4/96	1125.21	60.84	1064.37	
EW-NW	11/1/96	1125.21	60.85	1064.36	
EW-NW	12/5/96	1125.21	62.68	1062.53	
EW-NW	4/7/97	1125.21	66.40	1058.81	
EW-NW	6/2/97	1125.21	68.69	1056.52	
EW-NW	9/10/97	1125.21	68.04	1057.17	
EW-NW	12/11/97	1125.21	70.15	1055.06	
EW-NW	3/13/98	1125.21	62.22	1062.99	
EW-NW	6/22/98	1125.21	63.08	1062.13	
EW-NW	9/22/98	1125.21	62.90	1062.31	
EW-OE	5/1/91	1129.13	51.75	1077.38	Measured from paint mark on
EW-OE	5/3/91	1129.13	51.24	1077.89	North side of casing
EW-OE	5/4/91	1129.13	52.52	1076.61	
EW-OE	5/5/91	1129.13	52.68	1076.45	
EW-OE	5/6/91	1129.13	52.73	1076.40	
EW-OE	5/7/91	1129.13	52.90	1076.23	
EW-OE	5/8/91	1129.13	53.02	1076.11	
EW-OE	5/9/91	1129.13	53.12	1076.01	
EW-OE	5/10/91	1129.13	53.42	1075.71	
EW-OE	5/12/91	1129.13	53.73	1075.40	
EW-OE	5/13/91	1129.13	53.83	1075.30	
EW-OE	5/15/91	1129.13	54.20	1074.93	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-OE	5/17/91	1129.13	54.52	1074.61	
EW-OE	5/20/91	1129.13	54.87	1074.26	
EW-OE	5/23/91	1129.13	55.39	1073.74	
EW-OE	5/27/91	1129.13	55.93	1073.20	
EW-OE	5/29/91	1129.13	56.16	1072.97	
EW-OE	6/1/91	1129.13	57.07	1072.06	
EW-OE	6/3/91	1129.13	57.09	1072.04	
EW-OE	6/5/91	1129.13	57.86	1071.27	
EW-OE	6/6/91	1129.13	58.12	1071.01	
EW-OE	6/7/91	1129.13	58.23	1070.90	
EW-OE	6/8/91	1129.13	58.30	1070.83	
EW-OE	6/9/91	1129.13	58.45	1070.68	
EW-OE	6/10/91	1129.13	58.13	1071.00	
EW-OE	6/11/91	1129.13	58.20	1070.93	
EW-OE	7/5/91	1129.13	61.15	1067.98	
EW-OE	8/7/91	1129.13	64.85	1064.28	
EW-OE	9/6/91	1129.13	64.12	1065.01	
EW-OE	10/8/91	1129.13	64.97	1064.16	
EW-OE	11/6/91	1129.13	64.87	1064.26	
EW-OE	12/5/91	1129.13	63.96	1065.17	
EW-OE	1/2/92	1129.13	64.25	1064.88	
EW-OE	1/24/92	1129.13	55.35	1073.78	
EW-OE	1/31/92	1129.13	52.65	1076.48	
EW-OE	2/7/92	1129.13	50.83	1078.30	
EW-OE	2/14/92	1129.13	48.07	1081.06	
EW-OE	2/21/92	1129.13	45.55	1083.58	
EW-OE	2/28/92	1129.13	44.00	1085.13	
EW-OE	3/9/92	1129.13	41.49	1087.64	
EW-OE	3/20/92	1129.13	38.81	1090.32	
EW-OE	4/3/92	1129.13	36.52	1092.61	
EW-OE	5/1/92	1129.13	34.78	1094.35	
EW-OE	6/1/92	1129.13	32.89	1096.24	
EW-OE	6/26/92	1129.13	33.48	1095.65	
EW-OE	7/10/92	1129.13	35.14	1093.99	
EW-OE	7/24/92	1129.13	36.31	1092.82	
EW-OE	8/7/92	1129.13	35.07	1094.06	
EW-OE	9/4/92	1129.13	32.41	1096.72	
EW-OE	10/2/92	1129.13	34.32	1094.81	
EW-OE	11/5/92	1129.13	38.41	1090.72	
EW-OE	12/1/92	1129.13	41.52	1087.61	
EW-OE	1/4/93	1129.13	37.66	1091.47	
EW-OE	1/11/93	1129.13	32.58	1096.55	
EW-OE	1/18/93	1129.13	29.06	1100.07	
EW-OE	1/26/93	1129.13	28.15	1100.98	
EW-OE	2/2/93	1129.13	28.29	1100.84	
EW-OE	2/9/93	1129.13	28.12	1101.01	
EW-OE	2/16/93	1129.13	27.67	1101.46	
EW-OE	3/1/93	1129.13	26.90	1102.23	
EW-OE	3/15/93	1129.13	27.39	1101.74	
EW-OE	4/1/93	1129.13	27.31	1101.82	
EW-OE	4/26/93	1129.13	28.54	1100.59	
EW-OE	5/3/93	1129.13	28.09	1101.04	
EW-OE	6/1/93	1129.13	28.74	1100.39	
EW-OE	6/11/93	1129.13	29.38	1099.75	
EW-OE	7/1/93	1129.13	30.06	1099.07	
EW-OE	8/6/93	1129.13	32.39	1096.74	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-OE	9/7/93	1129.13	32.31	1096.82	
EW-OE	10/7/93	1129.13	33.86	1095.27	
EW-OE	11/9/93	1129.13	35.49	1093.64	
EW-OE	12/6/93	1129.13	33.69	1095.44	
EW-OE	1/4/94	1129.13	34.64	1094.49	
EW-OE	2/3/94	1129.13	37.51	1091.62	
EW-OE	3/7/94	1129.13	40.14	1088.99	
EW-OE	4/6/94	1129.13	41.78	1087.35	
EW-OE	5/6/94	1129.13	43.34	1085.79	
EW-OE	6/7/94	1129.13	44.90	1084.23	
EW-OE	7/6/94	1129.13	46.48	1082.65	
EW-OE	8/4/94	1129.13	47.90	1081.23	
EW-OE	9/9/94	1129.13	48.48	1080.65	
EW-OE	10/12/94	1129.13	49.03	1080.10	
EW-OE	11/4/94	1129.13	49/09		
EW-OE	12/2/94	1129.13	49.37	1079.76	
EW-OE	1/9/95	1129.13	44.80	1084.33	
EW-OE	2/3/95	1129.13	40.71	1088.42	
EW-OE	3/2/95	1129.13	34.60	1094.53	
EW-OE	4/5/95	1129.13	31.39	1097.74	
EW-OE	5/10/95	1129.13	33.47	1095.66	
EW-OE	6/6/95	1129.13	34.86	1094.27	
EW-OE	7/7/95	1129.13	37.53	1091.60	
EW-OE	8/4/95	1129.13	40.21	1088.92	
EW-OE	9/7/95	1129.13	38.75	1090.38	
EW-OE	10/6/95	1129.13	38.13	1091.00	
EW-OE	11/10/95	1129.13	37.70	1091.43	
EW-OE	12/9/95	1129.13	38.64	1090.49	
EW-OE	1/11/96	1129.13	41.98	1087.15	
EW-OE	2/10/96	1129.13	44.02	1085.11	
EW-OE	3/8/96	1129.13	45.55	1083.58	Steel tape
EW-OE	4/6/96	1129.13	46.89	1082.24	
EW-OE	5/7/96	1129.13	48.00	1081.13	
EW-OE	6/5/96	1129.13	49.10	1080.03	
EW-OE	7/8/96	1129.13	50.01	1079.12	
EW-OE	8/2/96	1129.13	50.15	1078.98	
EW-OE	9/9/96	1129.13	50.54	1078.59	
EW-OE	10/4/96	1129.13	50.86	1078.27	
EW-OE	11/1/96	1129.13	51.52	1077.61	
EW-OE	12/5/96	1129.13	52.24	1076.89	
EW-OE	4/7/97	1129.13	56.43	1072.70	
EW-OE	6/2/97	1129.13	58.24	1070.89	
EW-OE	9/10/97	1129.13	59.67	1069.46	
EW-OE	12/11/97	1129.13	59.47	1069.66	
EW-OE	3/13/98	1129.13	53.00	1076.13	
EW-OE	6/22/98	1129.13	49.91	1079.22	
EW-OE	9/22/98	1129.13	48.45	1080.68	
EW-PZ1	12/6/93	1125.12	36.95	1088.17	Measured from TOC.
EW-PZ1	1/4/94	1125.12	33.54	1091.58	
EW-PZ1	2/3/94	1125.12	37.38	1087.74	
EW-PZ1	3/7/94	1125.12	40.34	1084.78	
EW-PZ1	4/6/94	1125.12	41.52	1083.60	
EW-PZ1	5/6/94	1125.12	43.23	1081.89	
EW-PZ1	6/7/94	1125.12	44.71	1080.41	
EW-PZ1	7/6/94	1125.12	46.38	1078.74	
EW-PZ1	8/4/94	1125.12	47.67	1077.45	
EW-PZ1	9/9/94	1125.12	48.74	1076.38	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ1	10/12/94	1125.12	49.40	1075.72	
EW-PZ1	11/4/94	1125.12	49.66	1075.46	
EW-PZ1	12/2/94	1125.12	49.84	1075.28	
EW-PZ1	1/9/95	1125.12	45.33	1079.79	
EW-PZ1	2/3/95	1125.12	40.83	1084.29	
EW-PZ1	3/2/95	1125.12	34.79	1090.33	
EW-PZ1	4/5/95	1125.12	31.21	1093.91	
EW-PZ1	5/10/95	1125.12	31.99	1093.13	
EW-PZ1	6/6/95	1125.12	35.37	1089.75	
EW-PZ1	7/7/95	1125.12	38.80	1086.32	
EW-PZ1	8/4/95	1125.12	41.18	1083.94	
EW-PZ1	9/7/95	1125.12	39.90	1085.22	
EW-PZ1	10/6/95	1125.12	38.60	1086.52	
EW-PZ1	11/10/95	1125.12	38.18	1086.94	
EW-PZ1	12/9/95	1125.12	40.06	1085.06	
EW-PZ1	1/11/96	1125.12	42.73	1082.39	
EW-PZ1	2/10/96	1125.12	44.01	1081.11	
EW-PZ1	3/8/96	1125.12	45.35	1079.77	
EW-PZ1	4/5/96	1125.12	46.70	1078.42	Troll placed in well
EW-PZ1	5/7/96	1125.12	47.80	1077.32	
EW-PZ1	6/5/96	1125.12	49.04	1076.08	
EW-PZ1	7/8/96	1125.12	49.88	1075.24	
EW-PZ1	8/2/96	1125.12	49.92	1075.20	
EW-PZ1	9/9/96	1125.12	50.26	1074.86	
EW-PZ1	10/4/96	1125.12	50.77	1074.35	Download Troll data logger
EW-PZ1	11/1/96	1125.12	51.47	1073.65	
EW-PZ1	12/5/96	1125.12	52.24	1072.88	
EW-PZ1	4/7/97	1125.12	55.71	1069.41	
EW-PZ1	6/2/97	1125.12	57.35	1067.77	
EW-PZ1	9/10/97	1125.12	58.46	1066.66	
EW-PZ1	12/12/97	1125.12	58.8	1066.32	
EW-PZ1	3/13/98	1125.12	53.38	1071.74	
EW-PZ1	6/22/98	1125.12	49.75	1075.37	
EW-PZ1	9/22/98	1125.12	49.68	1075.44	
EW-PZ1	6/9/99	1125.12	55.85	1069.27	
EW-PZ10	6/5/96	1121.46	50.34	1071.12	Measured from TOC
EW-PZ10	7/8/96	1121.46	52.06	1069.40	
EW-PZ10	8/2/96	1121.46	51.58	1069.88	
EW-PZ10	9/9/96	1121.46	51.76	1069.70	
EW-PZ10	10/4/96	1121.46	52.89	1068.57	
EW-PZ10	11/1/96	1121.46	53.61	1067.85	
EW-PZ10	12/5/96	1121.46	54.70	1066.76	
EW-PZ10	4/7/97	1121.46	58.27	1063.19	
EW-PZ10	6/2/97	1121.46	60.16	1061.30	
EW-PZ10	9/10/97	1121.46	57.04	1064.42	
EW-PZ10	12/11/97	1121.46	62.18	1059.28	
EW-PZ10	3/13/98	1121.46	56.25	1065.21	
EW-PZ10	6/22/98	1121.46	54.32	1067.14	
EW-PZ10	9/22/98	1121.46	54.30	1067.16	
EW-PZ2	12/6/93	1124.42	31.50	1092.92	Measured from TOC.
EW-PZ2	1/4/94	1124.42	32.59	1091.83	
EW-PZ2	2/3/94	1124.42	36.39	1088.03	
EW-PZ2	3/7/94	1124.42	39.38	1085.04	
EW-PZ2	4/6/94	1124.42	40.64	1083.78	
EW-PZ2	5/6/94	1124.42	42.36	1082.06	
EW-PZ2	6/7/94	1124.42	43.87	1080.55	
EW-PZ2	7/6/94	1124.42	45.57	1078.85	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ2	8/4/94	1124.42	47.06	1077.36	
EW-PZ2	9/9/94	1124.42	ND		Well dry
EW-PZ2	10/12/94	1124.42	ND		Well dry
EW-PZ2	11/4/94	1124.42	ND		Well dry
EW-PZ2	12/2/94	1124.42	ND		Well dry
EW-PZ2	1/9/95	1124.42	45.16	1079.26	
EW-PZ2	2/3/95	1124.42	39.96	1084.46	
EW-PZ2	3/2/95	1124.42	33.92	1090.50	
EW-PZ2	4/5/95	1124.42	30.15	1094.27	
EW-PZ2	5/10/95	1124.42	30.95	1093.47	
EW-PZ2	6/6/95	1124.42	34.25	1090.17	
EW-PZ2	7/7/95	1124.42	37.76	1086.66	
EW-PZ2	8/4/95	1124.42	40.10	1084.32	
EW-PZ2	9/7/95	1124.42	38.90	1085.52	
EW-PZ2	10/6/95	1124.42	37.91	1086.51	
EW-PZ2	11/10/95	1124.42	37.55	1086.87	
EW-PZ2	12/9/95	1124.42	38.79	1085.63	
EW-PZ2	1/11/96	1124.42	41.44	1082.98	
EW-PZ2	2/10/96	1124.42	42.84	1081.58	
EW-PZ2	3/8/96	1124.42	44.01	1080.41	
EW-PZ2	4/5/96	1124.42	45.34	1079.08	Troll placed in well
EW-PZ2	5/7/96	1124.42	46.76	1077.66	
EW-PZ2	6/5/96	1124.42	47.83	1076.59	
EW-PZ2	7/8/96	1124.42	ND		Dry. TD = 48.20.
EW-PZ2	8/2/96	1124.42	ND		Dry
EW-PZ2	9/9/96	1124.42	ND		Dry
EW-PZ2	10/4/96	1124.42	ND		Dry
EW-PZ2	11/1/96	1124.42	ND		Dry
EW-PZ2	12/5/96	1124.42	ND		Dry
EW-PZ2	4/7/97	1124.42	ND		Dry
EW-PZ2	6/2/97	1124.42	ND		Well is dry
EW-PZ2	9/10/97	1124.42	Dry		Well is dry
EW-PZ2	12/11/97	1124.42	Dry		Well is dry
EW-PZ2	3/13/98	1124.42	DRY		
EW-PZ2	6/22/98	1124.42	DRY		
EW-PZ2	9/22/98	1124.42	DRY		
EW-PZ3	12/6/93	1124.79	33.12	1091.67	Measured from TOC.
EW-PZ3	1/4/94	1124.79	34.30	1090.49	
EW-PZ3	2/3/94	1124.79	38.01	1086.78	
EW-PZ3	3/7/94	1124.79	40.96	1083.83	
EW-PZ3	4/6/94	1124.79	42.04	1082.75	
EW-PZ3	5/6/94	1124.79	43.73	1081.06	
EW-PZ3	6/7/94	1124.79	45.21	1079.58	
EW-PZ3	7/6/94	1124.79	46.88	1077.91	
EW-PZ3	8/4/94	1124.79	48.26	1076.53	
EW-PZ3	9/9/94	1124.79	48.89	1075.90	
EW-PZ3	10/12/94	1124.79	49.70	1075.09	
EW-PZ3	11/4/94	1124.79	50.03	1074.76	
EW-PZ3	12/2/94	1124.79	50.25	1074.54	
EW-PZ3	1/9/95	1124.79	45.62	1079.17	
EW-PZ3	2/3/95	1124.79	41.81	1082.98	
EW-PZ3	3/2/95	1124.79	35.88	1088.91	
EW-PZ3	4/5/95	1124.79	32.29	1092.50	
EW-PZ3	5/10/95	1124.79	33.02	1091.77	
EW-PZ3	6/6/95	1124.79	36.43	1088.36	
EW-PZ3	7/7/95	1124.79	39.74	1085.05	
EW-PZ3	8/4/95	1124.79	42.01	1082.78	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ3	9/7/95	1124.79	40.66	1084.13	
EW-PZ3	10/6/95	1124.79	39.20	1085.59	
EW-PZ3	11/10/95	1124.79	38.75	1086.04	
EW-PZ3	12/9/95	1124.79	41.03	1083.76	
EW-PZ3	1/11/96	1124.79	43.54	1081.25	
EW-PZ3	2/10/96	1124.79	44.83	1079.96	
EW-PZ3	3/8/96	1124.79	45.96	1078.83	
EW-PZ3	4/5/96	1124.79	47.25	1077.54	Troll placed in well
EW-PZ3	5/7/96	1124.79	48.30	1076.49	
EW-PZ3	6/5/96	1124.79	49.52	1075.27	
EW-PZ3	7/8/96	1124.79	50.28	1074.51	
EW-PZ3	8/2/96	1124.79	50.18	1074.61	TD=102.5
EW-PZ3	9/9/96	1124.79	50.47	1074.32	
EW-PZ3	10/4/96	1124.79	51.13	1073.66	Download Troll data logger
EW-PZ3	11/1/96	1124.79	51.83	1072.96	
EW-PZ3	12/5/96	1124.79	52.71	1072.08	
EW-PZ3	4/7/97	1124.79	56.37	1068.42	
EW-PZ3	6/2/97	1124.79	57.99	1066.80	
EW-PZ3	9/10/97	1124.79	59.03	1065.76	
EW-PZ3	12/11/97	1124.79	59.67	1065.12	
EW-PZ3	3/13/98	1124.79	54.28	1070.51	
EW-PZ3	6/22/98	1124.79	51.31	1073.48	
EW-PZ3	9/22/98	1124.79	51.05	1073.74	
EW-PZ4	12/6/93	1108.08	11.27	1096.81	Measured from TOC.
EW-PZ4	1/4/94	1108.08	12.30	1095.78	
EW-PZ4	2/3/94	1108.08	14.98	1093.10	
EW-PZ4	3/7/94	1108.08	17.36	1090.72	
EW-PZ4	4/6/94	1108.08	18.59	1089.49	
EW-PZ4	5/6/94	1108.08	19.91	1088.17	
EW-PZ4	6/7/94	1108.08	21.59	1086.49	
EW-PZ4	7/6/94	1108.08	23.48	1084.60	
EW-PZ4	8/4/94	1108.08	25.18	1082.90	
EW-PZ4	9/9/94	1108.08	26.00	1082.08	
EW-PZ4	10/12/94	1108.08	26.66	1081.42	
EW-PZ4	11/4/94	1108.08	26.29	1081.79	
EW-PZ4	12/2/94	1108.08	26.56	1081.52	
EW-PZ4	1/9/95	1108.08	16.66	1091.42	
EW-PZ4	2/3/95	1108.08	13.97	1094.11	
EW-PZ4	3/2/95	1108.08	7.66	1100.42	
EW-PZ4	4/5/95	1108.08	8.54	1099.54	
EW-PZ4	5/10/95	1108.08	10.13	1097.95	
EW-PZ4	6/6/95	1108.08	12.90	1095.18	
EW-PZ4	7/7/95	1108.08	15.15	1092.93	
EW-PZ4	8/4/95	1108.08	17.43	1090.65	
EW-PZ4	9/7/95	1108.08	15.13	1092.95	
EW-PZ4	10/6/95	1108.08	14.14	1093.94	
EW-PZ4	11/10/95	1108.08	13.65	1094.43	
EW-PZ4	12/9/95	1108.08	15.72	1092.36	
EW-PZ4	1/11/96	1108.08	18.42	1089.66	
EW-PZ4	2/10/96	1108.08	20.48	1087.60	Road OK
EW-PZ4	3/8/96	1108.08	22.06	1086.02	
EW-PZ4	4/6/96	1108.08	23.90	1084.18	
EW-PZ4	5/7/96	1108.08	25.44	1082.64	
EW-PZ4	6/5/96	1108.08	26.88	1081.20	
EW-PZ4	7/8/96	1108.08	28.01	1080.07	
EW-PZ4	8/2/96	1108.08	28.41	1079.67	TD=37.85
EW-PZ4	9/9/96	1108.08	28.82	1079.26	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ4	10/4/96	1108.08	28.99	1079.09	
EW-PZ4	11/1/96	1108.08	29.65	1078.43	
EW-PZ4	12/5/96	1108.08	30.48	1077.60	
EW-PZ4	4/7/97	1108.08	34.86	1073.22	
EW-PZ4	6/2/97	1108.08	ND		Well is dry
EW-PZ4	9/10/97	1108.08	Dry		Well is dry
EW-PZ4	12/11/97	1108.08	Dry		Well is dry
EW-PZ4	3/12/98	1108.08	28.02	1080.06	
EW-PZ4	6/22/98	1108.08	24.92	1083.16	
EW-PZ4	9/22/98	1108.08	23.99	1084.09	
EW-PZ5	12/6/93	1129.03	45.38	1083.65	Measured from TOC.
EW-PZ5	1/4/94	1129.03	47.47	1081.56	
EW-PZ5	2/3/94	1129.03	52.68	1076.35	
EW-PZ5	3/7/94	1129.03	55.04	1073.99	
EW-PZ5	4/6/94	1129.03	55.62	1073.41	
EW-PZ5	5/6/94	1129.03	57.52	1071.51	
EW-PZ5	6/7/94	1129.03	58.88	1070.15	
EW-PZ5	7/6/94	1129.03	60.58	1068.45	
EW-PZ5	8/4/94	1129.03	61.85	1067.18	
EW-PZ5	9/9/94	1129.03	60.91	1068.12	
EW-PZ5	10/12/94	1129.03	63.25	1065.78	
EW-PZ5	11/4/94	1129.03	63.67	1065.36	
EW-PZ5	12/2/94	1129.03	63.86	1065.17	
EW-PZ5	1/9/95	1129.03	56.21	1072.82	
EW-PZ5	2/3/95	1129.03	53.45	1075.58	
EW-PZ5	3/2/95	1129.03	46.45	1082.58	
EW-PZ5	4/5/95	1129.03	43.43	1085.60	
EW-PZ5	5/10/95	1129.03	44.48	1084.55	
EW-PZ5	6/6/95	1129.03	50.09	1078.94	
EW-PZ5	7/7/95	1129.03	53.67	1075.36	
EW-PZ5	8/4/95	1129.03	55.90	1073.13	
EW-PZ5	9/7/95	1129.03	54.00	1075.03	
EW-PZ5	10/6/95	1129.03	50.75	1078.28	
EW-PZ5	11/10/95	1129.03	50.26	1078.77	
EW-PZ5	12/9/95	1129.03	55.18	1073.85	
EW-PZ5	1/11/96	1129.03	57.59	1071.44	
EW-PZ5	2/10/96	1129.03	58.27	1070.76	
EW-PZ5	3/8/96	1129.03	59.27	1069.76	
EW-PZ5	4/6/96	1129.03	60.20	1068.83	
EW-PZ5	5/7/96	1129.03	61.16	1067.87	
EW-PZ5	6/7/96	1129.03	62.23	1066.80	
EW-PZ5	7/8/96	1129.03	62.65	1066.38	
EW-PZ5	8/2/96	1129.03	61.85	1067.18	TD=93.95 from TOC
EW-PZ5	9/9/96	1129.03	61.77	1067.26	
EW-PZ5	10/4/96	1129.03	63.46	1065.57	
EW-PZ5	11/1/96	1129.03	64.07	1064.96	
EW-PZ5	12/5/96	1129.03	65.35	1063.68	
EW-PZ5	4/7/97	1129.03	69.04	1059.99	
EW-PZ5	6/2/97	1129.03	71.07	1057.96	
EW-PZ5	9/10/97	1129.03	71.49	1057.54	
EW-PZ5	12/11/97	1129.03	73.04	1055.99	
EW-PZ5	3/13/98	1129.03	66.46	1062.57	
EW-PZ5	6/22/98	1129.03	65.39	1063.64	
EW-PZ5	9/22/98	1129.03	65.54	1063.49	
EW-PZ6	12/6/93	1127.97	41.20	1086.77	Measured from TOC.
EW-PZ6	1/4/94	1127.97	43.36	1084.61	
EW-PZ6	2/3/94	1127.97	49.05	1078.92	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ6	3/7/94	1127.97	51.69	1076.28	
EW-PZ6	4/6/94	1127.97	52.21	1075.76	
EW-PZ6	5/6/94	1127.97	54.28	1073.69	
EW-PZ6	6/7/94	1127.97	55.58	1072.39	
EW-PZ6	7/6/94	1127.97	57.48	1070.49	
EW-PZ6	8/4/94	1127.97	58.72	1069.25	
EW-PZ6	9/9/94	1127.97	58.41	1069.56	
EW-PZ6	10/12/94	1127.97	60.40	1067.57	
EW-PZ6	11/4/94	1127.97	60.73	1067.24	
EW-PZ6	12/2/94	1127.97	60.91	1067.06	
EW-PZ6	1/9/95	1127.97	53.59	1074.38	
EW-PZ6	2/3/95	1127.97	49.50	1078.47	
EW-PZ6	3/2/95	1127.97	41.90	1086.07	
EW-PZ6	4/5/95	1127.97	39.17	1088.80	
EW-PZ6	5/10/95	1127.97	40.20	1087.77	
EW-PZ6	6/6/95	1127.97	46.06	1081.91	
EW-PZ6	7/7/95	1127.97	50.32	1077.65	
EW-PZ6	8/4/95	1127.97	52.63	1075.34	
EW-PZ6	9/7/95	1127.97	50.71	1077.26	
EW-PZ6	10/6/95	1127.97	47.70	1080.27	
EW-PZ6	11/10/95	1127.97	47.23	1080.74	
EW-PZ6	12/9/95	1127.97	51.60	1076.37	
EW-PZ6	1/11/96	1127.97	54.34	1073.63	
EW-PZ6	2/10/96	1127.97	54.92	1073.05	
EW-PZ6	3/8/96	1127.97	56.12	1071.85	
EW-PZ6	4/6/96	1127.97	57.24	1070.73	
EW-PZ6	5/7/96	1127.97	58.28	1069.69	
EW-PZ6	6/7/96	1127.97	59.40	1068.57	
EW-PZ6	7/8/96	1127.97	60.03	1067.94	
EW-PZ6	8/2/96	1127.97	58.97	1069.00	TD=72.95
EW-PZ6	9/9/96	1127.97	59.19	1068.78	
EW-PZ6	10/4/96	1127.97	60.66	1067.31	
EW-PZ6	11/1/96	1127.97	61.28	1066.69	
EW-PZ6	12/6/96	1127.97	62.57	1065.40	
EW-PZ6	4/7/97	1127.97	66.50	1061.47	
EW-PZ6	6/2/97	1127.97	68.61	1059.36	
EW-PZ6	9/10/97	1127.97	68.99	1058.98	
EW-PZ6	12/11/97	1127.97	70.79	1057.18	
EW-PZ6	3/13/98	1127.97	62.62	1065.35	
EW-PZ6	6/22/98	1127.97	61.92	1066.05	
EW-PZ6	9/22/98	1127.97	62.12	1065.85	
EW-PZ7	6/5/96	1122.15	45.56	1076.59	Measured from TOC
EW-PZ7	7/8/96	1122.15	46.52	1075.63	
EW-PZ7	8/2/96	1122.15	46.49	1075.66	TD=56.3
EW-PZ7	9/9/96	1122.15	46.83	1075.32	
EW-PZ7	10/4/96	1122.15	47.04	1075.11	Download Troll data logger
EW-PZ7	11/1/96	1122.15	47.74	1074.41	
EW-PZ7	12/5/96	1122.15	48.31	1073.84	
EW-PZ7	4/7/97	1122.15	51.58	1070.57	
EW-PZ7	6/2/97	1122.15	54.88	1067.27	
EW-PZ7	9/10/97	1122.15	Dry		
EW-PZ7	12/11/97	1122.15	55.48	1066.67	
EW-PZ7	3/13/98	1122.15	50.21	1071.94	
EW-PZ7	6/22/98	1122.15	45.83	1076.32	
EW-PZ7	9/22/98	1122.15	45.72	1076.43	
EW-PZ8	6/5/96	1122.14	47.11	1075.03	Measured from TOC
EW-PZ8	7/8/96	1122.14	47.39	1074.75	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-PZ8	8/2/96	1122.14	47.30	1074.84	TD=85.7
EW-PZ8	9/9/96	1122.14	47.61	1074.53	
EW-PZ8	10/4/96	1122.14	48.22	1073.92	
EW-PZ8	11/1/96	1122.14	48.89	1073.25	
EW-PZ8	12/5/96	1122.14	49.71	1072.43	
EW-PZ8	4/7/97	1122.14	53.19	1068.95	
EW-PZ8	6/2/97	1122.14	54.81	1067.33	
EW-PZ8	9/10/97	1122.14	55.77	1066.37	
EW-PZ8	12/11/97	1122.14	56.17	1065.97	
EW-PZ8	3/13/98	1122.14	50.38	1071.76	
EW-PZ8	6/22/98	1122.14	47.35	1074.79	
EW-PZ8	9/22/98	1122.14	46.97	1075.17	
EW-PZ9	6/5/96	1121.46	47.11	1074.35	Measured from TOC
EW-PZ9	7/8/96	1121.46	47.87	1073.59	
EW-PZ9	8/2/96	1121.46	47.67	1073.79	
EW-PZ9	9/9/96	1121.46	48.01	1073.45	
EW-PZ9	10/4/96	1121.46	48.61	1072.85	
EW-PZ9	11/1/96	1121.46	48.36	1073.10	
EW-PZ9	12/5/96	1121.46	50.22	1071.24	
EW-PZ9	4/7/97	1121.46	53.43	1068.03	
EW-PZ9	6/2/97	1121.46	55.46	1066.00	
EW-PZ9	9/10/97	1121.46	56.33	1065.13	
EW-PZ9	12/11/97	1121.46	57	1064.46	
EW-PZ9	3/13/98	1121.46	51.09	1070.37	
EW-PZ9	6/22/98	1121.46	48.06	1073.40	
EW-PZ9	9/22/98	1121.46	48.06	1073.40	
EW-RW1	3/4/91	1124.94	66.07	1058.87	
EW-RW1	3/6/91	1124.94	65.04	1059.90	
EW-RW1	3/7/91	1124.94	64.39	1060.55	
EW-RW1	3/8/91	1124.94	63.65	1061.29	
EW-RW1	3/11/91	1124.94	62.39	1062.55	
EW-RW1	3/14/91	1124.94	61.04	1063.90	
EW-RW1	3/16/91	1124.94	66.55	1058.39	
EW-RW1	3/27/91	1124.94	59.26	1065.68	
EW-RW1	3/28/91	1124.94	59.22	1065.72	
EW-RW1	3/29/91	1124.94	58.50	1066.44	
EW-RW1	4/1/91	1124.94	56.34	1068.60	
EW-RW1	4/2/91	1124.94	55.53	1069.41	
EW-RW1	4/3/91	1124.94	54.89	1070.05	
EW-RW1	4/4/91	1124.94	54.02	1070.92	
EW-RW1	4/5/91	1124.94	53.64	1071.30	
EW-RW1	4/8/91	1124.94	51.42	1073.52	
EW-RW1	4/9/91	1124.94	50.65	1074.29	
EW-RW1	4/10/91	1124.94	49.79	1075.15	
EW-RW1	4/11/91	1124.94	49.29	1075.65	
EW-RW1	4/12/91	1124.94	48.89	1076.05	
EW-RW1	4/15/91	1124.94	47.51	1077.43	
EW-RW1	4/16/91	1124.94	47.29	1077.65	
EW-RW1	4/17/91	1124.94	47.03	1077.91	
EW-RW1	4/18/91	1124.94	46.91	1078.03	
EW-RW1	4/22/91	1124.94	46.56	1078.38	
EW-RW1	4/25/91	1124.94	46.72	1078.22	
EW-RW1	4/27/91	1124.94	46.92	1078.02	
EW-RW1	4/29/91	1124.94	47.26	1077.68	
EW-RW1	5/1/91	1124.94	47.49	1077.45	
EW-RW1	5/3/91	1124.94	48.06	1076.88	
EW-RW1	5/4/91	1124.94	48.33	1076.61	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-RW1	5/5/91	1124.94	48.57	1076.37	
EW-RW1	5/6/91	1124.94	48.63	1076.31	
EW-RW1	5/7/91	1124.94	48.91	1076.03	
EW-RW1	5/8/91	1124.94	49.28	1075.66	
EW-RW1	5/9/91	1124.94	49.33	1075.61	
EW-RW1	5/10/91	1124.94	49.68	1075.26	
EW-RW1	5/12/91	1124.94	50.24	1074.70	
EW-RW1	5/13/91	1124.94	50.50	1074.44	
EW-RW1	5/15/91	1124.94	50.95	1073.99	
EW-RW1	5/17/91	1124.94	51.34	1073.60	
EW-RW1	5/20/91	1124.94	51.98	1072.96	
EW-RW1	5/23/91	1124.94	52.85	1072.09	
EW-RW1	5/27/91	1124.94	53.58	1071.36	
EW-RW1	5/29/91	1124.94	54.09	1070.85	
EW-RW1	6/1/91	1124.94	67.00	1057.94	Pumping
EW-RW1	6/3/91	1124.94	55.46	1069.48	
EW-RW1	6/5/91	1124.94	94.57	1030.37	Aquifer test
EW-RW1	6/6/91	1124.94	105.50	1019.44	Aquifer test
EW-RW1	6/7/91	1124.94	105?		Aquifer test
EW-RW1	6/8/91	1124.94	ND		Aquifer test
EW-RW1	6/9/91	1124.94	ND		Aquifer test
EW-RW1	6/10/91	1124.94	57.86	1067.08	Aquifer test
EW-RW1	6/11/91	1124.94	57.50	1067.44	Aquifer test
EW-RW1	7/5/91	1124.94	59.20	1065.74	
EW-RW1	8/6/91	1124.94	61.16	1063.78	
EW-RW1	9/6/91	1124.94	63.16	1061.78	
EW-RW1	10/8/91	1124.94	64.27	1060.67	
EW-RW1	11/6/91	1124.94	63.99	1060.95	
EW-RW1	12/5/91	1124.94	62.15	1062.79	
EW-RW1	1/2/92	1124.94	61.78	1063.16	
EW-RW1	1/24/92	1124.94	54.58	1070.36	
EW-RW1	1/31/92	1124.94	50.68	1074.26	
EW-RW1	2/7/92	1124.94	47.83	1077.11	
EW-RW1	2/14/92	1124.94	45.35	1079.59	
EW-RW1	2/21/92	1124.94	42.28	1082.66	
EW-RW1	2/28/92	1124.94	40.55	1084.39	
EW-RW1	3/9/92	1124.94	38.49	1086.45	
EW-RW1	3/20/92	1124.94	35.63	1089.31	
EW-RW1	4/3/92	1124.94	38.48	1086.46	
EW-RW1	5/1/92	1124.94	32.00	1092.94	
EW-RW1	6/1/92	1124.94	30.10	1094.84	
EW-RW1	6/26/92	1124.94	30.88	1094.06	
EW-RW1	7/10/92	1124.94	33.06	1091.88	
EW-RW1	7/24/92	1124.94	34.85	1090.09	
EW-RW1	8/7/92	1124.94	33.39	1091.55	
EW-RW1	9/4/92	1124.94	30.18	1094.76	
EW-RW1	10/2/92	1124.94	32.30	1092.64	
EW-RW1	11/5/92	1124.94	37.44	1087.50	
EW-RW1	12/1/92	1124.94	40.74	1084.20	
EW-RW1	1/4/93	1124.94	36.85	1088.09	
EW-RW1	1/11/93	1124.94	31.11	1093.83	
EW-RW1	1/18/93	1124.94	27.22	1097.72	
EW-RW1	1/26/93	1124.94	25.46	1099.48	
EW-RW1	2/2/93	1124.94	25.62	1099.32	
EW-RW1	2/9/93	1124.94	25.54	1099.40	
EW-RW1	2/16/93	1124.94	24.98	1099.96	
EW-RW1	3/1/93	1124.94	24.05	1100.89	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-RW1	3/15/93	1124.94	24.61	1100.33	
EW-RW1	4/1/93	1124.94	24.65	1100.29	
EW-RW1	4/26/93	1124.94	25.83	1099.11	
EW-RW1	5/3/93	1124.94	25.57	1099.37	
EW-RW1	6/1/93	1124.94	26.15	1098.79	
EW-RW1	6/11/93	1124.94	26.81	1098.13	
EW-RW1	7/1/93	1124.94	27.70	1097.24	
EW-RW1	8/6/93	1124.94	30.58	1094.36	
EW-RW1	9/7/93	1124.94	30.43	1094.51	
EW-RW1	10/7/93	1124.94	32.57	1092.37	
EW-RW1	11/9/93	1124.94	34.41	1090.53	
EW-RW1	12/6/93	1124.94	32.05	1092.89	
EW-RW1	1/4/94	1124.94	33.13	1091.81	
EW-RW1	2/3/94	1124.94	36.91	1088.03	
EW-RW1	3/7/94	1124.94	39.94	1085.00	
EW-RW1	4/6/94	1124.94	41.17	1083.77	
EW-RW1	5/6/94	1124.94	42.88	1082.06	
EW-RW1	6/7/94	1124.94	44.40	1080.54	
EW-RW1	7/6/94	1124.94	46.10	1078.84	
EW-RW1	8/4/94	1124.94	47.59	1077.35	
EW-RW1	9/9/94	1124.94	48.68	1076.26	
EW-RW1	10/12/94	1124.94	49.30	1075.64	
EW-RW1	11/4/94	1124.94	49.59	1075.35	
EW-RW1	12/2/94	1124.94	49.73	1075.21	
EW-RW1	1/9/95	1124.94	45.64	1079.30	
EW-RW1	2/3/95	1124.94	40.67	1084.27	
EW-RW1	3/2/95	1124.94	34.60	1090.34	
EW-RW1	4/5/95	1124.94	30.78	1094.16	
EW-RW1	5/10/95	1124.94	31.60	1093.34	
EW-RW1	6/6/95	1124.94	34.96	1089.98	
EW-RW1	7/7/95	1124.94	38.46	1086.48	
EW-RW1	8/4/95	1124.94	40.86	1084.08	
EW-RW1	9/7/95	1124.94	39.72	1085.22	
EW-RW1	10/6/95	1124.94	38.55	1086.39	
EW-RW1	11/10/95	1124.94	38.19	1086.75	
EW-RW1	12/9/95	1124.94	39.73	1085.21	
EW-RW1	1/11/96	1124.94	42.44	1082.50	
EW-RW1	2/10/96	1124.94	43.85	1081.09	
EW-RW1	3/8/96	1124.94	45.09	1079.85	
EW-RW1	4/6/96	1124.94	46.41	1078.53	
EW-RW1	5/7/96	1124.91	52.84	1072.07	Pump removed, elevation -0.03 feet.
EW-RW1	6/5/96	1124.91	48.72	1076.19	
EW-RW1	7/8/96	1124.91	49.52	1075.39	
EW-RW1	8/2/96	1124.91	49.62	1075.29	
EW-RW1	9/9/96	1124.91	50.00	1074.91	
EW-RW1	10/4/96	1124.91	50.44	1074.47	
EW-RW1	11/1/96	1124.91	51.14	1073.77	
EW-RW1	12/5/96	1124.91	51.85	1073.06	
EW-RW1	4/7/97	1124.91	55.31	1069.60	
EW-RW1	6/2/97	1124.91	56.94	1067.97	
EW-RW1	9/10/97	1124.91	58.12	1066.79	
EW-RW2	12/5/91	1121.39	65.84	1055.55	Measured from well seal
EW-RW2	1/2/92	1121.39	ND		Aquifer test
EW-RW2	1/24/92	1121.39	56.54	1064.85	
EW-RW2	1/31/92	1121.39	53.37	1068.02	
EW-RW2	2/7/92	1121.39	51.63	1069.76	
EW-RW2	2/14/92	1121.39	48.83	1072.56	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-RW2	2/21/92	1121.39	46.37	1075.02	
EW-RW2	2/28/92	1121.39	45.13	1076.26	
EW-RW2	3/9/92	1121.39	42.68	1078.71	
EW-RW2	3/20/92	1121.39	40.45	1080.94	
EW-RW2	4/3/92	1121.39	38.20	1083.19	
EW-RW2	5/1/92	1121.39	36.11	1085.28	
EW-RW2	6/1/92	1121.39	33.40	1087.99	
EW-RW2	6/26/92	1121.39	35.95	1085.44	
EW-RW2	7/10/92	1121.39	39.24	1082.15	
EW-RW2	7/24/92	1121.39	40.88	1080.51	
EW-RW2	8/7/92	1121.39	38.70	1082.69	
EW-RW2	9/4/92	1121.39	33.48	1087.91	
EW-RW2	10/2/92	1121.39	38.88	1082.51	
EW-RW2	11/5/92	1121.39	44.46	1076.93	
EW-RW2	12/3/92	1121.39	47.95	1073.44	
EW-RW2	1/4/93	1121.39	40.37	1081.02	
EW-RW2	1/11/93	1121.39	ND		No access, surrounded by water.
EW-RW2	1/18/93	1121.39	ND		No access, surrounded by water.
EW-RW2	1/26/93	1121.39	30.42	1090.97	
EW-RW2	2/2/93	1121.39	31.05	1090.34	
EW-RW2	2/9/93	1121.39	30.73	1090.66	
EW-RW2	2/16/93	1121.39	29.64	1091.75	
EW-RW2	3/1/93	1121.39	28.90	1092.49	
EW-RW2	3/15/93	1121.39	29.94	1091.45	
EW-RW2	4/1/93	1121.39	29.52	1091.87	
EW-RW2	4/26/93	1121.39	30.90	1090.49	
EW-RW2	5/3/93	1121.39	30.06	1091.33	
EW-RW2	6/1/93	1121.39	30.18	1091.21	
EW-RW2	6/11/93	1121.39	31.36	1090.03	
EW-RW2	7/1/93	1121.39	32.51	1088.88	
EW-RW2	8/6/93	1121.39	37.58	1083.81	
EW-RW2	9/7/93	1121.39	35.84	1085.55	
EW-RW2	10/7/93	1121.39	39.14	1082.25	
EW-RW2	11/9/93	1121.39	42.35	1079.04	
EW-RW2	12/6/93	1121.39	38.00	1083.39	
EW-RW2	1/4/94	1121.39	39.91	1081.48	
EW-RW2	2/3/94	1121.39	37.69	1083.70	
EW-RW2	3/7/94	1121.39	46.94	1074.45	
EW-RW2	4/6/94	1121.39	47.62	1073.77	
EW-RW2	5/6/94	1121.39	49.39	1072.00	
EW-RW2	6/7/94	1121.39	50.71	1070.68	
EW-RW2	7/6/94	1121.39	52.38	1069.01	
EW-RW2	8/4/94	1121.39	53.79	1067.60	
EW-RW2	9/9/94	1121.39	53.01	1068.38	
EW-RW2	10/13/94	1121.39	55.13	1066.26	
EW-RW2	11/4/94	1121.39	55.39	1066.00	
EW-RW2	12/2/94	1121.39	55.55	1065.84	
EW-RW2	1/9/95	1121.39	48.85	1072.54	
EW-RW2	2/3/95	1121.39	46.07	1075.32	
EW-RW2	3/2/95	1121.39	39.63	1081.76	
EW-RW2	4/5/95	1121.39	36.05	1085.34	
EW-RW2	5/10/95	1121.39	37.01	1084.38	
EW-RW2	6/6/95	1121.39	42.10	1079.29	
EW-RW2	7/7/95	1121.39	45.59	1075.80	
EW-RW2	8/4/95	1121.39	47.71	1073.68	
EW-RW2	9/7/95	1121.39	46.08	1075.31	
EW-RW2	10/6/95	1121.39	41.70	1079.69	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-RW2	11/10/95	1121.39	42.66	1078.73	
EW-RW2	12/9/95	1121.39	47.05	1074.34	
EW-RW2	1/11/96	1121.39	49.36	1072.03	
EW-RW2	2/10/96	1121.39	50.10	1071.29	
EW-RW2	3/8/96	1121.39	51.06	1070.33	
EW-RW2	4/6/96	1121.39	52.03	1069.36	
EW-RW2	5/7/96	1121.34	47.36	1073.98	Pump removed, elevation -0.05 feet.
EW-RW2	6/5/96	1121.34	53.80	1067.54	
EW-RW2	7/8/96	1121.34	54.30	1067.04	
EW-RW2	8/2/96	1121.34	53.66	1067.68	
EW-RW2	9/9/96	1121.34	53.75	1067.59	
EW-RW2	10/4/96	1121.34	55.12	1066.22	
EW-RW2	11/1/96	1121.34	55.83	1065.51	
EW-RW2	12/5/96	1121.34	56.96	1064.38	
EW-RW2	4/7/97	1121.34	60.71	1060.63	
EW-RW2	6/2/97	1121.34	62.64	1058.70	
EW-RW2	9/10/97	1121.34	63.31	1058.03	
EW-W	4/28/82	1128.50	60.10	1068.40	Data from Graf (1986)
EW-W	8/16/82	1128.50	68.48	1060.02	Data from Graf (1986)
EW-W	9/17/82	1128.50	67.20	1061.30	Data from Graf (1986)
EW-W	12/11/82	1128.50	68.71	1059.79	Data from Graf (1986)
EW-W	12/12/82	1128.50	68.34	1060.16	Data from Graf (1986)
EW-W	12/14/82	1128.50	67.56	1060.94	Data from Graf (1986)
EW-W	12/16/82	1128.50	65.65	1062.85	Data from Graf (1986)
EW-W	12/20/82	1128.50	61.88	1066.62	Data from Graf (1986)
EW-W	12/24/82	1128.50	59.93	1068.57	Data from Graf (1986)
EW-W	12/28/82	1128.50	57.42	1071.08	Data from Graf (1986)
EW-W	12/30/82	1128.50	55.40	1073.10	Data from Graf (1986)
EW-W	1/2/83	1128.50	53.36	1075.14	Data from Graf (1986)
EW-W	1/6/83	1128.50	51.78	1076.72	Data from Graf (1986)
EW-W	1/11/83	1128.50	50.64	1077.86	Data from Graf (1986)
EW-W	1/14/83	1128.50	50.55	1077.95	Data from Graf (1986)
EW-W	1/18/83	1128.50	50.69	1077.81	Data from Graf (1986)
EW-W	1/21/83	1128.50	51.43	1077.07	Data from Graf (1986)
EW-W	1/24/83	1128.50	51.64	1076.86	Data from Graf (1986)
EW-W	1/27/83	1128.50	52.33	1076.17	Data from Graf (1986)
EW-W	2/1/83	1128.50	52.53	1075.97	Data from Graf (1986)
EW-W	2/6/83	1128.50	51.58	1076.92	Data from Graf (1986)
EW-W	2/10/83	1128.50	47.06	1081.44	Data from Graf (1986)
EW-W	2/13/83	1128.50	44.84	1083.66	Data from Graf (1986)
EW-W	2/17/83	1128.50	44.09	1084.41	Data from Graf (1986)
EW-W	2/19/83	1128.50	43.23	1085.27	Data from Graf (1986)
EW-W	2/24/83	1128.50	42.61	1085.89	Data from Graf (1986)
EW-W	3/1/83	1128.50	41.93	1086.57	Data from Graf (1986)
EW-W	3/8/83	1128.50	39.44	1089.06	Data from Graf (1986)
EW-W	3/22/83	1128.50	37.56	1090.94	Data from Graf (1986)
EW-W	3/28/83	1128.50	35.75	1092.75	Data from Graf (1986)
EW-W	4/2/83	1128.50	35.35	1093.15	Data from Graf (1986)
EW-W	4/15/83	1128.50	35.62	1092.88	Data from Graf (1986)
EW-W	4/27/83	1128.50	34.47	1094.03	Data from Graf (1986)
EW-W	5/6/83	1128.50	34.76	1093.74	Data from Graf (1986)
EW-W	6/22/83	1128.50	38.30	1090.20	Data from Graf (1986)
EW-W	9/11/83	1128.50	40.11	1088.39	Data from Graf (1986)
EW-W	10/2/83	1128.50	38.18	1090.32	Data from Graf (1986)
EW-W	11/22/83	1128.50	37.79	1090.71	Data from Graf (1986)
EW-W	7/9/84	1128.50	52.89	1075.61	Data from Graf (1986)
EW-W	10/10/84	1128.50	50.78	1077.72	Data from Graf (1986)

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-W	12/18/84	1128.50	55.28	1073.22	Data from Graf (1986)
EW-W	1/3/85	1128.50	41.31	1087.19	Data from Graf (1986)
EW-W	1/8/85	1128.50	40.88	1087.62	Data from Graf (1986)
EW-W	2/20/85	1128.50	38.40	1090.10	Data from Graf (1986)
EW-W	8/14/85	1128.50	48.23	1080.27	Data from Graf (1986)
EW-W	1/12/88	1128.50	62.43	1066.07	Measured from well seal
EW-W	3/4/88	1128.50	59.13	1069.37	
EW-W	6/14/88	1128.50	60.41	1068.09	
EW-W	7/22/88	1128.50	62.04	1066.46	
EW-W	8/25/88	1128.50	62.95	1065.55	
EW-W	9/24/88	1128.50	63.34	1065.16	
EW-W	10/21/88	1128.50	62.84	1065.66	
EW-W	12/21/88	1128.50	65.41	1063.09	
EW-W	1/19/89	1128.50	66.30	1062.20	
EW-W	3/31/89	1128.50	67.38	1061.12	
EW-W	5/8/89	1128.50	67.59	1060.91	
EW-W	5/31/89	1128.50	68.60	1059.90	
EW-W	6/30/89	1128.50	69.38	1059.12	
EW-W	7/27/89	1128.50	69.80	1058.70	
EW-W	9/5/89	1128.50	69.59	1058.91	
EW-W	9/28/89	1128.50	70.08	1058.42	
EW-W	11/6/89	1128.50	71.30	1057.20	
EW-W	12/1/89	1128.50	72.34	1056.16	
EW-W	1/8/90	1128.50	72.58	1055.92	
EW-W	1/25/90	1128.50	72.77	1055.73	
EW-W	2/5/90	1128.50	73.01	1055.49	
EW-W	3/5/90	1128.50	73.75	1054.75	
EW-W	4/6/90	1128.50	74.72	1053.78	
EW-W	5/8/90	1128.50	74.75	1053.75	
EW-W	6/5/90	1128.50	75.79	1052.71	
EW-W	7/6/90	1128.50	76.48	1052.02	
EW-W	7/30/90	1128.50	72.29	1056.21	
EW-W	8/7/90	1128.50	71.02	1057.48	
EW-W	9/11/90	1128.50	66.12	1062.38	
EW-W	10/8/90	1128.50	70.31	1058.19	
EW-W	11/1/90	1128.50	72.43	1056.07	
EW-W	12/3/90	1128.50	74.05	1054.45	
EW-W	1/8/91	1128.50	74.38	1054.12	
EW-W	2/4/91	1128.50	76.25	1052.25	
EW-W	3/4/91	1128.50	75.79	1052.71	
EW-W	3/27/91	1128.50	68.55	1059.95	
EW-W	3/28/91	1128.50	68.07	1060.43	
EW-W	3/29/91	1128.50	66.06	1062.44	
EW-W	4/1/91	1128.50	62.04	1066.46	
EW-W	4/2/91	1128.50	60.97	1067.53	
EW-W	4/3/91	1128.50	60.26	1068.24	
EW-W	4/4/91	1128.50	59.15	1069.35	
EW-W	4/5/91	1128.50	58.15	1070.35	
EW-W	4/8/91	1128.50	56.82	1071.68	
EW-W	4/9/91	1128.50	55.81	1072.69	
EW-W	4/10/91	1128.50	54.79	1073.71	
EW-W	4/11/91	1128.50	54.67	1073.83	
EW-W	4/12/91	1128.50	54.54	1073.96	
EW-W	4/15/91	1128.50	53.86	1074.64	
EW-W	4/16/91	1128.50	53.95	1074.55	
EW-W	4/17/91	1128.50	53.97	1074.53	
EW-W	4/18/91	1128.50	54.16	1074.34	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-W	4/22/91	1128.50	55.21	1073.29	
EW-W	4/25/91	1128.50	56.36	1072.14	
EW-W	4/27/91	1128.50	57.19	1071.31	
EW-W	4/29/91	1128.50	58.16	1070.34	
EW-W	5/1/91	1128.50	58.95	1069.55	
EW-W	5/3/91	1128.50	61.90	1066.60	
EW-W	5/4/91	1128.50	62.10	1066.40	
EW-W	5/5/91	1128.50	61.95	1066.55	
EW-W	5/6/91	1128.50	61.05	1067.45	
EW-W	5/7/91	1128.50	61.53	1066.97	
EW-W	5/8/91	1128.50	61.90	1066.60	
EW-W	5/9/91	1128.50	62.23	1066.27	
EW-W	5/10/91	1128.50	62.70	1065.80	
EW-W	5/12/91	1128.50	63.37	1065.13	
EW-W	5/13/91	1128.50	63.69	1064.81	
EW-W	5/15/91	1128.50	64.31	1064.19	
EW-W	5/17/91	1128.50	64.74	1063.76	
EW-W	5/20/91	1128.50	65.42	1063.08	
EW-W	5/23/91	1128.50	66.24	1062.26	
EW-W	5/27/91	1128.50	67.17	1061.33	
EW-W	5/29/91	1128.50	67.45	1061.05	
EW-W	6/1/91	1128.50	68.12	1060.38	
EW-W	6/3/91	1128.50	67.37	1061.13	
EW-W	6/5/91	1128.50	68.72	1059.78	
EW-W	6/6/91	1128.50	68.96	1059.54	
EW-W	6/7/91	1128.50	69.09	1059.41	
EW-W	6/8/91	1128.50	69.21	1059.29	
EW-W	6/9/91	1128.50	69.42	1059.08	
EW-W	6/10/91	1128.50	69.43	1059.07	
EW-W	6/11/91	1128.50	69.55	1058.95	
EW-W	7/5/91	1128.50	72.70	1055.80	
EW-W	8/6/91	1128.50	73.93	1054.57	
EW-W	9/6/91	1128.50	75.29	1053.21	
EW-W	10/8/91	1128.50	76.09	1052.41	
EW-W	11/6/91	1128.50	74.27	1054.23	Drilling EW-RW2
EW-W	12/5/91	1128.50	71.71	1056.79	
EW-W	12/30/91	1128.50	71.28	1057.22	
EW-W	12/31/91	1128.50	72.05	1056.45	
EW-W	1/2/92	1128.50	72.43	1056.07	
EW-W	1/24/92	1128.50	61.02	1067.48	
EW-W	1/31/92	1128.50	57.38	1071.12	
EW-W	2/7/92	1128.50	55.52	1072.98	
EW-W	2/14/92	1128.50	52.55	1075.95	
EW-W	2/21/92	1128.50	49.99	1078.51	
EW-W	2/28/92	1128.50	48.73	1079.77	
EW-W	3/9/92	1128.50	46.26	1082.24	
EW-W	3/20/92	1128.50	44.11	1084.39	
EW-W	4/3/92	1128.50	42.02	1086.48	
EW-W	5/1/92	1128.50	41.39	1087.11	
EW-W	6/1/92	1128.50	38.28	1090.22	
EW-W	6/26/92	1128.50	41.27	1087.23	
EW-W	7/10/92	1128.50	42.89	1085.61	
EW-W	7/24/92	1128.50	46.81	1081.69	
EW-W	8/7/92	1128.50	44.26	1084.24	
EW-W	9/4/92	1128.50	38.65	1089.85	
EW-W	10/2/92	1128.50	44.65	1083.85	
EW-W	11/5/92	1128.50	50.97	1077.53	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-W	12/1/92	1128.50	54.35	1074.15	
EW-W	1/4/93	1128.50	46.01	1082.49	
EW-W	1/11/93	1128.50	38.24	1090.26	
EW-W	1/18/93	1128.50	35.14	1093.36	
EW-W	1/26/93	1128.50	35.14	1093.36	
EW-W	2/2/93	1128.50	36.11	1092.39	
EW-W	2/9/93	1128.50	35.95	1092.55	
EW-W	2/16/93	1128.50	35.13	1093.37	
EW-W	3/1/93	1128.50	34.23	1094.27	
EW-W	3/15/93	1128.50	35.37	1093.13	
EW-W	4/1/93	1128.50	35.06	1093.44	
EW-W	4/26/93	1128.50	36.66	1091.84	
EW-W	5/3/93	1128.50	35.76	1092.74	
EW-W	6/1/93	1128.50	36.75	1091.75	
EW-W	6/11/93	1128.50	37.25	1091.25	
EW-W	7/1/93	1128.50	38.26	1090.24	
EW-W	8/6/93	1128.50	43.61	1084.89	
EW-W	9/7/93	1128.50	41.38	1087.12	
EW-W	10/7/93	1128.50	45.06	1083.44	
EW-W	11/9/93	1128.50	48.37	1080.13	
EW-W	12/6/93	1128.50	43.41	1085.09	
EW-W	1/4/94	1128.50	45.37	1083.13	
EW-W	2/3/94	1128.50	50.85	1077.65	
EW-W	3/7/94	1128.50	53.12	1075.38	
EW-W	4/6/94	1128.50	53.80	1074.70	
EW-W	5/6/94	1128.50	55.73	1072.77	
EW-W	6/7/94	1128.50	57.03	1071.47	
EW-W	7/6/94	1128.50	57.80	1070.70	
EW-W	8/4/94	1128.50	60.34	1068.16	
EW-W	9/9/94	1128.50	59.52	1068.98	
EW-W	10/12/94	1128.50	61.48	1067.02	
EW-W	11/4/94	1128.50	61.97	1066.53	
EW-W	12/2/94	1128.50	62.14	1066.36	
EW-W	1/9/95	1128.50	54.88	1073.62	
EW-W	2/3/95	1128.50	51.25	1077.25	
EW-W	3/2/95	1128.50	48.94	1079.56	
EW-W	4/5/95	1128.50	41.00	1087.50	
EW-W	5/10/95	1128.50	42.03	1086.47	
EW-W	6/6/95	1128.50	47.80	1080.70	
EW-W	7/7/95	1128.50	51.73	1076.77	
EW-W	8/4/95	1128.50	53.98	1074.52	
EW-W	9/7/95	1128.50	52.12	1076.38	
EW-W	10/6/95	1128.50	49.10	1079.40	
EW-W	11/10/95	1128.50	48.66	1079.84	
EW-W	12/9/95	1128.50	53.12	1075.38	
EW-W	1/11/96	1128.50	55.71	1072.79	
EW-W	2/10/96	1128.50	56.35	1072.15	
EW-W	3/8/96	1128.50	57.40	1071.10	
EW-W	4/6/96	1128.50	58.52	1069.98	
EW-W	5/7/96	1128.50	59.51	1068.99	
EW-W	6/5/96	1128.50	60.60	1067.90	
EW-W	7/8/96	1128.50	61.14	1067.36	
EW-W	8/2/96	1128.50	60.21	1068.29	
EW-W	9/9/96	1128.50	60.34	1068.16	
EW-W	10/4/96	1128.50	61.84	1066.66	Broken weld, no lock
EW-W	11/1/96	1128.50	62.50	1066.00	
EW-W	12/5/96	1128.50	63.80	1064.70	Pump OK

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
EW-W	4/7/97	1128.50	67.74	1060.76	
EW-W	6/2/97	1128.50	69.80	1058.70	
EW-W	9/10/97	1128.50	70.14	1058.36	
EW-W	12/11/97	1128.50	71.88	1056.62	
EW-W	3/13/98	1128.50	64.37	1064.13	
EW-W	6/22/98	1128.50	63.44	1065.06	
EW-W	9/22/98	1128.50	63.58	1064.92	
EW-W	6/8/99	1128.50	67.00	1061.50	
SB-1	2/4/91	1103.74	63.89	1039.85	Measured from well seal
SB-1	3/4/91	1103.74	64.56	1039.18	
SB-1	3/27/91	1103.74	63.01	1040.73	
SB-1	4/4/91	1103.74	61.62	1042.12	
SB-1	4/22/91	1103.74	57.91	1045.83	
SB-1	6/3/91	1103.74	58.94	1044.80	
SB-1	7/5/91	1103.74	60.54	1043.20	
SB-1	8/6/91	1103.74	61.75	1041.99	
SB-1	9/6/91	1103.74	62.65	1041.09	
SB-1	10/8/91	1103.74	63.34	1040.40	
SB-1	11/7/91	1103.74	63.88	1039.86	
SB-1	12/5/91	1103.74	64.05	1039.69	
SB-1	1/2/92	1103.74	63.06	1040.68	
SB-1	1/24/92	1103.74	59.87	1043.87	
SB-1	2/7/92	1103.74	56.42	1047.32	
SB-1	2/14/92	1103.74	54.79	1048.95	
SB-1	2/21/92	1103.74	52.67	1051.07	
SB-1	2/28/92	1103.74	50.98	1052.76	
SB-1	3/9/92	1103.74	48.43	1055.31	
SB-1	3/20/92	1103.74	45.57	1058.17	
SB-1	4/3/92	1103.74	42.71	1061.03	
SB-1	5/1/92	1103.74	38.94	1064.80	
SB-1	6/1/92	1103.74	35.91	1067.83	
SB-1	6/26/92	1103.74	35.96	1067.78	
SB-1	7/10/92	1103.74	37.51	1066.23	
SB-1	7/24/92	1103.74	38.58	1065.16	
SB-1	8/7/92	1103.74	37.81	1065.93	
SB-1	9/4/92	1103.74	36.82	1066.92	
SB-1	10/2/92	1103.74	37.38	1066.36	
SB-1	11/5/92	1103.74	41.50	1062.24	
SB-1	12/1/92	1103.74	44.98	1058.76	
SB-1	1/4/93	1103.74	44.02	1059.72	
SB-1	1/11/93	1103.74	40.63	1063.11	
SB-1	1/18/93	1103.74	37.80	1065.94	
SB-1	1/26/93	1103.74	34.80	1068.94	
SB-1	2/2/93	1103.74	34.02	1069.72	
SB-1	2/9/93	1103.74	33.33	1070.41	
SB-1	2/16/93	1103.74	32.41	1071.33	
SB-1	3/1/93	1103.74	30.73	1073.01	
SB-1	3/15/93	1103.74	30.22	1073.52	
SB-1	4/1/93	1103.74	29.61	1074.13	
SB-1	4/26/93	1103.74	29.88	1073.86	
SB-1	5/3/93	1103.74	29.66	1074.08	
SB-1	6/1/93	1103.74	29.93	1073.81	
SB-1	6/11/93	1103.74	30.50	1073.24	
SB-1	7/1/93	1103.74	32.06	1071.68	
SB-1	8/6/93	1103.74	35.42	1068.32	
SB-1	9/7/93	1103.74	37.81	1065.93	
SB-1	10/7/93	1103.74	ND		Could not find well.

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-1	11/9/93	1103.74	41.18	1062.56	
SB-1	12/6/93	1103.74	39.63	1064.11	
SB-1	1/4/94	1103.74	41.32	1062.42	
SB-1	2/3/94	1103.74	43.18	1060.56	
SB-1	3/7/94	1103.74	44.06	1059.68	
SB-1	4/6/94	1103.74	44.96	1058.78	
SB-1	5/6/94	1103.74	46.20	1057.54	
SB-1	6/7/94	1103.74	47.68	1056.06	
SB-1	7/6/94	1103.74	49.20	1054.54	
SB-1	8/4/94	1103.74	50.23	1053.51	
SB-1	9/9/94	1103.74	50.73	1053.01	
SB-1	10/11/94	1103.74	51.08	1052.66	
SB-1	11/4/94	1103.74	51.26	1052.48	
SB-1	12/2/94	1103.74	51.49	1052.25	
SB-1	1/9/95	1103.74	49.58	1054.16	
SB-1	2/3/95	1103.74	47.68	1056.06	
SB-1	3/2/95	1103.74	43.68	1060.06	
SB-1	4/5/95	1103.74	38.22	1065.52	
SB-1	5/11/95	1103.74	ND		Could not locate well
SB-1	6/6/95	1103.74	39.59	1064.15	
SB-1	7/7/95	1103.74	42.32	1061.42	
SB-1	8/4/95	1103.74	44.18	1059.56	
SB-1	9/7/95	1103.74	43.52	1060.22	
SB-1	10/6/95	1103.74	43.11	1060.63	
SB-1	11/10/95	1103.74	43.62	1060.12	
SB-1	12/9/95	1103.74	44.81	1058.93	
SB-1	1/11/96	1103.74	46.39	1057.35	
SB-1	2/10/96	1103.74	46.91	1056.83	
SB-1	3/8/96	1103.74	47.24	1056.50	
SB-1	4/5/96	1103.74	47.41	1056.33	
SB-1	5/7/96	1103.74	47.56	1056.18	
SB-1	6/5/96	1103.74	47.90	1055.84	
SB-1	7/8/96	1103.74	47.80	1055.94	
SB-1	8/2/96	1103.74	47.55	1056.19	
SB-1	9/9/96	1103.74	47.86	1055.88	
SB-1	10/4/96	1103.74	48.85	1054.89	
SB-1	11/1/96	1103.74	50.12	1053.62	
SB-1	12/5/96	1103.74	51.76	1051.98	
SB-1	4/7/97	1103.74	55.78	1047.96	
SB-1	6/2/97	1103.74	57.69	1046.05	
SB-1	9/10/97	1107.27	57.85	1049.42	
SB-1	12/11/97	1107.27	61.13	1046.14	
SB-1	3/13/98	1107.27	58.36	1048.91	
SB-2	2/4/91	1103.74	ND		Unable to locate well
SB-2	3/4/91	1103.74	63.77	1039.97	Measured from well seal
SB-2	3/27/91	1103.74	61.00	1042.74	
SB-2	4/4/91	1103.74	56.83	1046.91	
SB-2	4/22/91	1103.74	55.13	1048.61	
SB-2	6/3/91	1103.74	59.06	1044.68	
SB-2	7/5/91	1103.74	60.83	1042.91	
SB-2	8/6/91	1103.74	62.00	1041.74	
SB-2	9/6/91	1103.74	63.03	1040.71	
SB-2	10/8/91	1103.74	63.54	1040.20	
SB-2	11/7/91	1103.74	63.86	1039.88	
SB-2	12/5/91	1103.74	64.23	1039.51	
SB-2	1/2/92	1103.74	62.55	1041.19	
SB-2	1/24/92	1103.74	54.98	1048.76	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-2	2/7/92	1103.74	51.76	1051.98	
SB-2	2/14/92	1103.74	49.04	1054.70	
SB-2	2/21/92	1103.74	46.60	1057.14	
SB-2	2/28/92	1103.74	45.28	1058.46	
SB-2	3/9/92	1103.74	42.44	1061.30	
SB-2	3/20/92	1103.74	39.79	1063.95	
SB-2	4/3/92	1103.74	37.16	1066.58	
SB-2	5/1/92	1103.74	34.85	1068.89	
SB-2	6/1/92	1103.74	32.31	1071.43	
SB-2	6/26/92	1103.74	34.70	1069.04	
SB-2	7/10/92	1103.74	37.16	1066.58	
SB-2	7/24/92	1103.74	38.06	1065.68	
SB-2	8/7/92	1103.74	36.51	1067.23	
SB-2	9/4/92	1103.74	33.13	1070.61	
SB-2	10/2/92	1103.74	37.67	1066.07	
SB-2	11/5/92	1103.74	42.73	1061.01	
SB-2	12/1/92	1103.74	46.71	1057.03	
SB-2	1/4/93	1103.74	40.69	1063.05	
SB-2	1/11/93	1103.74	ND		No access, surrounded by water.
SB-2	1/18/93	1103.74	32.08	1071.66	
SB-2	1/26/93	1103.74	31.01	1072.73	
SB-2	2/2/93	1103.74	31.22	1072.52	
SB-2	2/9/93	1103.74	30.81	1072.93	
SB-2	2/16/93	1103.74	29.85	1073.89	
SB-2	3/1/93	1103.74	28.25	1075.49	
SB-2	3/15/93	1103.74	28.78	1074.96	
SB-2	4/1/93	1103.74	28.36	1075.38	
SB-2	4/26/93	1103.74	29.61	1074.13	
SB-2	5/3/93	1103.74	28.96	1074.78	
SB-2	6/1/93	1103.74	29.70	1074.04	
SB-2	6/11/93	1103.74	30.42	1073.32	
SB-2	7/1/93	1103.74	33.01	1070.73	
SB-2	8/6/93	1103.74	36.75	1066.99	
SB-2	9/7/93	1103.74	37.79	1065.95	
SB-2	10/7/93	1103.74	ND		Could not find well.
SB-2	11/9/93	1103.74	42.74	1061.00	
SB-2	12/6/93	1103.74	39.82	1063.92	
SB-2	1/4/94	1103.74	42.62	1061.12	
SB-2	2/3/94	1103.74	44.40	1059.34	
SB-2	3/7/94	1103.74	45.20	1058.54	
SB-2	4/6/94	1103.74	44.77	1058.97	
SB-2	5/6/94	1103.74	46.67	1057.07	
SB-2	6/7/94	1103.74	48.38	1055.36	
SB-2	7/6/94	1103.74	50.22	1053.52	
SB-2	8/4/94	1103.74	51.07	1052.67	
SB-2	9/9/94	1103.74	48.89	1054.85	
SB-2	10/11/94	1103.74	50.60	1053.14	
SB-2	11/4/94	1103.74	49.72	1054.02	
SB-2	12/2/94	1103.74	ND		Well cannot be located
SB-2	1/9/95	1103.74	ND		Well cannot be located
SB-2	2/3/95	1103.74	ND		Well cannot be located
SB-2	3/2/95	1103.74	ND		Well cannot be located
SB-2	4/5/95	1103.74	ND		Well destroyed by construction?
SB-2	5/11/95	1103.74	ND		Could not locate well
SB-2	6/6/95	1103.74	ND		Could not locate well
SB-3	2/4/91	1105.93	63.85	1042.08	Measured from well seal
SB-3	3/4/91	1105.93	64.31	1041.62	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-3	3/27/91	1105.93	62.58	1043.35	
SB-3	4/4/91	1105.93	60.87	1045.06	
SB-3	4/22/91	1105.93	56.55	1049.38	
SB-3	6/3/91	1105.93	58.37	1047.56	
SB-3	7/5/91	1105.93	60.30	1045.63	
SB-3	8/6/91	1105.93	61.78	1044.15	
SB-3	9/6/91	1105.93	62.88	1043.05	
SB-3	10/8/91	1105.93	63.53	1042.40	
SB-3	11/6/91	1105.93	63.98	1041.95	
SB-3	12/5/91	1105.93	63.93	1042.00	
SB-3	1/2/92	1105.93	62.83	1043.10	
SB-3	1/24/92	1105.93	58.89	1047.04	
SB-3	2/7/92	1105.93	54.78	1051.15	
SB-3	2/14/92	1105.93	52.68	1053.25	
SB-3	2/21/92	1105.93	49.98	1055.95	
SB-3	2/28/92	1105.93	48.09	1057.84	
SB-3	3/9/92	1105.93	ND		Box under water
SB-3	3/20/92	1105.93	41.79	1064.14	
SB-3	4/3/92	1105.93	38.47	1067.46	
SB-3	5/1/92	1105.93	34.65	1071.28	
SB-3	6/1/92	1105.93	31.61	1074.32	
SB-3	6/26/92	1105.93	32.51	1073.42	
SB-3	7/10/92	1105.93	34.75	1071.18	
SB-3	7/24/92	1105.93	ND		No access, well under water.
SB-3	8/7/92	1105.93	36.05	1069.88	
SB-3	9/4/92	1105.93	34.34	1071.59	
SB-3	10/2/92	1105.93	35.47	1070.46	
SB-3	11/5/92	1105.93	40.35	1065.58	
SB-3	12/1/92	1105.93	44.15	1061.78	
SB-3	1/4/93	1105.93	42.97	1062.96	
SB-3	1/11/93	1105.93	ND		No access, surrounded by water.
SB-3	1/18/93	1105.93	ND		No access, surrounded by water.
SB-3	1/26/93	1105.93	30.72	1075.21	
SB-3	2/2/93	1105.93	29.91	1076.02	
SB-3	2/9/93	1105.93	ND		No access, well under water.
SB-3	2/16/93	1105.93	28.00	1077.93	
SB-3	3/1/93	1105.93	25.83	1080.10	
SB-3	3/15/93	1105.93	25.83	1080.10	
SB-3	4/1/93	1105.93	25.62	1080.31	
SB-3	4/26/93	1105.93	26.63	1079.30	
SB-3	5/3/93	1105.93	26.50	1079.43	
SB-3	6/1/93	1105.93	26.93	1079.00	
SB-3	6/11/93	1105.93	27.79	1078.14	
SB-3	7/1/93	1105.93	30.13	1075.80	
SB-3	8/6/93	1105.93	34.55	1071.38	
SB-3	9/7/93	1105.93	37.17	1068.76	
SB-3	10/7/93	1105.93	39.05	1066.88	
SB-3	11/9/93	1105.93	40.43	1065.50	
SB-3	12/6/93	1105.93	39.04	1066.89	
SB-3	1/4/94	1105.93	40.57	1065.36	
SB-3	2/3/94	1105.93	42.20	1063.73	
SB-3	3/7/94	1105.93	44.20	1061.73	
SB-3	4/6/94	1105.93	44.89	1061.04	
SB-3	5/6/94	1105.93	46.26	1059.67	
SB-3	6/7/94	1105.93	47.83	1058.10	
SB-3	7/6/94	1105.93	49.27	1056.66	
SB-3	8/4/94	1105.93	50.36	1055.57	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-3	9/9/94	1105.93	50.95	1054.98	
SB-3	10/11/94	1105.93	51.36	1054.57	
SB-3	11/4/94	1105.93	51.39	1054.54	
SB-3	12/2/94	1105.93	51.55	1054.38	
SB-3	1/9/95	1105.93	49.21	1056.72	
SB-3	2/3/95	1105.93	46.74	1059.19	
SB-3	3/2/95	1105.93	41.37	1064.56	
SB-3	4/5/95	1105.93	34.97	1070.96	
SB-3	5/11/95	1105.93	35.55	1070.38	
SB-3	6/6/95	1105.93	38.18	1067.75	
SB-3	7/7/95	1105.93	41.42	1064.51	
SB-3	8/4/95	1105.93	43.82	1062.11	
SB-3	9/7/95	1105.93	42.68	1063.25	
SB-3	10/6/95	1105.93	41.98	1063.95	
SB-3	11/10/95	1105.93	42.48	1063.45	
SB-3	12/9/95	1105.93	43.98	1061.95	
SB-3	1/11/96	1105.93	45.80	1060.13	
SB-3	2/10/96	1105.93	46.55	1059.38	
SB-3	3/8/96	1105.93	46.76	1059.17	
SB-3	4/5/96	1105.93	46.79	1059.14	
SB-3	5/7/96	1105.93	46.67	1059.26	
SB-3	6/5/96	1105.93	46.88	1059.05	
SB-3	7/8/96	1105.93	46.54	1059.39	
SB-3	8/2/96	1105.93	46.37	1059.56	
SB-3	9/9/96	1105.93	46.83	1059.10	
SB-3	10/4/96	1105.93	47.93	1058.00	
SB-3	11/1/96	1105.93	49.49	1056.44	
SB-3	12/5/96	1105.93	51.31	1054.62	
SB-3	4/7/97	1105.93	55.49	1050.44	
SB-3	6/2/97	1105.93	57.58	1048.35	
SB-3	9/10/97	1105.93	57.41	1048.52	
SB-3	12/11/97	1105.93	61.07	1044.86	
SB-3	3/13/98	1105.93	57.71	1048.22	
SB-3	6/23/98	1105.93	53.94	1051.99	
SB-4	2/4/91	1117.77	67.38	1050.39	Measured from well seal
SB-4	3/4/91	1117.77	68.65	1049.12	
SB-4	3/27/91	1117.77	65.26	1052.51	
SB-4	3/28/91	1117.77	65.34	1052.43	
SB-4	3/29/91	1117.77	59.12?		Estimated depth?
SB-4	4/1/91	1117.77	64.38	1053.39	
SB-4	4/2/91	1117.77	63.92	1053.85	
SB-4	4/3/91	1117.77	63.60	1054.17	
SB-4	4/4/91	1117.77	63.17	1054.60	
SB-4	4/5/91	1117.77	62.71	1055.06	
SB-4	4/8/91	1117.77	61.40	1056.37	
SB-4	4/9/91	1117.77	60.98	1056.79	
SB-4	4/10/91	1117.77	60.45	1057.32	
SB-4	4/11/91	1117.77	60.10	1057.67	
SB-4	4/12/91	1117.77	59.83	1057.94	
SB-4	4/15/91	1117.77	58.53	1059.24	
SB-4	4/16/91	1117.77	58.37	1059.40	
SB-4	4/17/91	1117.77	58.07	1059.70	
SB-4	4/18/91	1117.77	57.95	1059.82	
SB-4	4/22/91	1117.77	57.42	1060.35	
SB-4	4/25/91	1117.77	57.40	1060.37	
SB-4	4/27/91	1117.77	57.45	1060.32	
SB-4	4/29/91	1117.77	57.61	1060.16	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-4	5/1/91	1117.77	57.75	1060.02	
SB-4	5/3/91	1117.77	58.15	1059.62	
SB-4	5/4/91	1117.77	58.27	1059.50	
SB-4	5/5/91	1117.77	58.38	1059.39	
SB-4	5/6/91	1117.77	58.39	1059.38	
SB-4	5/7/91	1117.77	58.48	1059.29	
SB-4	5/8/91	1117.77	58.69	1059.08	
SB-4	5/9/91	1117.77	58.78	1058.99	
SB-4	5/10/91	1117.77	58.99	1058.78	
SB-4	5/12/91	1117.77	59.20	1058.57	
SB-4	5/13/91	1117.77	59.31	1058.46	
SB-4	5/15/91	1117.77	59.58	1058.19	
SB-4	5/17/91	1117.77	59.81	1057.96	
SB-4	5/20/91	1117.77	59.75	1058.02	
SB-4	5/23/91	1117.77	60.44	1057.33	
SB-4	5/27/91	1117.77	60.78	1056.99	
SB-4	5/29/91	1117.77	60.89	1056.88	
SB-4	6/1/91	1117.77	61.17	1056.60	
SB-4	6/3/91	1117.77	61.37	1056.40	
SB-4	6/5/91	1117.77	61.46	1056.31	
SB-4	6/6/91	1117.77	61.59	1056.18	
SB-4	6/7/91	1117.77	61.64	1056.13	
SB-4	6/8/91	1117.77	61.70	1056.07	
SB-4	6/9/91	1117.77	61.83	1055.94	
SB-4	6/10/91	1117.77	61.89	1055.88	
SB-4	6/11/91	1117.77	62.97	1054.80	
SB-4	7/5/91	1117.77	63.43	1054.34	
SB-4	8/6/91	1117.77	65.07	1052.70	
SB-4	9/6/91	1117.77	66.30	1051.47	
SB-4	10/8/91	1117.77	67.07	1050.70	
SB-4	11/6/91	1117.77	67.36	1050.41	
SB-4	12/5/91	1117.77	66.54	1051.23	
SB-4	1/2/92	1117.77	66.04	1051.73	
SB-4	1/24/92	1117.77	61.77	1056.00	
SB-4	2/7/92	1117.77	56.90	1060.87	
SB-4	2/14/92	1117.77	55.02	1062.75	
SB-4	2/21/92	1117.77	52.38	1065.39	
SB-4	2/28/92	1117.77	50.68	1067.09	
SB-4	3/9/92	1117.77	47.88	1069.89	
SB-4	3/20/92	1117.77	44.67	1073.10	
SB-4	4/3/92	1117.77	41.81	1075.96	
SB-4	5/1/92	1117.77	38.43	1079.34	
SB-4	6/1/92	1117.77	35.61	1082.16	
SB-4	6/26/92	1117.77	36.42	1081.35	
SB-4	7/10/92	1117.77	39.09	1078.68	
SB-4	7/24/92	1117.77	44.13	1073.64	
SB-4	8/7/92	1117.77	40.17	1077.60	
SB-4	9/4/92	1117.77	37.30	1080.47	
SB-4	10/2/92	1117.77	39.16	1078.61	
SB-4	11/5/92	1117.77	44.18	1073.59	
SB-4	12/1/92	1117.77	47.37	1070.40	
SB-4	1/4/93	1117.77	45.37	1072.40	
SB-4	1/11/93	1117.77	40.05	1077.72	
SB-4	1/18/93	1117.77	36.28	1081.49	
SB-4	1/26/93	1117.77	34.00	1083.77	
SB-4	2/2/93	1117.77	33.58	1084.19	
SB-4	2/9/93	1117.77	33.00	1084.77	

Estes Landfill
Remedial Investigation
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-4	2/16/93	1117.77	32.09	1085.68	
SB-4	3/1/93	1117.77	30.72	1087.05	
SB-4	3/15/93	1117.77	30.64	1087.13	
SB-4	4/1/93	1117.77	30.12	1087.65	
SB-4	4/26/93	1117.77	30.68	1087.09	
SB-4	5/3/93	1117.77	30.35	1087.42	
SB-4	6/1/93	1117.77	30.72	1087.05	
SB-4	6/11/93	1117.77	31.17	1086.60	
SB-4	7/1/93	1117.77	32.69	1085.08	
SB-4	8/6/93	1117.77	37.24	1080.53	
SB-4	9/7/93	1117.77	38.60	1079.17	
SB-4	10/7/93	1117.77	40.98	1076.79	
SB-4	11/9/93	1117.77	42.78	1074.99	
SB-4	12/6/93	1117.77	40.44	1077.33	
SB-4	1/4/94	1117.77	41.83	1075.94	
SB-4	2/3/94	1117.77	44.83	1072.94	
SB-4	3/7/94	1117.77	46.96	1070.81	
SB-4	4/6/94	1117.77	47.65	1070.12	
SB-4	5/6/94	1117.77	49.05	1068.72	
SB-4	6/7/94	1117.77	50.42	1067.35	
SB-4	7/6/94	1117.77	51.88	1065.89	
SB-4	8/4/94	1117.77	53.08	1064.69	
SB-4	9/9/94	1117.77	53.71	1064.06	
SB-4	10/11/94	1117.77	54.04	1063.73	
SB-4	11/4/94	1117.77	54.78	1062.99	
SB-4	12/2/94	1117.77	54.90	1062.87	
SB-4	1/9/95	1117.77	52.12	1065.65	
SB-4	2/3/95	1117.77	49.47	1068.30	
SB-4	3/2/95	1117.77	43.90	1073.87	
SB-4	4/5/95	1117.77	38.61	1079.16	
SB-4	5/11/95	1117.77	38.91	1078.86	
SB-4	6/6/95	1117.77	42.07	1075.70	
SB-4	7/7/95	1117.77	45.17	1072.60	
SB-4	8/4/95	1117.77	47.23	1070.54	
SB-4	9/7/95	1117.77	46.20	1071.57	
SB-4	10/6/95	1117.77	46.88	1070.89	
SB-4	11/10/95	1117.77	45.54	1072.23	
SB-4	12/9/95	1117.77	47.06	1070.71	
SB-4	1/11/96	1117.77	49.14	1068.63	
SB-4	2/10/96	1117.77	50.07	1067.70	
SB-4	3/8/96	1117.77	50.61	1067.16	
SB-4	4/5/96	1117.77	51.22	1066.55	
SB-4	5/7/96	1117.77	51.79	1065.98	
SB-4	6/5/96	1117.77	52.45	1065.32	
SB-4	7/8/96	1117.77	52.72	1065.05	
SB-4	8/2/96	1117.77	52.41	1065.36	Bailed vault
SB-4	9/9/96	1117.77	52.81	1064.96	
SB-4	10/4/96	1117.77	53.47	1064.30	
SB-4	11/1/96	1117.77	54.45	1063.32	
SB-4	12/5/96	1117.77	55.74	1062.03	
SB-4	4/7/97	1117.77	59.41	1058.36	
SB-4	6/2/97	1117.77	61.09	1056.68	
SB-4	9/10/97	1117.77	62.13	1055.64	
SB-4	12/11/97	1117.77	64.02	1053.75	
SB-4	3/13/98	1117.77	59.45	1058.32	
SB-4	6/23/98	1117.77	57.22	1060.55	
SB-4	9/22/98	1117.77	57.94	1059.83	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-5	2/4/91	1115.15	71.65	1043.50	Measured from well seal
SB-5	3/4/91	1115.15	72.35	1042.80	
SB-5	3/27/91	1115.15	70.75	1044.40	
SB-5	4/4/91	1115.15	69.32	1045.83	
SB-5	4/22/91	1115.15	65.16	1049.99	
SB-5	6/3/91	1115.15	66.38	1048.77	
SB-5	7/5/91	1115.15	68.04	1047.11	
SB-5	8/6/91	1115.15	69.50	1045.65	
SB-5	9/6/91	1115.15	70.62	1044.53	
SB-5	10/8/91	1115.15	71.25	1043.90	
SB-5	11/6/91	1115.15	71.82	1043.33	
SB-5	12/5/91	1115.15	71.73	1043.42	
SB-5	1/2/92	1115.15	70.89	1044.26	
SB-5	1/24/92	1115.15	67.62	1047.53	
SB-5	2/7/92	1115.15	63.82	1051.33	
SB-5	2/14/92	1115.15	62.07	1053.08	
SB-5	2/21/92	1115.15	59.77	1055.38	
SB-5	2/28/92	1115.15	57.96	1057.19	
SB-5	3/9/92	1115.15	55.18	1059.97	
SB-5	3/20/92	1115.15	52.00	1063.15	
SB-5	4/3/92	1115.15	49.89	1065.26	
SB-5	5/1/92	1115.15	44.94	1070.21	
SB-5	6/1/92	1115.15	41.83	1073.32	
SB-5	6/26/92	1115.15	42.09	1073.06	
SB-5	7/10/92	1115.15	43.91	1071.24	
SB-5	7/24/92	1115.15	45.42	1069.73	
SB-5	8/7/92	1115.15	44.99	1070.16	
SB-5	9/4/92	1115.15	43.55	1071.60	
SB-5	10/2/92	1115.15	44.33	1070.82	
SB-5	11/5/92	1115.15	48.56	1066.59	
SB-5	12/1/92	1115.15	52.09	1063.06	
SB-5	1/4/93	1115.15	51.18	1063.97	
SB-5	1/11/93	1115.15	47.78	1067.37	
SB-5	1/18/93	1115.15	43.90	1071.25	
SB-5	1/26/93	1115.15	40.98	1074.17	
SB-5	2/2/93	1115.15	39.68	1075.47	
SB-5	2/9/93	1115.15	39.26	1075.89	
SB-5	2/16/93	1115.15	38.25	1076.90	
SB-5	3/1/93	1115.15	36.41	1078.74	
SB-5	3/15/93	1115.15	35.93	1079.22	
SB-5	4/1/93	1115.15	35.42	1079.73	
SB-5	4/26/93	1115.15	35.97	1079.18	
SB-5	5/3/93	1115.15	35.87	1079.28	
SB-5	6/1/93	1115.15	36.09	1079.06	
SB-5	6/11/93	1115.15	36.72	1078.43	
SB-5	7/1/93	1115.15	38.62	1076.53	
SB-5	8/6/93	1115.15	42.49	1072.66	
SB-5	9/7/93	1115.15	43.89	1071.26	
SB-5	10/7/93	1115.15	46.72	1068.43	
SB-5	11/9/93	1115.15	48.21	1066.94	
SB-5	12/6/93	1115.15	46.85	1068.30	
SB-5	1/4/94	1115.15	48.25	1066.90	
SB-5	2/3/94	1115.15	50.35	1064.80	
SB-5	3/7/94	1115.15	51.82	1063.33	
SB-5	4/6/94	1115.15	52.54	1062.61	
SB-5	5/6/94	1115.15	53.78	1061.37	
SB-5	6/7/94	1115.15	55.28	1059.87	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-5	7/6/94	1115.15	56.64	1058.51	
SB-5	8/4/94	1115.15	57.80	1057.35	
SB-5	9/9/94	1115.15	58.47	1056.68	
SB-5	10/11/94	1115.15	58.79	1056.36	
SB-5	11/4/94	1115.15	59.02	1056.13	
SB-5	12/2/94	1115.15	59.23	1055.92	
SB-5	1/9/95	1115.15	57.25	1057.90	
SB-5	2/3/95	1115.15	54.96	1060.19	
SB-5	3/2/95	1115.15	50.47	1064.68	
SB-5	4/5/95	1115.15	44.48	1070.67	
SB-5	5/11/95	1115.15	ND		Could not locate well
SB-5	6/6/95	1115.15	ND		Could not locate well
SB-5	7/7/95	1115.15	49.42	1065.73	
SB-5	8/4/95	1115.15	51.52	1063.63	
SB-5	9/7/95	1115.15	50.79	1064.36	
SB-5	10/6/95	1115.15	48.30	1066.85	
SB-5	11/10/95	1115.15	50.83	1064.32	
SB-5	12/9/95	1115.15	51.94	1063.21	
SB-5	1/11/96	1115.15	53.68	1061.47	Area cleared of trash
SB-5	2/10/96	1115.15	54.47	1060.68	
SB-5	3/8/96	1115.15	54.77	1060.38	
SB-5	4/5/96	1115.15	54.93	1060.22	
SB-5	5/7/96	1115.15	55.02	1060.13	
SB-5	6/5/96	1115.15	55.41	1059.74	
SB-5	7/8/96	1115.15	55.25	1059.90	
SB-5	8/2/96	1115.15	55.18	1059.97	
SB-5	9/9/96	1115.15	55.48	1059.67	
SB-5	10/4/96	1115.15	56.40	1058.75	
SB-5	11/1/96	1115.15	57.76	1057.39	
SB-5	12/5/96	1115.15	59.37	1055.78	
SB-5	4/7/97	1115.15	63.43	1051.72	
SB-5	6/2/97	1115.15	65.33	1049.82	
SB-5	9/10/97	1115.15	65.64	1049.51	
SB-5	12/11/97	1115.15	68.72	1046.43	
SB-5	3/13/98	1115.15	65.55	1049.60	
SB-6	2/4/91	1117.92	70.64	1047.28	Measured from well seal
SB-6	3/4/91	1117.92	71.45	1046.47	
SB-6	3/27/91	1117.92	69.29	1048.63	
SB-6	4/4/91	1117.92	67.51	1050.41	
SB-6	4/22/91	1117.92	62.30	1055.62	
SB-6	6/3/91	1117.92	64.80	1053.12	
SB-6	7/5/91	1117.92	66.78	1051.14	
SB-6	8/6/91	1117.92	68.33	1049.59	
SB-6	9/6/91	1117.92	69.58	1048.34	
SB-6	10/8/91	1117.92	70.34	1047.58	
SB-6	11/7/91	1117.92	70.85	1047.07	
SB-6	12/5/91	1117.92	70.36	1047.56	Construction in progress, well buried.
SB-6	1/2/92	1117.92	69.74	1048.18	
SB-6	1/24/92	1117.92	65.88	1052.04	
SB-6	2/7/92	1117.92	61.42	1056.50	
SB-6	2/14/92	1117.92	59.39	1058.53	
SB-6	2/21/92	1117.92	56.99	1060.93	
SB-6	2/28/92	1117.92	57.17	1060.75	
SB-6	3/9/92	1117.92	52.41	1065.51	
SB-6	3/20/92	1117.92	49.22	1068.70	
SB-6	4/3/92	1117.92	46.09	1071.83	
SB-6	5/1/92	1117.92	42.38	1075.54	

Estes Landfill
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ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-6	6/1/92	1117.92	39.44	1078.48	
SB-6	6/26/92	1117.92	40.01	1077.91	
SB-6	7/10/92	1117.92	42.27	1075.65	
SB-6	7/24/92	1117.92	41.14	1076.78	
SB-6	8/7/92	1117.92	ND		No two readings close w/tape & sounder
SB-6	9/4/92	1117.92	40.12	1077.80	
SB-6	10/2/92	1117.92	42.44	1075.48	
SB-6	11/5/92	1117.92	47.22	1070.70	
SB-6	12/1/92	1117.92	50.59	1067.33	
SB-6	1/4/93	1117.92	49.09	1068.83	
SB-6	1/11/93	1117.92	44.80	1073.12	
SB-6	1/18/93	1117.92	40.89	1077.03	
SB-6	1/26/93	1117.92	38.26	1079.66	
SB-6	2/2/93	1117.92	37.54	1080.38	
SB-6	2/9/93	1117.92	36.83	1081.09	
SB-6	2/16/93	1117.92	35.88	1082.04	
SB-6	3/1/93	1117.92	34.26	1083.66	
SB-6	3/15/93	1117.92	33.95	1083.97	
SB-6	4/1/93	1117.92	33.45	1084.47	
SB-6	4/26/93	1117.92	33.99	1083.93	
SB-6	5/3/93	1117.92	33.82	1084.10	
SB-6	6/1/93	1117.92	34.11	1083.81	
SB-6	6/11/93	1117.92	34.66	1083.26	
SB-6	7/1/93	1117.92	36.43	1081.49	
SB-6	8/6/93	1117.92	40.77	1077.15	
SB-6	9/7/93	1117.92	42.66	1075.26	
SB-6	10/7/93	1117.92	44.90	1073.02	
SB-6	11/9/93	1117.92	46.40	1071.52	
SB-6	12/6/93	1117.92	44.62	1073.30	
SB-6	1/4/94	1117.92	45.98	1071.94	
SB-6	2/3/94	1117.92	48.52	1069.40	
SB-6	3/7/94	1117.92	50.25	1067.67	
SB-6	4/6/94	1117.92	51.11	1066.81	
SB-6	5/6/94	1117.92	52.36	1065.56	
SB-6	6/7/94	1117.92	53.78	1064.14	
SB-6	7/6/94	1117.92	55.15	1062.77	
SB-6	8/4/94	1117.92	56.37	1061.55	
SB-6	9/9/94	1117.92	57.09	1060.83	
SB-6	10/11/94	1117.92	57.52	1060.40	
SB-6	11/4/94	1117.92	57.90	1060.02	
SB-6	12/2/94	1117.92	58.30	1059.62	
SB-6	1/9/95	1117.92	55.75	1062.17	
SB-6	2/3/95	1117.92	53.14	1064.78	
SB-6	3/2/95	1117.92	47.93	1069.99	
SB-6	4/5/95	1117.92	42.32	1075.60	
SB-6	5/11/95	1117.92	42.50	1075.42	
SB-6	6/6/95	1117.92	45.23	1072.69	
SB-6	7/7/95	1117.92	48.23	1069.69	
SB-6	8/4/95	1117.92	50.32	1067.60	
SB-6	9/7/95	1117.92	49.49	1068.43	
SB-6	10/6/95	1117.92	48.81	1069.11	
SB-6	11/10/95	1117.92	49.08	1068.84	
SB-6	12/9/95	1117.92	50.51	1067.41	
SB-6	1/11/96	1117.92	52.40	1065.52	
SB-6	2/10/96	1117.92	53.28	1064.64	Bolts for vault difficult to tighten
SB-6	3/8/96	1117.92	53.72	1064.20	
SB-6	4/5/96	1117.92	54.08	1063.84	

Estes Landfill
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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-6	5/7/96	1117.92	54.36	1063.56	
SB-6	6/5/96	1117.92	54.94	1062.98	
SB-6	7/8/96	1117.92	55.02	1062.90	
SB-6	8/2/96	1117.92	54.83	1063.09	
SB-6	9/9/96	1117.92	55.24	1062.68	
SB-6	10/4/96	1117.92	55.95	1061.97	
SB-6	11/1/96	1117.92	57.19	1060.73	
SB-6	12/5/96	1117.92	58.46	1059.46	
SB-6	4/7/97	1117.92	62.32	1055.60	
SB-6	6/2/97	1117.92	64.11	1053.81	
SB-6	9/10/97	1117.92	64.95	1052.97	
SB-6	12/11/97	1117.92	67.42	1050.50	
SB-6	3/13/98	1117.92	63.31	1054.61	
SB-6	9/22/98	1117.92	61.43	1056.49	
SB-7	2/4/91	1111.74	67.37	1044.37	Measured from well seal.
SB-7	3/4/91	1111.74	70.05	1041.69	
SB-7	3/27/91	1111.74	66.30	1045.44	
SB-7	4/4/91	1111.74	64.70	1047.04	
SB-7	4/22/91	1111.74	60.21	1051.53	
SB-7	6/3/91	1111.74	61.90	1049.84	
SB-7	7/5/91	1111.74	63.70	1048.04	
SB-7	8/6/91	1111.74	65.23	1046.51	
SB-7	9/6/91	1111.74	66.37	1045.37	
SB-7	10/8/91	1111.74	67.04	1044.70	
SB-7	11/6/91	1111.74	67.57	1044.17	
SB-7	12/5/91	1111.74	67.39	1044.35	
SB-7	1/2/92	1111.74	66.59	1045.15	
SB-7	1/24/92	1111.74	62.92	1048.82	
SB-7	2/7/92	1111.74	58.91	1052.83	
SB-7	2/14/92	1111.74	56.97	1054.77	
SB-7	2/21/92	1111.74	54.54	1057.20	
SB-7	2/28/92	1111.74	52.68	1059.06	
SB-7	3/9/92	1111.74	49.74	1062.00	
SB-7	3/20/92	1111.74	46.54	1065.20	
SB-7	4/3/92	1111.74	43.31	1068.43	
SB-7	5/1/92	1111.74	39.31	1072.43	
SB-7	6/1/92	1111.74	36.29	1075.45	
SB-7	6/26/92	1111.74	36.82	1074.92	
SB-7	7/10/92	1111.74	38.96	1072.78	
SB-7	7/24/92	1111.74	40.67	1071.07	
SB-7	8/7/92	1111.74	40.24	1071.50	
SB-7	9/4/92	1111.74	38.49	1073.25	
SB-7	10/2/92	1111.74	39.39	1072.35	
SB-7	11/5/92	1111.74	44.12	1067.62	
SB-7	12/1/92	1111.74	47.70	1064.04	
SB-7	1/4/93	1111.74	46.37	1065.37	
SB-7	1/11/93	1111.74	42.60	1069.14	
SB-7	1/18/93	1111.74	38.49	1073.25	
SB-7	1/26/93	1111.74	35.39	1076.35	
SB-7	2/2/93	1111.74	34.53	1077.21	
SB-7	2/9/93	1111.74	33.71	1078.03	
SB-7	2/16/93	1111.74	32.66	1079.08	
SB-7	3/1/93	1111.74	30.69	1081.05	
SB-7	3/15/93	1111.74	30.42	1081.32	
SB-7	4/1/93	1111.74	30.01	1081.73	
SB-7	4/26/93	1111.74	30.81	1080.93	
SB-7	5/3/93	1111.74	30.70	1081.04	

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Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
SB-7	6/1/93	1111.74	30.99	1080.75	
SB-7	6/11/93	1111.74	31.73	1080.01	
SB-7	7/1/93	1111.74	33.82	1077.92	
SB-7	8/6/93	1111.74	38.09	1073.65	
SB-7	9/7/93	1111.74	40.50	1071.24	
SB-7	10/7/93	1111.74	42.45	1069.29	
SB-7	11/9/93	1111.74	43.86	1067.88	
SB-7	12/6/93	1111.74	42.36	1069.38	
SB-7	1/4/94	1111.74	43.77	1067.97	
SB-7	2/3/94	1111.74	45.99	1065.75	
SB-7	3/7/94	1111.74	47.50	1064.24	
SB-7	4/6/94	1111.74	48.3	1063.44	
SB-7	5/6/94	1111.74	49.56	1062.18	
SB-7	6/7/94	1111.74	51.05	1060.69	
SB-7	7/6/94	1111.74	52.45	1059.29	
SB-7	8/4/94	1111.74	53.59	1058.15	
SB-7	9/9/94	1111.74	54.32	1057.42	
SB-7	10/11/94	1111.74	54.70	1057.04	
SB-7	11/4/94	1111.74	54.93	1056.81	
SB-7	12/2/94	1111.74	55.03	1056.71	
SB-7	1/9/95	1111.74	52.89	1058.85	
SB-7	2/3/95	1111.74	50.45	1061.29	
SB-7	3/2/95	1111.74	45.51	1066.23	
SB-7	4/5/95	1111.74	39.28	1072.46	
SB-7	5/11/95	1111.74	39.54	1072.20	
SB-7	6/6/95	1111.74	42.04	1069.70	
SB-7	7/7/95	1111.74	45.11	1066.63	
SB-7	8/4/95	1111.74	47.37	1064.37	
SB-7	9/7/95	1111.74	46.48	1065.26	
SB-7	10/6/95	1111.74	45.84	1065.90	
SB-7	11/10/95	1111.74	46.28	1065.46	
SB-7	12/9/95	1111.74	47.63	1064.11	
SB-7	1/11/96	1111.74	49.42	1062.32	
SB-7	2/10/96	1111.74	50.24	1061.50	
SB-7	3/8/96	1111.74	50.51	1061.23	New parking area completed to south
SB-7	4/5/96	1111.74	50.69	1061.05	
SB-7	5/7/96	1111.74	50.79	1060.95	
SB-7	6/5/96	1111.74	51.17	1060.57	
SB-7	7/8/96	1111.74	50.98	1060.76	
SB-7	8/2/96	1111.74	50.56	1061.18	
SB-7	9/9/96	1111.74	50.41	1061.33	
SB-7	10/4/96	1111.74	49.76	1061.98	
SB-7	11/1/96	1111.74	49.52	1062.22	
SB-7	12/5/96	1111.74	49.13	1062.61	Buried under pile of rubble
SB-7	4/7/97	1111.74	49.40	1062.34	approx. 0.3 foot water column
SB-7	6/2/97	1111.74	ND		Well is obstructed (@ 49.60 feet)
SB-7	9/10/97	1111.74	ND		Well is obstructed (@ 49.60 feet)
SB-7	9/10/97	1111.74	ND		Well is obstructed (@ 49.60 feet)
SB-7	3/13/98	1111.74	48.30	1063.44	
TW-1	12/6/90	1119.52	68.55	1050.97	No product/odor. Measured TOC.
TW-1	3/4/91	1119.52	70.99	1048.53	
TW-1	3/12/91	1119.52	69.04	1050.48	
TW-1	9/6/91	1119.52	ND		Covered with dirt.
TW-1	10/8/91	1119.52	71.10	1048.42	
TW-1	12/5/91	1119.52	69.30	1050.22	
TW-1	1/2/92	1119.52	68.85	1050.67	
TW-1	1/24/92	1119.52	ND		No access.

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TW-1	2/28/92	1119.52	51.45	1068.07	
TW-1	3/9/92	1119.52	49.63	1069.89	
TW-1	3/20/92	1119.52	45.40	1074.12	
TW-1	4/3/92	1119.52	42.52	1077.00	
TW-1	5/1/92	1119.52	39.44	1080.08	
TW-1	6/1/92	1119.52	36.64	1082.88	Has no cap.
TW-1	6/26/92	1119.52	38.09	1081.43	
TW-1	7/10/92	1119.52	41.44	1078.08	
TW-1	7/24/92	1119.52	ND		No access, gates locked.
TW-1	8/7/92	1119.52	ND		No access, gates locked.
TW-1	9/4/92	1119.52	ND		No access, gates locked.
TW-1	10/2/92	1119.52	41.63	1077.89	
TW-1	11/5/92	1119.52	47.14	1072.38	
TW-1	12/1/92	1119.52	50.46	1069.06	
TW-1	1/4/93	1119.52	47.61	1071.91	
TW-1	1/11/93	1119.52	41.11	1078.41	
TW-1	1/18/93	1119.52	ND		No access, surrounded by water.
TW-1	1/26/93	1119.52	34.99	1084.53	
TW-1	2/2/93	1119.52	34.91	1084.61	
TW-1	2/9/93	1119.52	34.43	1085.09	
TW-1	2/16/93	1119.52	33.49	1086.03	
TW-1	3/1/93	1119.52	32.20	1087.32	
TW-1	3/15/93	1119.52	32.52	1087.00	
TW-1	4/1/93	1119.52	30.00	1089.52	
TW-1	4/26/93	1119.52	32.93	1086.59	
TW-1	5/3/93	1119.52	32.53	1086.99	
TW-1	6/1/93	1119.52	ND		
TW-1	6/11/93	1119.52	33.51	1086.01	
TW-1	7/1/93	1119.52	35.09	1084.43	
TW-1	8/6/93	1119.52	40.32	1079.20	
TW-1	9/7/93	1119.52	41.17	1078.35	
TW-1	10/7/93	1119.52	43.98	1075.54	
TW-1	11/9/93	1119.52	45.90	1073.62	
TW-1	12/6/93	1119.52	43.04	1076.48	
TW-1	1/4/94	1119.52	44.66	1074.86	
TW-1	2/3/94	1119.52	48.14	1071.38	
TW-1	3/7/94	1119.52	50.09	1069.43	
TW-1	4/6/94	1119.52	50.97	1068.55	
TW-1	5/6/94	1119.52	52.31	1067.21	
TW-1	6/7/94	1119.52	53.68	1065.84	
TW-1	7/6/94	1119.52	55.11	1064.41	
TW-1	8/4/94	1119.52	56.30	1063.22	
TW-1	9/9/94	1119.52	56.71	1062.81	
TW-1	10/11/94	1119.52	57.52	1062.00	
TW-1	11/4/94	1119.52	57.95	1061.57	
TW-1	12/2/94	1119.52	58.02	1061.50	
TW-1	1/9/95	1119.52	54.53	1064.99	
TW-1	2/3/95	1119.52	51.68	1067.84	
TW-1	3/2/95	1119.52	45.45	1074.07	
TW-1	4/5/95	1119.52	40.24	1079.28	
TW-1	5/11/95	1119.52	41.12	1078.40	
TW-1	6/6/95	1119.52	45.00	1074.52	
TW-1	7/7/95	1119.52	48.20	1071.32	
TW-1	8/4/95	1119.52	50.43	1069.09	
TW-1	9/7/95	1119.52	49.08	1070.44	
TW-1	10/6/95	1119.52	47.95	1071.57	
TW-1	11/10/95	1119.52	48.05	1071.47	

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TW-1	12/9/95	1119.52	50.21	1069.31	
TW-1	1/11/96	1119.52	52.35	1067.17	
TW-1	2/10/96	1119.52	53.15	1066.37	
TW-1	3/8/96	1119.52	53.75	1065.77	
TW-1	4/5/96	1119.52	54.42	1065.10	
TW-1	5/7/96	1119.52	54.95	1064.57	
TW-1	6/5/96	1119.52	55.59	1063.93	
TW-1	7/8/96	1119.52	55.88	1063.64	
TW-1	8/2/96	1119.52	55.44	1064.08	
TW-1	9/9/96	1119.52	55.84	1063.68	
TW-1	10/4/96	1119.52	56.54	1062.98	
TW-1	11/1/96	1119.52	57.73	1061.79	
TW-1	12/5/96	1119.52	ND		Not measured
TW-1	4/7/97	1119.52	ND		Destroyed
TW-2	12/7/90	1119.52	68.75	1050.77	No product/odor. Measured TOC
TW-2	3/12/91	1119.52	ND		Well destroyed 1/91
TW-3	12/7/90	1120.56	70.25	1050.31	No product/odor. Measured TOC.
TW-3	3/12/91	1120.56	67.40	1053.16	
TW-3	6/3/91	1120.56	65.05	1055.51	
TW-3	7/5/91	1120.56	67.87	1052.69	
TW-3	9/6/91	1120.56	72.08	1048.48	
TW-3	10/8/91	1120.56	71.97	1048.59	
TW-3	12/5/91	1120.56	69.89	1050.67	
TW-3	1/2/92	1120.56	69.81	1050.75	
TW-3	1/24/92	1120.56	60.66	1059.90	
TW-3	2/7/92	1120.56	ND		Could not find, broken PVC in area.
TW-3	3/20/92	1120.56	38.89	1081.67	
TW-3	4/3/92	1120.56	36.66	1083.90	
TW-3	5/1/92	1120.56	34.96	1085.60	
TW-3	6/1/92	1120.56	34.68	1085.88	
TW-3	6/26/92	1120.56	35.44	1085.12	
TW-3	7/10/92	1120.56	40.36	1080.20	
TW-3	7/24/92	1120.56	ND		No access, gates locked.
TW-3	8/7/92	1120.56	ND		No access, gates locked.
TW-3	9/4/92	1120.56	ND		No access, gates locked.
TW-3	10/2/92	1120.56	40.39	1080.17	
TW-3	11/5/92	1120.56	46.87	1073.69	
TW-3	12/1/92	1120.56	50.02	1070.54	
TW-3	1/4/93	1120.56	45.96	1074.60	
TW-3	1/11/93	1120.56	34.74	1085.82	
TW-3	1/18/93	1120.56	31.37	1089.19	
TW-3	1/26/93	1120.56	30.52	1090.04	
TW-3	2/2/93	1120.56	31.33	1089.23	
TW-3	2/9/93	1120.56	31.05	1089.51	
TW-3	2/16/93	1120.56	30.26	1090.30	
TW-3	3/1/93	1120.56	29.12	1091.44	
TW-3	3/15/93	1120.56	30.21	1090.35	
TW-3	4/1/93	1120.56	29.91	1090.65	
TW-3	4/26/93	1120.56	31.37	1089.19	
TW-3	5/3/93	1120.56	30.71	1089.85	
TW-3	6/1/93	1120.56	ND		
TW-3	6/11/93	1120.56	31.94	1088.62	
TW-3	7/1/93	1120.56	33.13	1087.43	
TW-3	8/6/93	1120.56	40.09	1080.47	
TW-3	9/7/93	1120.56	38.74	1081.82	
TW-3	10/7/93	1120.56	43.34	1077.22	
TW-3	11/9/93	1120.56	45.50	1075.06	

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
TW-3	12/6/93	1120.56	41.04	1079.52	
TW-3	1/4/94	1120.56	43.61	1076.95	
TW-3	2/3/94	1120.56	48.10	1072.46	
TW-3	3/7/94	1120.56	50.15	1070.41	
TW-3	4/6/94	1120.56	50.75	1069.81	
TW-3	5/6/94	1120.56	52.22	1068.34	
TW-3	6/7/94	1120.56	53.70	1066.86	
TW-3	7/6/94	1120.56	55.27	1065.29	
TW-3	8/4/94	1120.56	56.40	1064.16	
TW-3	9/9/94	1120.56	56.25	1064.31	
TW-3	10/11/94	1120.56	57.64	1062.92	
TW-3	11/4/94	1120.56	58.07	1062.49	
TW-3	12/2/94	1120.56	58.14	1062.42	
TW-3	1/9/95	1120.56	53.03	1067.53	
TW-3	2/3/95	1120.56	49.77	1070.79	
TW-3	3/2/95	1120.56	40.65	1079.91	
TW-3	4/5/95	1120.56	36.57	1083.99	
TW-3	5/11/95	1120.56	38.29	1082.27	
TW-3	6/6/95	1120.56	44.80	1075.76	
TW-3	7/7/95	1120.56	48.16	1072.40	
TW-3	8/4/95	1120.56	50.46	1070.10	
TW-3	9/7/95	1120.56	48.80	1071.76	
TW-3	10/6/95	1120.56	46.90	1073.66	
TW-3	11/10/95	1120.56	46.89	1073.67	
TW-3	12/9/95	1120.56	49.82	1070.74	
TW-3	1/11/96	1120.56	52.74	1067.82	
TW-3	2/10/96	1120.56	53.39	1067.17	
TW-3	3/8/96	1120.56	54.10	1066.46	
TW-3	4/5/96	1120.56	55.02	1065.54	
TW-3	5/7/96	1120.56	55.73	1064.83	
TW-3	6/5/96	1120.56	56.44	1064.12	
TW-3	7/8/96	1120.56	56.90	1063.66	
TW-3	8/2/96	1120.56	56.13	1064.43	
TW-3	9/9/96	1120.56	ND		Covered with dirt
TW-3	10/4/96	1120.56	ND		Not found, buried under asphalt?
TW-3	4/7/97	1120.56	ND		Destroyed
TW-4	12/7/90	1118.52	68.19	1050.33	No product/odor. Measured TOC.
TW-4	3/12/91	1118.52	ND		Cascading water at 40' depth.
TW-4	3/27/91	1118.52	ND		Buried again.
TW-4	4/4/91	1118.52	50+		Cascading water at 40' depth.
TW-4	6/3/91	1118.52	63.16	1055.36	No sound of cascading water.
TW-4	7/5/91	1118.52	65.46	1053.06	
TW-4	9/6/91	1118.52	69.08	1049.44	
TW-4	10/8/91	1118.52	70.03	1048.49	
TW-4	1/2/92	1118.52	64.84	1053.68	
TW-4	1/24/92	1118.52	40.71	1077.81	Boiling sound from well.
TW-4	2/7/92	1118.52	40.80	1077.72	
TW-4	2/28/92	1118.52	41.21	1077.31	
TW-4	3/9/92	1118.52	38.34	1080.18	
TW-4	3/20/92	1118.52	36.50	1082.02	
TW-4	4/3/92	1118.52	34.25	1084.27	
TW-4	5/1/92	1118.52	32.59	1085.93	
TW-4	6/1/92	1118.52	30.11	1088.41	
TW-4	6/26/92	1118.52	34.40	1084.12	
TW-4	7/10/92	1118.52	39.35	1079.17	
TW-4	7/24/92	1118.52	ND		No access, gates locked.
TW-4	8/7/92	1118.52	ND		No access, gates locked.

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TW-4	9/4/92	1118.52	ND		No access, gates locked.
TW-4	10/2/92	1118.52	39.21	1079.31	
TW-4	11/5/92	1118.52	46.88	1071.64	
TW-4	12/1/92	1118.52	50.50	1068.02	
TW-4	1/4/93	1118.52	40.71	1077.81	
TW-4	1/11/93	1118.52	ND		No access, surrounded by water.
TW-4	1/18/93	1118.52	36.98	1081.54	
TW-4	1/26/93	1118.52	28.61	1089.91	
TW-4	2/2/93	1118.52	29.67	1088.85	
TW-4	2/9/93	1118.52	ND		No access, well under water.
TW-4	2/16/93	1118.52	28.22	1090.30	
TW-4	3/1/93	1118.52	27.29	1091.23	
TW-4	3/15/93	1118.52	26.28	1092.24	
TW-4	4/1/93	1118.52	28.03	1090.49	
TW-4	4/26/93	1118.52	ND		Well buried.
TW-4	5/3/93	1118.52	28.51	1090.01	
TW-4	6/1/93	1118.52	ND		
TW-4	6/11/93	1118.52	29.76	1088.76	
TW-4	7/1/93	1118.52	30.98	1087.54	
TW-4	8/6/93	1118.52	37.04	1081.48	
TW-4	9/7/93	1118.52	33.09	1085.43	
TW-4	10/7/93	1118.52	38.58	1079.94	
TW-4	11/9/93	1118.52	42.89	1075.63	
TW-4	12/6/93	1118.52	ND		Unable to locate well, buried.
TW-4	1/4/94	1118.52	38.11	1080.41	
TW-4	2/3/94	1118.52	47.37	1071.15	
TW-4	3/7/94	1118.52	49.70	1068.82	
TW-4	4/6/94	1118.52	50.13	1068.39	
TW-4	5/6/94	1118.52	51.94	1066.58	
TW-4	6/7/94	1118.52	53.21	1065.31	
TW-4	7/6/94	1118.52	54.91	1063.61	
TW-4	8/4/94	1118.52	56.18	1062.34	
TW-4	9/9/94	1118.52	55.11	1063.41	
TW-4	10/11/94	1118.52	57.40	1061.12	
TW-4	11/4/94	1118.52	57.78	1060.74	
TW-4	12/2/94	1118.52	57.91	1060.61	
TW-4	1/9/95	1118.52	48.66	1069.86	
TW-4	2/3/95	1118.52	ND		Well cannot be located
TW-4	3/2/95	1118.52	36.81	1081.71	
TW-4	4/5/95	1118.52	33.69	1084.83	
TW-4	5/11/95	1118.52	35.34	1083.18	
TW-4	6/6/95	1118.52	40.56	1077.96	
TW-4	7/7/95	1118.52	48.07	1070.45	
TW-4	8/4/95	1118.52	50.50	1068.02	
TW-4	9/7/95	1118.52	48.52	1070.00	
TW-4	10/6/95	1118.52	40.45	1078.07	
TW-4	11/10/95	1118.52	42.35	1076.17	Cascading water, reading approximate
TW-4	12/9/95	1118.52	49.78	1068.74	
TW-4	1/11/96	1118.52	52.18	1066.34	
TW-4	2/10/96	1118.52	52.66	1065.86	
TW-4	3/8/96	1118.52	53.39	1065.13	
TW-4	4/5/96	1118.52	54.34	1064.18	
TW-4	5/7/96	1118.52	55.08	1063.44	
TW-4	6/5/96	1118.52	55.83	1062.69	
TW-4	7/8/96	1118.52	56.22	1062.30	
TW-4	8/2/96	1118.52	55.16	1063.36	
TW-4	9/9/96	1118.52	ND		Demolished, PVC laying 50 feet northea

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
TW-4	10/4/96	1118.52	ND		Abandoned
TW-4	4/7/97	1118.52	ND		Destroyed
TW-5	12/6/93	1115.63	39.89	1075.74	
TW-5	1/4/94	1115.63	41.84	1073.79	
TW-5	2/3/94	1115.63	45.99	1069.64	
TW-5	3/7/94	1115.63	47.96	1067.67	
TW-5	4/6/94	1115.63	48.68	1066.95	
TW-5	5/6/94	1115.63	50.21	1065.42	
TW-5	6/7/94	1115.63	51.57	1064.06	
TW-5	7/6/94	1115.63	53.16	1062.47	
TW-5	8/4/94	1115.63	54.34	1061.29	
TW-5	9/9/94	1115.63	54.34	1061.29	
TW-5	10/11/94	1115.63	55.61	1060.02	
TW-5	11/4/94	1115.63	55.94	1059.69	
TW-5	12/2/94	1115.63	56.08	1059.55	
TW-5	1/9/95	1115.63	51.15	1064.48	
TW-5	2/3/95	1115.63	48.03	1067.60	
TW-5	3/2/95	1115.63	40.24	1075.39	
TW-5	4/5/95	1115.63	35.50	1080.13	
TW-5	5/11/95	1115.63	37.51	1078.12	
TW-5	6/6/95	1115.63	42.57	1073.06	
TW-5	7/7/95	1115.63	45.98	1069.65	
TW-5	8/4/95	1115.63	48.33	1067.30	
TW-5	9/7/95	1115.63	46.67	1068.96	
TW-5	10/6/95	1115.63	ND		Well grouted and abandoned
TW-P	3/4/91	0.00	74.21	-74.21	Not pumping
TW-P	4/22/91	0.00	68.37	-68.37	
TW-P	9/6/91	0.00	71.80	-71.80	
TW-P	10/8/91	0.00	83.91	-83.91	Pump was running
TW-P	12/5/91	0.00	71.10	-71.10	Well off
TW-P	1/2/92	0.00	70.98	-70.98	Well off
TW-P	1/24/92	0.00	63.07	-63.07	
TW-P	2/7/92	0.00	58.65	-58.65	
TW-P	2/28/92	0.00	51.49		Tape covered with oil at water line
TW-P	3/20/92	0.00	ND		Oil present on water surface.
TW-P	4/3/92	0.00	ND		Oil present on water surface.
TW-P	5/1/92	0.00	ND		Oil present on water surface.
TW-P	6/1/92	0.00	ND		Oil present on water surface.
TW-P	6/26/92	0.00	ND		Oil present on water surface.
TW-P	7/10/92	0.00	ND		Oil present on water surface.
TW-P	1/26/93	0.00	ND		Oil present on water surface.
TW-P	2/2/93	0.00	ND		Oil present on water surface.
TW-P	2/9/93	0.00	ND		Oil present on water surface.
TW-P	2/16/93	0.00	ND		Oil present on water surface.
TW-P	3/1/93	0.00	ND		Oil present on water surface.
TW-P	4/26/93	0.00	ND		Oil present on water surface.
TW-P	5/3/93	0.00	ND		Oil present on water surface.
TW-USGS	1/11/56	1131.50	36.71	1094.79	Data from USGS
TW-USGS	2/5/57	1131.50	42.13	1089.37	Data from USGS
TW-USGS	1/13/58	1131.50	44.70	1086.80	Data from USGS
TW-USGS	1/9/59	1131.50	42.77	1088.73	Data from USGS
TW-USGS	2/3/60	1131.50	43.90	1087.60	Data from USGS
TW-USGS	2/28/61	1131.50	43.18	1088.32	Data from USGS
TW-USGS	1/31/62	1131.50	52.39	1079.11	Data from USGS
TW-USGS	2/1/63	1131.50	50.70	1080.80	Data from USGS
TW-USGS	2/3/64	1131.50	48.32	1083.18	Data from USGS
TW-USGS	1/11/65	1131.50	51.71	1079.79	Data from USGS

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
TW-USGS	1/11/66	1131.50	37.87	1093.63	Data from USGS
TW-USGS	2/8/67	1131.50	30.93	1100.57	Data from USGS
TW-USGS	1/5/68	1131.50	42.62	1088.88	Data from USGS
TW-USGS	1/15/69	1131.50	29.40	1102.10	Data from USGS
TW-USGS	1/23/70	1131.50	39.20	1092.30	Data from USGS
TW-USGS	1/22/71	1131.50	37.70	1093.80	Data from USGS
TW-USGS	12/20/71	1131.50	48.80	1082.70	Data from USGS
TW-USGS	1/12/73	1131.50	43.40	1088.10	Data from USGS
TW-USGS	12/26/73	1131.50	29.30	1102.20	Data from USGS
TW-USGS	1/7/76	1131.50	58.50	1073.00	Data from USGS
TW-USGS	12/16/76	1131.50	61.80	1069.70	Data from USGS
TW-USGS	12/22/77	1131.50	58.60	1072.90	Data from USGS
TW-USGS	3/28/78	1131.50	42.15	1089.35	Data from USGS
TW-USGS	1/2/79	1131.50	27.50	1104.00	Data from USGS
TW-USGS	1/16/80	1131.50	35.50	1096.00	Data from USGS
TW-USGS	2/4/81	1131.50	30.20	1101.30	Data from USGS
TW-USGS	1/15/82	1131.50	48.90	1082.60	Data from USGS
TW-USGS	11/29/82	1131.50	47.46	1084.04	Data from USGS
TW-USGS	6/18/85	1131.50	20.00	1111.50	Data from USGS
TW-USGS	12/10/85	1131.50	29.40	1102.10	Data from USGS
TW-USGS	6/14/88	1131.50	36.75	1094.75	Measured from top of steel plate
TW-USGS	7/22/88	1131.50	37.86	1093.64	
TW-USGS	8/25/88	1131.50	38.99	1092.51	
TW-USGS	10/21/88	1131.50	38.25	1093.25	
TW-USGS	12/16/88	1131.50	38.70	1092.80	
TW-USGS	1/24/89	1131.50	40.51	1090.99	
TW-USGS	4/4/89	1131.50	43.60	1087.90	
TW-USGS	5/8/89	1131.50	44.68	1086.82	
TW-USGS	5/30/89	1131.50	44.94	1086.56	
TW-USGS	6/30/89	1131.50	45.40	1086.10	
TW-USGS	7/27/89	1131.50	45.71	1085.79	
TW-USGS	9/5/89	1131.50	47.22	1084.28	
TW-USGS	9/29/89	1131.50	47.77	1083.73	
TW-USGS	11/6/89	1131.50	48.73	1082.77	
TW-USGS	12/1/89	1131.50	49.65	1081.85	
TW-USGS	1/8/90	1131.50	50.82	1080.68	
TW-USGS	2/5/90	1131.50	51.39	1080.11	
TW-USGS	3/5/90	1131.50	52.29	1079.21	
TW-USGS	4/6/90	1131.50	53.39	1078.11	
TW-USGS	5/8/90	1131.50	54.42	1077.08	
TW-USGS	6/5/90	1131.50	55.15	1076.35	
TW-USGS	7/6/90	1131.50	55.85	1075.65	
TW-USGS	7/24/90	1131.50	56.38	1075.12	
TW-USGS	7/27/90	1131.50	56.16	1075.34	
TW-USGS	7/30/90	1131.50	55.64	1075.86	
TW-USGS	8/7/90	1131.50	54.81	1076.69	
TW-USGS	8/15/90	1131.50	54.10	1077.40	
TW-USGS	8/16/90	1131.50	53.81	1077.69	
TW-USGS	8/17/90	1131.50	53.54	1077.96	
TW-USGS	8/20/90	1131.50	52.80	1078.70	
TW-USGS	8/22/90	1131.50	52.30	1079.20	
TW-USGS	9/6/90	1131.50	50.47	1081.03	
TW-USGS	9/11/90	1131.50	49.74	1081.76	
TW-USGS	10/8/90	1131.50	48.36	1083.14	
TW-USGS	11/1/90	1131.50	49.15	1082.35	
TW-USGS	12/3/90	1131.50	50.52	1080.98	
TW-USGS	1/8/91	1131.50	53.68	1077.82	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
TW-USGS	2/4/91	1131.50	55.61	1075.89	
TW-USGS	3/4/91	1131.50	56.98	1074.52	
TW-USGS	3/27/91	1131.50	50.30	1081.20	
TW-USGS	4/4/91	1131.50	47.22	1084.28	
TW-USGS	4/22/91	1131.50	43.40	1088.10	
TW-USGS	6/3/91	1131.50	46.25	1085.25	
TW-USGS	7/5/91	1131.50	48.15	1083.35	
TW-USGS	8/6/91	1131.50	49.87	1081.63	
TW-USGS	9/6/91	1131.50	51.44	1080.06	
TW-USGS	10/8/91	1131.50	52.27	1079.23	
TW-USGS	11/6/91	1131.50	51.88	1079.62	
TW-USGS	12/5/91	1131.50	52.20	1079.30	
TW-USGS	1/2/92	1131.50	51.16	1080.34	
TW-USGS	1/24/92	1131.50	44.65	1086.85	
TW-USGS	2/7/92	1131.50	41.22	1090.28	
TW-USGS	2/14/92	1131.50	39.93	1091.57	
TW-USGS	2/21/92	1131.50	38.32	1093.18	
TW-USGS	2/28/92	1131.50	37.40	1094.10	
TW-USGS	3/9/92	1131.50	35.92	1095.58	
TW-USGS	3/20/92	1131.50	34.03	1097.47	
TW-USGS	4/3/92	1131.50	32.41	1099.09	
TW-USGS	5/1/92	1131.50	30.78	1100.72	
TW-USGS	6/1/92	1131.50	29.15	1102.35	
TW-USGS	6/26/92	1131.50	28.66	1102.84	
TW-USGS	7/10/92	1131.50	29.11	1102.39	
TW-USGS	7/24/92	1131.50	29.26	1102.24	
TW-USGS	8/7/92	1131.50	28.29	1103.21	
TW-USGS	9/4/92	1131.50	27.11	1104.39	
TW-USGS	10/2/92	1131.50	27.88	1103.62	
TW-USGS	11/5/92	1131.50	29.43	1102.07	
TW-USGS	12/1/92	1131.50	31.05	1100.45	
TW-USGS	1/4/93	1131.50	29.08	1102.42	
TW-USGS	1/11/93	1131.50	26.67	1104.83	
TW-USGS	1/18/93	1131.50	24.28	1107.22	
TW-USGS	1/26/93	1131.50	23.30	1108.20	
TW-USGS	2/2/93	1131.50	23.45	1108.05	
TW-USGS	2/9/93	1131.50	23.33	1108.17	
TW-USGS	2/16/93	1131.50	22.84	1108.66	
TW-USGS	3/1/93	1131.50	22.21	1109.29	
TW-USGS	3/15/93	1131.50	22.61	1108.89	
TW-USGS	4/1/93	1131.50	22.32	1109.18	
TW-USGS	4/26/93	1131.50	23.26	1108.24	
TW-USGS	5/3/93	1131.50	23.01	1108.49	
TW-USGS	6/1/93	1131.50	23.41	1108.09	
TW-USGS	6/11/93	1131.50	23.85	1107.65	
TW-USGS	7/1/93	1131.50	24.27	1107.23	
TW-USGS	8/6/93	1131.50	24.93	1106.57	
TW-USGS	9/7/93	1131.50	24.99	1106.51	
TW-USGS	10/6/93	1131.50	25.83	1105.67	
TW-USGS	11/9/93	1131.50	26.60	1104.90	
TW-USGS	12/6/93	1131.50	25.79	1105.71	
TW-USGS	1/4/94	1131.50	26.40	1105.10	
TW-USGS	2/3/94	1131.50	27.62	1103.88	
TW-USGS	3/7/94	1131.50	29.08	1102.42	
TW-USGS	4/6/94	1131.50	29.58	1101.92	
TW-USGS	5/6/94	1131.50	30.66	1100.84	
TW-USGS	6/7/94	1131.50	31.82	1099.68	

Estes Landfill
Remedial Investigation
Monthly Water Level Data
(Through 6/99)

ESE

Well	Date Measured	Reference Point	Depth to Water	Water Level Elevation	Remarks
TW-USGS	7/6/94	1131.50	33.05	1098.45	
TW-USGS	8/4/94	1131.50	34.01	1097.49	
TW-USGS	9/9/94	1131.50	34.48	1097.02	
TW-USGS	10/11/94	1131.50	34.53	1096.97	
TW-USGS	11/4/94	1131.50	34.20	1097.30	
TW-USGS	12/2/94	1131.50	34.92	1096.58	
TW-USGS	1/9/95	1131.50	32.82	1098.68	
TW-USGS	2/3/95	1131.50	28.02	1103.48	
TW-USGS	3/2/95	1131.50	28.56	1102.94	
TW-USGS	4/5/95	1131.50	26.78	1104.72	
TW-USGS	5/10/95	1131.50	27.13	1104.37	
TW-USGS	6/6/95	1131.50	27.54	1103.96	
TW-USGS	7/7/95	1131.50	28.63	1102.87	
TW-USGS	8/4/95	1131.50	29.76	1101.74	
TW-USGS	9/7/95	1131.50	28.30	1103.20	
TW-USGS	10/6/95	1131.50	28.23	1103.27	
TW-USGS	11/10/95	1131.50	27.94	1103.56	
TW-USGS	12/9/95	1131.50	29.07	1102.43	
TW-USGS	1/11/96	1131.50	30.36	1101.14	
TW-USGS	2/10/96	1131.50	31.60	1099.90	
TW-USGS	3/8/96	1131.50	32.48	1099.02	
TW-USGS	4/5/96	1131.50	33.87	1097.63	
TW-USGS	5/7/96	1131.50	35.19	1096.31	
TW-USGS	6/5/96	1131.50	36.75	1094.75	
TW-USGS	7/8/96	1131.50	37.39	1094.11	
TW-USGS	8/2/96	1131.50	37.42	1094.08	
TW-USGS	9/9/96	1131.50	37.92	1093.58	
TW-USGS	10/4/96	1131.50	37.95	1093.55	
TW-USGS	11/1/96	1131.50	38.55	1092.95	
TW-USGS	12/5/96	1131.50	39.81	1091.69	
TW-USGS	4/7/97	1131.50	43.91	1087.59	
TW-USGS	6/2/97	1131.50	45.02	1086.48	
TW-USGS	9/10/97	1131.50	46.02	1085.48	
TW-USGS	12/11/97	1131.50	43.89	1087.61	
TW-USGS	3/13/98	1131.50	39.14	1092.36	
TW-USGS	6/23/98	1131.50	35.25	1096.25	
TW-USGS	9/22/98	1131.50	32.82	1098.68	

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull John F. Hagen, Acting Director

February 25, 1999 **E-5161.01--3.4.7.1**
RPU99,339

Ms. Karen O'Regan, Env. Programs Mngr
Office of Environmental Programs
City of Phoenix
200 West Washington Street - 14th Floor
Phoenix, Arizona 85003

RE: Comments on Draft Remedial Investigation Report dated September 5, 1997; Estes Landfill Water Quality Assurance Revolving Fund (WQARF) Registry Site; Phoenix, Arizona

Dear Ms. O'Regan:

The Arizona Department of Environmental Quality and QST Environmental, Inc. (QST), ADEQ contractor, have performed a technical review of Remedial Investigation Draft Report, dated September 5, 1997, prepared by Harding Lawson Associates (HLA). The comments provided below are a result of this review in addition to reviewing relevant documents in ADEQ's files. Comments to the Draft RI report are provided in the following sections, and are either specific (by sections, figures, tables, and appendices of the report) or general (apply to the overall document or large portions).

COMMENTS BY SECTION

Executive Summary

Comment #1. ***Page ES-I, Paragraph 2:*** The following statement should be deleted: "The study area includes a network of groundwater monitoring wells that extends beyond the portion of the aquifer which is impacted by the Site." ADEQ has not made a determination as to the source(s) of the contamination which is reportedly to exist "north" and "south" of "the Site". It is possible that Estes Landfill is at least a contributor to this contamination.

Comment #2. ***Page ES-I, Paragraph 2:*** The Bradley, or Fortieth Street Landfill, a newer **(opened 1972-1973)** landfill which is also privately owned and operated....".

Comment #3. ***Page ES-iv:*** The first paragraph under the "Sources" subsection states that "the source area on the Estes Landfill appears to be a liquid waste disposal pit that was located near the southeast corner of the Site". While ADEQ agrees that the liquid waste disposal pit was a major source area on the landfill, it should not be stated or assumed that this pit was the only source area for the landfill.

Comment #4 Page ES-iv: The second paragraph of the "Sources" subsection states that "the northernmost well in the study (EW-22) shows levels of VOC contamination that may originate from an offsite source". ADEQ has not seen any evidence that the vinyl chloride (VC) and cis-1,2 dichloroethylene (DCE) detected in EW-22 originated from an offsite source. Monitor well EW-22 is downgradient from the landfill before relocation and down-to-crossgradient from the present landfill. VC (which is a gas at standard temperature and pressure) and cis-1,2 DCE are anaerobic degradation products of trichloroethylene (TCE). Since the region under the landfill is the only region which is anaerobic, then it is likely to assume that the VC would have to have originated from the landfill.

Section 1.0 Introduction

Comment #5. ***Section 1.2, Page 1-5, Paragraph 1:*** This paragraph discusses the relocation of the landfill, in which 20 cubic yards of material were found to contain hazardous constituents. It is not discussed whether confirmation sampling was conducted by HDR to determine that all landfill material had been removed, in particular the areas of hazardous material. In addition, sampling of native soil (saturated or unsaturated) should have been conducted to determine if residual hazardous constituents had impacted the subsurface below the portion of relocated refuse. There is no information on such activity in ADEQ's files. If data is available it should be presented in this report. Unless it can be demonstrated that all hazardous material had been removed, and no residual hazardous constituent concentrations remain in the subsurface soil, there may be a potential source of VOCs in the soil and groundwater.

Section 2.0 Site Conceptual Model

Comment #6. ***Section 2.0, Page 2-1, Paragraph 2 and 3:*** It would appear that the primary source of VOC contamination in groundwater may be the former liquid waste disposal pit. However, based on the statements in this section, very little can be confirmed regarding disposal practices and areas at the former landfill, and there is no reliable evidence to support the assumption made in the report. Past waste disposal practices were typically conducted in a very haphazard fashion. Consequently, there is potential that liquids wastes containing volatile organic compounds (VOCs) may have been disposed in other parts of the landfill. This is further demonstrated by the fact that during relocation of the landfill within the Salt River material was encountered which contained hazardous constituents.

Comment #7. ***Figures, General:*** The inferred location of the liquid waste disposal pit should be shown on all figures were contaminant data is presented.

Comment #8. ***Section 2.0, Page 2-2, Paragraph 1:*** " Septic wastes were co-disposed in the liquid disposal pit, helping to explain the high degree of biodegradation of VOCs." This statement needs to be supported by a reference (i.e. biodegradation data or a hypothetical degradation model). HLA has not demonstrated that biodegradation processes associated with septic type wastes would also be an adequate degrader of chlorinated contaminates.

Comment #9. ***Section 2.0, Page 2-2, Paragraph 2:*** "The majority of the resulting contamination lies within the aquifer and not above the water table. Generation of additional groundwater contamination through infiltration and percolation from the surface is not considered a factor due to the lack of rainfall, and high evaporation rate in the Phoenix area." ADEQ believes that the statement "lack of rainfall" is inaccurate. The Phoenix area frequently receives significant rainfall, precipitation is often catastrophic and results in significant runoff volumes per event. The large volumes of rain per event can certainly act as a mobilizing force, especially if source areas are not capped or are within runoff or low lying areas. Given the significant areal extent of the current landfill surface it is likely that either runoff and/or low lying areas exist. Also see comment regarding Section 3.4, Page 3-5, Paragraph 2.

Comment #10. ***Section 2.0, Page 2-2, Paragraph 3:*** HLA states that "EPA guidance suggest that dissolved concentrations within 10 percent of the solubility indicated the presence of DNAPL in the groundwater monitoring system." The EPA guidance document should be referenced.

Comment #11. ***Section 2.0, Page 2-2, Paragraph 4:*** This paragraph states that another source of TCE is located approximately one half mile to the south of the Site. However, based on predominantly west and southwest groundwater flow components, and TCE concentrations (June 1996) at wells EW-19, EW-PZ1, it has not been demonstrated that Estes is not a contributor to the TCE impact. More detail should be provided regarding the wells and inferred boundaries of offsite TCE influence.

Comment #12. ***Section 2.0, Page 2-3, Paragraph 2:*** A statement is made in the report that off-site contamination source maybe present in the an area north of the landfill. This conclusion is based on the movement of groundwater flow at the site (i.e., west and southwest), VOC constituents found in off-site wells north of the landfill, and the assumption that the liquid waste disposal pit is the main source of the VOC release in the landfill. However, it has not been demonstrated that other potential sources of VOCs may exist within portions of the former (relocated) landfill. If present in these areas, VOCs could have vertically migrated to unit F2 (assuming F2 presence) and could continue to be a source of VOC contamination in groundwater at these wells. Also see comments # 72 and #75.

Comment #13. ***Section 2.0, Page 2-3, Paragraph 3:*** A statement is made that "West of the source area, where alluvial groundwater concentrations are still elevated, the bedrock is not impacted, suggesting that impact to the bedrock is limited." ADEQ is unaware of any wells screened in the bedrock west of the *source* (referring to the liquid disposal pit). It is unclear how it can be known that bedrock contamination is limited.

Comment #14. ***Section 2.0, Page 2-4, 1st Row of Table:*** Under the Significance column, the first sentence should be changed to 'Indicates the pit was a *major* cause' rather than 'Indicates the pit was the *original* cause'.

Comment #15. ***Section 2.0, Page 2-4, 2nd Row of Table:*** Under the Model Element column, the first sentence should be changed to 'No DNAPLs *have been detected* at the Site' rather than 'No DNAPLs *are present* at the Site'.

Comment #16. ***Section 2.0, Page 2-5, 3rd Row of Table:*** Per Figures 6.21, 6.23 and 6.25, which depict VC, cis-1,2-DCE and TCE concentrations in groundwater, respectively, it is of interest to note that if groundwater flow is in a predominantly western direction (SW during flood events) why should concentrations of the three constituents above increase in wells along SE-NW transect (EW-NW, EW-11 and EW-22), with the highest concentrations being detected in wells located on the Estes property? Also see Comment #13

Comment #17. ***Section 2.0, Page 2-5, 3rd Row of Table:*** Under the Supporting Data column, the first sentence should be changed to *"Groundwater contamination at EW-22 may not be from the pit source but from another source on the landfill or possible from the riverbed below the area where the landfill was previously located."*

Comment #18. ***Section 2.0, Page 2-5, 3rd Row of Table:*** Under the Supporting Data column, the second sentence should be removed as it assumes that the pit is the only source of contamination on the entire landfill. In addition, it assumes present day groundwater flow and not what conditions may have been prior to the channelization of the Salt River in the area of the landfill.

Comment #19. ***Section 2.0, Page 2-5, 3rd Row of Table:*** Under the Supporting Data column, the first sentence should be changed to *"The similar chemical signature indicates that the contamination originated from the landfill.'* The second sentence should be changed to *"The similar detections in EW-11 in the middle of the riverbed support this."*

Comment #20. ***Section 2.0, Page 2-7, 1st Row of Table:*** The SCM identifies VC and cis-1,2-DCE as signature chemicals for the Estes Landfill because these compounds are present on-site with the greatest concentrations. The signature chemicals were identified from a list of "compounds of interest" summarized in Section 6.0 of the report. There are three concerns associated with reducing the compounds to these two signature chemicals: 1.) Other factors such as toxicity, mobility, and persistence of a chemical should be evaluated before any compound of interest is eliminated from further investigation; 2.) All compounds of interest may not have been identified in Section 6.0 (See Comment # 66); and 3.) Other TCE releases in the area are inferred, but wouldn't TCE from these sources also degrade to VC and cis-1,2-DCE potentially causing interference of the Estes plume?

Comment #21. ***Section 2.0, Page 2-7, 3rd Row of Table:*** See Comment #8.

Comment #22. ***Section 2.0, Page 2-7, 3rd Row Table:*** Under the Model Element column, the sentence should be changed to *"Other plumes of impacted groundwater may be in the study* *area."*

Comment #23. ***Section 2.0, Page 2-8, 1st Row:*** In the SCM it is concluded that groundwater VOC concentrations have decreased over time. One of the supporting data for this conclusion is that data shows concentrations decreasing over time. When comparing the annual mean groundwater data (i.e. Figures 6.18 to 6.20), ADEQ believes that there is no conclusive trend that would establish any significant decrease of these compounds in the appropriate well. Specific comments on the review of Figures 6.18 to 6.20 are provided in Comment #s 63 and 64.

Section 3.0 Physical Setting

Comment #24. ***Section 3.4, Page 3-5, Paragraph 2:*** HLA states "Occurrences of recharge to the aquifer after a rainfall event have been recorded on the continuous water level recorders at the Site even in the absence of visible flow in the river." This would contradict the earlier statement in Section 2.0 (page 2-2, paragraph 2) that discounts contaminant percolation from precipitation infiltration.

Comment #25. ***Section 3.6, Page 3-11, Paragraph 1:*** HLA states "Impacted groundwater from the Site does not reach the Southbank Lake." HLA should reference the section(s) of the RI that support this statement. The Southbank Lake is directly downgradient (west) and has had reported concentrations of VOCs.

Section 4.0 Overview of RI and FS Activities

Comment #26. ***Section 4.1, Page 4-2, Paragraph 1:*** This section of the report summarizes the relocation of a portion of the landfill as part of the Salt River channelization and bank stabilization project. The information in ADEQ's files regarding the relocation project does not indicate that confirmatory soil and groundwater sampling was performed. If such data is available, it should be summarized in this section of the report.

Comment #27. ***Section 4.1.1, Page 4-6, Paragraph 2:*** The report states that the northern lateral extent of groundwater contamination appeared to be defined by EW-2, in which concentrations of VOCs were not above analytical detection limits. Although the last round of sampling presented in the report did not detect the presence of VOCs in Well EW-2, previous round of the groundwater sampling did detect the presence of VOCs. Consequently, further explanation is required in this section in order to justify that Well EW-2 characterizes the northern extent of groundwater contamination. In addition, because no confirmatory sampling data is available on the landfill relocation effort, ADEQ is concerned of potential ongoing impact that the former landfill location may cause; this should also be addressed in this section of the report.

Comment #28. ***Section 4.1.1, Page 4-6, Paragraph 3:*** This section of the report states that the June 1989 sampling results showed low levels of VC and 1,2-DCE in well EW-1, and this well appeared to define the downgradient extent of contamination migration of the site. ADEQ does not agree with this statement because the level of VC found in EW-1 during this sampling round exceeded the Arizona aquifer water quality standard (AWQS). In addition, the level of TCE also exceeded the AWQS.

Comment #29. ***Section 4.2.3, Page 4-10, Paragraph 3:*** " Soil gas results (HLA, 1992e) while generally very low, did show slightly higher concentrations near the suspected major source area" This comment raises several concerns. First qualitative comments such as "very low" are misleading and uninformative to the reader. ADEQ recommends that the use of adjectives such as "low" (for both soil gas and analytical results), be related to known reference standards. Acceptable reference standards are the soil remediation levels (SRLs), groundwater protection levels (GPLs), aquifer water quality standards (AWQSs), maximum contaminant levels (MCLs), health based guidance levels (HBGLs), and preliminary remediation goals (PRGs -- if no other standard is available). In the case of soil gas readings, where reference standards are inappropriate, an informal reference standard should be established based on similar sites and conditions. Second, because concentrations are "low" between both the "source" and the assumed "non source areas" additional explanation is required. Potential relationships between soil gas concentrations and groundwater concentrations should be explored.

> Table 6.7 and Figure 6.12 to 6.15 indicates that, in some cases, VOCs are found in higher concentrations away from the **major** source area (i.e., disposal pit). This should be discussed regarding other potential sources of VOCs within the landfill.

Comment #30. ***Section 4.2.3, Page 4-10, Paragraph 3:*** It is stated that "Soil gas results, while generally very low, did show slightly higher concentrations near the suspected major source area near the southeast corner of the Estes Landfill." In addition to showing low concentrations near the suspected major source area near the southeast corner, there is another area along the southwest corner which also has "low" concentrations of VOCs. Lastly, according to Figures 6.8 through 6.12 (soil-gas concentrations), the north central/eastern portion along the Salt River has "low" soil gas concentrations. These results may indicate additional minor sources.

Comment #31. ***Section 4.2.4, Page 4-11, Paragraph 1:*** This section of the report states that downgradient extent of groundwater contamination appeared to be defined by monitor wells EW-1 and EW-12. Based on the most current data presented in the report (1996), EW-1 may be used as one of the downgradient compliance wells. However, because the level of TCE found in EW-12 (1996 data) exceeds the AWQS, this well should not be used as an compliance well.

Comment #32. ***Section 4.2.4, Page 4-11, Paragraph 2:*** The report states that the northern extent of groundwater contamination appeared to be defined by monitor wells EW-9 and EW-11. Review of groundwater data indicates that the VC level of the most current data presented in the report in both wells exceeds AWQSs/MCLs. The fluctuating TCE level found in EW-9 is also a concern. Consequently, these wells should not be used as compliance wells.

Comment #33. ***Section 4.2.5, Page 4-13, Paragraph 2:*** In the report it states that "Ozonation was ruled out as a successful treatment of the contaminated groundwater due to lesser reduction of VOCs during field scale testing". Although "lesser reduction of VOCs" is one of the evaluation criteria, unless pilot testing demonstrates that there is no significant reduction of VOCs, other evaluation criteria (e.g., implementability, regulatory constraints, cost, etc.) should have been examined before ruling out the remedial alternative. Consequently, this section of the report should provide addition information on other evaluation criteria that was used to rule out Ozonation.

Comment #34. ***Section 4.3.1, Page 4-15, Paragraph 2:*** In this section of the report, there is no discussion of TCE concentrations at EW-12, which increased above the AWQS in September 1993 and has continuously exceeded the AWQS (See Comment # 31).

Comment #35. ***Section 4.4.3, Page 4-22, Paragraph 5:*** The results of the soil gas survey for TCE, 1,2-DCE, VC, and Chlorobenzene may indicate that VOCs compounds are present in areas of the landfill other than the liquid waste disposal pit. These results should be addressed in more detail regarding this potential.

Comment #36. ***Section 4.4.3, Page 4-23, Paragraph 2:*** This section of the report states that "while concentrations were elevated in several areas, the production of methane appeared to be relatively low, as illustrated by the limited pressures observed in the probe." The survey data should be presented in an appendix, including pressure and methane concentrations. This section should also address conclusions regarding the presence of methane in the landfill.

Comment #37. ***Section 4.5.2, Page 4-26, Paragraph 2:*** It is stated that additional groundwater analysis for certain biological parameters has yielded the conclusion that active degradation of chlorinated VOCs is occurring at the Site. Further, this degradation is likely responsible for the observed downward concentration trends at the Site. ADEQ does not believe that active degradation has been clearly established or that a downward concentration trend can be derived from the data collected at the site. These items are discussed in greater detail elsewhere in Section 7.0 discussion.

Comment #38. ***Section 4.5.2, Page 4-26, Paragraph 3:*** To provide a confident and accurate vertical profile of contaminants, sampling and characterization techniques must be carefully selected based on the contaminant, media, and well construction. A brief explanation of both the spinner logging techniques and depth specific sampling techniques, used in this investigation, may help the reader to determine whether an accurate profile was presented.

Comment #39. ***Section 4.5.2, Page 4-27, Paragraph 3:*** Provide a definition of "subsample". Also, were VOCs, other than VC or cis-1,2-DCE, detected in any of the sample analyzed?

Section 5.0 Hydrogeology

Comment #40. ***Section 5.3.4, Page 5-11, Paragraph 2:*** In the discussion of Unit F4, it is stated that "....the transport path for the VOCs into F4 is thought to be related to localized weathering and/or fracturing in this area because F4 is a barrier to subsurface flow in the existing SCM." There does not appear to be a detailed discussion in the SCM of F4 acting as a barrier to subsurface flow. more support should be provided for this statement. In addition, a seemingly contradictory statement is made regarding results of a pump test at EW-6 (Section 5.4, page 5-17, paragraph 3), that "This response indicates a hydraulic connection between units F3 and F4 at this location. or at least between EW-6 and EW-15."

Comment #41. ***Section 5.5.1, Page 5-19, Paragraph 2:*** A reference should be provided for the estimate of KH values as approximately 10 to 100 times greater than KV values.

Comment #42. ***Section 5.6.2.2, Page 5-24 and 5-25:*** Groundwater elevation data from Wells EW-11 and EW-22 should be used in the groundwater level contour presentations on Figures 5.13, 5.14, 5.15 and 5.16, where data is available. Otherwise, an explanation should be provided for not using data from these wells. These wells are critical for understanding groundwater movement north and west of the Site, especially if offsite contaminant sources are suspected. See Comment # 72 for evidence of potential northwest groundwater flow component at wells EW-19, EW-9, EW-11 and EW-22.

Comment #43. ***Section 5.6.2.2, Page 5-24 and 5-25:*** Discussion is not given to the horizontal flow component in unit F2, the unit HLA describes as being associated with most contaminants. It appears as though there should have been adequate data to substantiate a conclusion on the direction of flow (i.e., 1996 data collected with data loggers within unit F2).

Comment #44. ***Section 5.6.3, Page 5-25 and 5-26:*** Discussion is not given to the vertical flow component in unit F4. This unit has had consistently high VC concentrations at Well EW-15 and warrants some discussion.

Section 6.0 Site Characterization and Nature and Extent of Contamination

Comment #45. ***Section 6.1, Page 6-2, Table:*** In the list of analytes for the surface soil samples collected, it was observed that for the pesticides, only organochlorine pesticides was included. Please provide further clarification as to why organophosphorus pesticides and chlorinated herbicides were not included in the list of analytes.

Comment #46. ***Section 6.1, Page 6-3, Paragraph 1:*** This section of the report references background soil concentrations for the inorganics. If site specific background values are to be used. the methodology of how background values were determined must be presented in the report.

Comment #47. ***Section 6.1, Page 6-3, Paragraph 2:*** Discussion summarizing metals detections. Copper and lead analytes are apparently above background levels for Arizona. However these levels are below region IX PRGs. HLA does not appear to offer any source explanation for these metals. Also, a discussion should be included as to how these concentrations compare with the SRLs. Further potential source areas would not likely be associated with the liquid disposal waste pit.

Comment #48. ***Table 6-2:*** In Table 6-2, PRGs are listed for Beta-BHC and Aroclor 1254. Please confirm if a PRG exists for "Beta-BHC". Also, please reconfirm the PRG level for Aroclor 1254. The SRLs, effective December 4, 1997, should be used instead of PRGs (unless an SRL or an HBGL is unavailable).

Comment #49. ***Section 6.2.1, Page 6-4, Paragraph 2:*** "Approximately 20 cubic yards of such materials found to contain non-organic hazardous constituents..." The discovery of hazardous waste during the partial landfill relocation indicates that hazardous waste sources potentially exist in the un-relocated portion of the landfill. Does information exist in the HDR report to indicate the type of non organic hazardous wastes discovered? Does the report document where the hazardous wastes were encountered? Were the hazardous wastes located throughout the landfill or in segregated sections? Responses to these questions can assist in the evaluation of non organic hazardous waste sources in the original landfill configuration.

Comment #50. ***Section 6.2.2, Page 6-4, Paragraph 4:*** The soil investigation activities performed by SH&B consisted of test borings and pits which revealed the presence of landfilled material to a depth of 45 feet. Depth of waste within the landfill was determined by visual assessment and field screening (no soil chemistry was performed). Based on this information, ADEQ is concerned that the actual depth of impact soil within the landfill was not adequately determined. Although visual assessment of material was verified to a depth of 45 feet, impacted soil could extend well below that depth.

Comment #51. ***Section 6.2.3, Page 6-5, Paragraph 2:*** During the soil investigation performed by Hargis & Associates, ADEQ questions why analysis of organophosphorus pesticides and chlorinated herbicides were not performed. This section also states that one sample contained leachable lead at 0.14 mg/l, which is not reflected in Table 6.5. A rationale should be provided for selection of samples for analysis (Table 6.4).

Comment #52. ***Section 6.2.3, Page 6-5, Paragraph 3 and 4:*** Discussion regarding low levels of organochlorine pesticides and polychlorinated biphenyls (PCBs). ADEQ is concerned that these low levels likely indicate a potential source of these constituents exist within the relocated landfill or landfill proper. Were groundwater samples analyzed for theses compounds?

Comment #53. ***Table 6.5 (last page):*** In reviewing the result of the leachable lead, it is unclear as to which sampled intervals were analyzed for the parameter. Clarification should be provided.

Comment #54. ***Section 6.2.3, Page 6-6, Paragraph 1:*** This section of the report specifies that the results of total lead in the soil sample collected were below the residential Arizona health based guidance levels (HBGLs). Review of this data indicates that the concentration of total lead from samples EL-2 (10'-11') and EL-7 (40'-41') exceeds the residential HBGL but is below the non-residential HBGL. Clarification needs to be made. In addition, the appropriate regulatory standard for this is now the soil remediation levels (SRLs) for lead which supersedes the HBGLs.

Comment #55. ***Section 6.2.4, Page 6-8, Paragraph 2:*** This section of the report states that "the results of the chemical analyses of the soil samples from boring B-1 and B-2 indicated that VOC concentrations were not present within the soil matrix.... (Table 6.6)." However, Table 6.6 presents VOCs detected which were qualified as "detected compounds may have been due to background laboratory contamination". In light of the fact that the concentration of Methylene Chloride in samples B-2-80, B-2-85, and B-2-90 exceeds Arizona residential SRLs, further QA/QC data is warranted in order to confirm that the detection of this compound was the result of background laboratory contamination.

Comment #56. ***Section 6.2, General Comment on Subsurface Soil Investigation:*** The effort to determine the waste depth of the landfill appears to have been concentrated on the removed section of the landfill, and the east (relocated landfill) section. However, it appears that insufficient effort was made to characterize landfilled wastes and waste depths in the central and west portions of the landfill. In addition, chemistry analyses of soil samples collected seems to have been concentrated on the eastern portion of the landfill and within close proximity to the disposal pit.

> Based on these findings, ADEQ believes that further characterization of central and western portions of the landfill is warranted to determine the depth of landfill wastes, impact of constituents in subsurface soils, and identification of other potential sources of VOCs.

Comment #57. ***Section 6.3.1, Page 6-12, Paragraph 3:*** This section of the report states that "the list of target chemicals was based on groundwater quality data....for VC, cis-1,2-DCE, 1,1-DCE, TCE, 1,2-DCB, PCE benzene, and Chlorobenzene (referring to Phase I soil gas analytical parameters)." A review of the groundwater quality data indicates that other VOCs detected within on-site wells (e.g., 1,1,1-TCA, 1,4-DCB, etc.) were not included as an analyte. Please provide further clarification was to why these detected VOCs were not included as analytes during the Phase I soil gas survey.

Comment #58. ***Pages 6-13 and 6-14:*** In terms of the report's summary of the Phase I and Phase II soil gas survey results, please refer to Comment # 35.

Comment #59. ***Section 6.3.3, Page 6-16, Paragraph 3:*** No data tables or figures are presented summarizing the results of the June 1995 sampling of the three deep permanent gas probes. These data may be helpful in evaluating the VOC vapor concentrations, along with previous soil gas surveys.

Comment #60. ***Section 6.4, General:*** There is no mention of any sampling conducted at Southbank Lake (west of the site), inferred to be recharged by groundwater. This location should be included in the discussion of the VOC plume migration, including evaluation of previous sample results, if available.

Comment #61. ***Section 6.4.2, Page 6-19, Paragraph 2:*** In the last sentence in paragraph 2, it specifies that "analysis of pesticides and PCBs were also eliminated from the sampling program.....because no pesticides or PCBs were detected." As previously commented, ADEQ is concerned that organophosphorus pesticides and chlorinated herbicides were never included in the analytical parameters. Justification should be provided as to why these two parameters were not included.

Comment #62. ***Section 6.4.3, Page 6-21:*** This section of the report addresses QA/QC and data validation that were performed on selected groundwater data. In reviewing this section of the report, it was noted that specific data validation problems associated with the raw data were not discussed in detail. QA/QC and data validation goals were also not discussed. It is recommended that all completed tables and evaluation worksheets used for data validation of the groundwater data be included in this report. Lastly, it would appear that "sensitivity" was not performed as part of the data validation. Rationale should be provided concerning this omission.

Comment #63. ***Section 6.4.4, Page 6-24, Paragraph 1:*** The report states that "....Chemical concentrations graphs of VC, cis-1,2-DCE, and TCE detected in the groundwater samples collected from well EW-E demonstrates this decline (Figures 6.18, 6.19, and 6.20)." After reviewing each figure, it is interpreted that only VC may have a general trend of decline. In general, concentrations of these compounds parallel fluctuations in groundwater elevations. ADEQ recommends an overlay of corresponding groundwater elevation with the respective contaminant concentrations. This may provide a more representative presentation of the contaminant degradation trend.

Comment #64. ***Figures 6.18, 6.19, and 6.20:*** On the three figures, the compound data for well EW-E begins in 1982; however, the groundwater data in Appendix A begins in 1988. Consequently, if the pre-1988 data is to be used on the figures, it should be quantified in the report and included in Appendix A. In addition, some of data points do not appear to be properly plotted in all three figures in accordance with the dates shown in Appendix A.

Comment #65. ***Section 6.4.4.1, Page 6-24, Paragraph 4:*** In this section of the report "A chemical compound was identified as a Compound of Interest if that particular chemical compound met all of the following distinct non-biased criteria:

- The chemical compound has an ADEQ AWQS;....."

There may be contaminants, present at the Site, that do not have an associated AWQS, but still may pose a threat to human health or the environment. Therefore, when a contaminant does not have an associated AWQS other criteria should be evaluated (e.g., EPA Region IX PRGs, EPA MCLs, etc.).

Comment #66. ***Section 6.4.4.1, Page 6-25, Paragraph 1:*** In the list of Compounds of Interest, the following compounds met all three criteria, but were not included: bis (2-ethylhexyl) phthalate; Chloroform; 1,1-Dichloroethene; (trans) 1,2-Dichloroethene; and lead. Justification should be provided for omission of these compounds. In addition, chloroform and manganese, which have no AWQSs, were omitted from the list. However, their concentrations exceeded respective s and were detected at a frequency greater than 20%. Consequently, it is recommended that these compound be included as Compound of Interest.

> Other compounds that exceeded the AWQS or s but were detected at a frequency of less than 20% included: methylene chloride; 1,3-dichlorobenzene; 1,2-dichloroethane; chloromethane; bromodichloromethane; carbon tetrachloride; 1,1,2,2-tetrachloroethane; nickel; copper; mercury; antimony; and thallium. For these compounds, ADEQ would recommend further clarification in removing these compound from further consideration as Compounds of Interest.

Comment #67. ***Table 6.9 & 6.10:*** Chloroform which has a maximum contaminant level (MCL) of 100 µg/l is not shown in Table 6.9. Nitrate is not shown in Table 6.10.

Comment #68. ***Section 6.4.5, General:*** Annual mean concentrations of compounds were used for data comparisons and support of degradation observations. Justification for this method instead of other statistical methods should be presented. Use of annual mean values can mask concentration trends as they relate to seasonal or groundwater fluctuations. Other statistical analyses (e.g. student t-test) would seem more appropriate.

Comment #69. ***Section 6.4.5, Page 6-26, Paragraph 3:*** In terms of identifying VC and cis-1,2-DCE as signature chemicals, please refer to Comment #s 20 and 66.

Comment #70. ***Section 6.4.5, Page 6-26, Paragraph 4:*** In this section of the report it states that "TCE has been detected in select onsite wells only at *low* concentrations". TCE has been detected in some onsite wells at concentrations exceeding the AWQS, and the term "low" should be quantified.

Comment #71. ***Section 6.4.5, Page 6-27:*** There is no mention of unit F4, which has some of the highest VOC concentrations reported (at Well EW-15). A summary of inferred F4 conditions and relationship to upper alluvial units should be provided.

Comment #72. ***Section 6.4.5.1, Page 6-30, Paragraph 2:*** HLA states "...the groundwater samples collected from well EW-19, installed in early 1996, had concentrations of VC that were less than the VC concentrations detected in the groundwater samples collected from wells EW-11 and EW-12." The data HLA is comparing is from June 1996 (the initial reported sampling of EW-19). However, well EW-9, located between EW-19 and EW-11, had VC concentrations of 130 µg/l, compared to EW-19 at 10 µg/l, EW-11 at 36 µg/l, and EW-22 at 13 µg/l. Further, evaluation of the groundwater elevations, for the June 1996 sampling event, indicate an inferred groundwater flow direction of west/northwest in the area of these wells.

This evaluation of the June 1996 data suggests that there may be a flow component

> and degradation/dilution of VC to the northwest along the path of EW-19, EW-9, EW-11, and EW-22. In addition, this scenario may also support a potential source of VC from the former landfill portion that was relocated (See Comment # 5).
>
> Subsequent groundwater elevation and sample analytical data from 1996, 1997, and 1998 (if available) should be evaluated for these wells to confidently verify this observation. There does not appear to be enough data to support the HLA contention that there is an offsite source to the northwest of the source area.

Comment #73. ***Section 6.4.5.1, Page 6-30 & 6-31, Vertical Extent of VC Subsection:*** This section discusses the decreasing concentration of VC in various wells; however, it does not mention the possibility that the decreasing concentrations are a result of flushing from the wet years in 1992 and 1993. Hydrographs from the report, when compared to concentrations over time, seem to infer this.

Comment #74. ***Section 6.4.5.1, Page 6-31, Paragraph 1:*** The following statement is misleading "Annual mean VC concentrations in the groundwater samples collected from well EW-15 declined from 1,700 µg/l during 1993 to 305 µg/l during 1996." EW-15 was initially sampled in December 1993, therefore, there was only one sample for *annual* mean calculation. Further, only one sample was reported for 1996 which does not support a valid annual mean comparison. In addition, this June 1996 sample was reported at 390 µg/l, however, the annual mean was reported at 305 µg/l. This annual mean result needs to be clarified.

> Contrary to the HLA statement that "...the vertical extent of VC appears to be limited to the upper alluvial units of F1, F2, and F3....," the concentrations of VC found in well EW-15 (unit F4) would indicate that the vertical extent of VC in groundwater has *not* been fully determined. Evaluations of conditions and concentrations at well EW-8, located approximately 1,000 feet downgradient, should have no bearing on vertical distribution at EW-15. Therefore, further assessment to determine the vertical migration of VC appears to be warranted.

Comment #75. ***Section 6.4.5.2, Page 6-33, Paragraph 3:*** This section specifies that the detection of cis-1,2-DCE in wells EW-22 and EW-11 "...were not due to the source area, and may be due to an offsite source area located north of the Site." Similar to the discussion in comment # 42 regarding VC concentrations in these wells, comparison of the June 1996 data for wells EW-19, EW-9, EW-11, and EW-22 indicate potential migration of cis-1,2-DCE along this northwest pathway. Cis-1,2-DCE concentration at these wells are 56 µg/l, 19 µg/l, 12 µg/l, and 4.8 µg/l, respectively. This would tend to support migration from the relocated landfill area.

Comment #76. ***Section 6.4.5.2, Page 6-34, Paragraph 3:*** Same issues apply for the vertical extent of cis-1,2-DCE at well EW-15 as for VC, please refer to Comment # 55.

Comment #77. ***Section 6.4.5.2, General:*** ADEQ is concerned about the evaluation of vertical impact to unit F4 at the source. The ratio and concentrations of TCE (intermediate) daughter product to cis-1,2-DCE to (final) daughter product VC, indicates that degradation processes may not be as rapid in unit F-4 as shallower units. This should be addressed, as well as vertical characterization.

Section 7.0 Contaminant Fate and Transport

Comment #78. ***Section 7.0, General:*** The HLA report concludes that "the rapid decline in concentration appears to be primarily related to the presence of a unique set of environmental conditions that create a sequential anaerobic/aerobic groundwater system." Certainly field data seem to confirm that existing environmental factors can contribute to a natural degradation process as outlined in the HLA report. *However, ADEQ recommends that further discussion be given to the subsurface mechanisms which are likely causing the unique anaerobic aerobic processes.* The report mentions that anaerobic conditions appear prevalent at the source, potentially caused by iron reducing conditions. Other degradation mechanisms aside, will the aquifer have sufficient volume of ferric iron to support anaerobic conditions until the remaining TCE parent products have been completely degraded? This should be quantified. ADEQ also recommends that the aerobic conditions supporting breakdown of VC be further evaluated, especially considering the toxicity of VC. It is likely that aerobic conditions are being sustained at the leading edges of the plume. Could this environment revert to anaerobic if gradient conditions change during flood events?

> The draft report indicates that concentration increases are believed to occur from hydraulic loading caused from the rapid water elevation rise that accompanies river flow. In addition, ADEQ adds that concentration increases could occur from mobilization of VOC components which are sorbed in vadose zone and fill soils, and become mobilized during high water events. Significant flows will saturate normally dry landfill cells affecting constituents absorbed in fill material. *ADEQ also questions how spike concentration decreases prove aerobic biologic degradation near the source area, when it is previously stated that source area degradation is primarily due to an <u>anaerobic</u> chemical process causing the breakdown of TCE.* As hypothesized, aerobic VC degradation is potentially occurring primarily at plume fringes outside the anaerobic landfill environment. Conversely, do concentration declines associated with flood events indicate that this degradation environment in the landfill proper reverts back to aerobic processes during these events? Further understanding of these complex processes is warranted to support an evaluation of natural attenuation should one be considered for the feasibility study.
>
> A ratio comparison of mean cis-1,2-DCE and VC concentrations (Figure 2.2) indicates the following:

- the ratio of cis-1,2-DCE to VC concentrations is relatively similar at source area wells EW-E and EW-18 (e.g., EW-E mean value for cis-1,2-DCE at 582 µg/l and VC at 1,095 µg/l yield approximate 1:1.8 concentration ratio) and immediate downgradient wells EW-4, TW-4, and TW-3 (e.g., EW-4 mean value for cis-1,2-DCE at 31 µg/l and VC at 49 µg/l yield approximate 1:1.6 concentration ratio)

- however, based on HLA contention that cis-1,2-DCE undergoes primary degradation (rapid dechlorination) in the anaerobic environment and VC undergoes primary degradation in the aerobic environment, a different ratio would be expected at the source and downgradient (i.e., greater ratio at source and closer ratio downgradient).

Comment #79. ***Section 7.2.3, Page 7-5, Paragraph 3:*** "Based on the nature of sediments at the Site, which are relatively low in amount of organic material, and the lack of detectable VOCs in the soil, it appears that sorption plays a relatively small role in the distribution of VOCs at the site, with the possible exception of unit F2 beneath the source area....away from the source area, sorption appears to play a negligible role in the capture and subsequent release of contaminants at the site."

Further support of the above contentions regarding the significant role of sorption need to be included. Specifically: what is the organic carbon content (f_{oc}) of the soil; and what are the calculated retardation factors for TCE, cis-1,2-DCE and VC?

Numerical evidence should be provided to substantiate these conclusions. Further, no groundwater velocity calculations are provided (for transport). The lack of groundwater velocity calculations is a significant shortfall in the determination of natural attenuation processes, especially in proving plume stability.

Comment #80. ***Section 7.2.5, Page 7-10, Paragraph 2:*** It is stated that cis-1,2-DCE and VC concentrations at wells EW-9, EW-11 and EW-NW are higher than expected for the inferred environment (lateral cross gradient contaminant migration). In addition, it is hypothesized that another source of VC is present *west* of EW-11. This is an apparent contradictory statement because HLA contends that the flow is predominantly west-southwest. VOCs from a source west of EW-11 would need to migrate *upgradient* to impact any of these wells.

Comment #81. ***Section 7.3, General:*** This section should be amended to incorporate a discussion of the biotic and abiotic transformations. The following is suggested text:

Biotic Transformations

Biotic transformations (also commonly referred to as biotransformation, biological degradation, or biodegradation) are caused by microorganisms and are generally the most important transformation mechanisms in groundwater systems (Wiedemeier et al., 1996). During biological degradation, organic compounds present in the aquifer often serve as a primary substrate (i.e., food source) for microorganisms. When a compound serves as a primary substrate, it acts as an electron donor to the microorganisms (i.e., the compound "donates" electrons to provide the microorganism with energy). This process most readily occurs under aerobic conditions. The biodegradation of fuel constituents such as benzene, toluene, xylene, and ethylbenzene (BTEX) occurs in this manner. Chlorinated aliphatic hydrocarbons (CAH), on the other hand, do not generally act as a primary substrate (i.e., they are not generally a food source). Instead, an alternate food source is utilized by the microorganisms and the CAH are used as electron acceptors in a process referred to as reductive dechlorination that occurs under anaerobic conditions. Reductive dechlorination of TCE generally occurs by sequential dechlorination to Dichloroethylene (1,2-DCE) to VC to ethene. During this sequential dechlorination, the CAH, used as an electron acceptor, has chlorine ions progressively removed and replaced with hydrogen atoms.

All of the chlorinated ethenes may be degraded by reductive dechlorination, though the rate of transformation decreases with decreased chlorination (Wiedemeier et al., 1996). Consequently, dechlorination of TCE to DCE occurs under mild to moderate reducing conditions whereas dechlorination of DCE to VC appears to require more strongly reducing conditions (Semprini et al., 1995).

Reducing conditions are generally characterized by the dominant competing electron acceptor. To function, microorganisms must pass the electrons used in their metabolism to some electron acceptor. Microbial populations use a variety of electron acceptors depending on redox (i.e., oxidation-reduction) conditions. When sufficient oxygen is present, oxygen is used as the prime electron acceptor and aerobic biodegradation dominates. When oxygen is depleted microorganisms use other electron acceptors in the following order of preference:

Nitrate (NO_3^-) → *Manganese(IV)* (MnO_2) → *Iron(III)* ($FeOOH$) → *Sulfate* (SO_4^{2-}) → *Carbon dioxide* (CO_2)

As reducing conditions become increasingly strong in an environment without oxygen (i.e., anoxic), the dominant metabolic pathway goes from denitrification, to manganese reducing, to iron reducing, to sulfate reducing, to methanogenesis (where CO_2 is reduced to produce methane). Microorganisms gain the most energy from the reduction of oxygen, nitrate, manganese, iron (III), sulfate, and carbon dioxide (in that order). Dechlorination (CAH as electron acceptor) generally provides a small amount of energy that is on the order of sulfate reduction (Wilson et al., 1996).

Consequently, reductive dechlorination occurs most readily under the strongest reducing conditions, and measuring concentrations of the above electron acceptors provides an indication of the potential for reductive dechlorination to occur.

The availability of electron donors is equally important in determining the significance of reductive dechlorination. In fact, biodegradation of CAH is generally an electron-donor-limited process (McCarty, 1996). Both native organic carbon in an aquifer and anthropogenic carbon (e.g., fuel hydrocarbon), when present, are used as electron donors. Wiedemeier et al. (1996) define three characteristic types, or levels, of reductive chlorination that are correlated with the electron donor availability. Type 1 behavior occurs when the primary substrate is anthropogenic carbon and results in rapid and extensive degradation of highly chlorinated compounds such as tetrachloroethylene (PCE), TCE, and 1,2-DCE. Type 2 behavior occurs in chlorinated solvent plumes in areas where natural organic carbon drives dechlorination and generally results in slower (but potentially significant) rates of biodegradation. Type 3 behavior predominates in areas of a plume where the carbon donor concentrations are low and dissolved oxygen concentrations exceed approximately 1 milligram per liter (i.e., aerobic conditions). Under Type 3 behavior reductive dechlorination of PCE, TCE, and 1,2-DCE will not occur but VC can be readily oxidized. Therefore, measuring and evaluating the total organic carbon within the aquifer (soil and water) can provide an indication of the potential for reductive dechlorination to occur.

While CAH are most readily biodegraded by reductive dechlorination, under certain circumstances they may also be degraded through cometabolism or as a primary substrate. Cometabolism occurs when an enzyme or cofactor, produced by a microorganism as part of their normal metabolism, happens to degrade the CAH. The microorganism obtains no direct benefit from the transformation. TCE, DCE, and VC may be degraded through cometabolism under both aerobic and anaerobic conditions (Vogel, 1994). PCE may be used in cometabolism under anaerobic conditions. The only chlorinated ethene capable of being used as a primary substrate is VC, which may be used as a primary substrate under aerobic conditions (McCarty and Semprini, 1994).

Abiotic Transformations

In addition to degrading biotically, as discussed above, constituents may also be degraded through abiotic or chemical transformations. For example, CAH generally undergo either or both substitution and dehydrohalogenation reactions in water (Vogel et al., 1987). During substitution reactions (hydrolysis), the CAH reacts with water (a halogen is replaced with a hydroxy group) to form an alcohol. Trichloroethane (TCA) chemically transforms to acetic acid in a hydrolysis reaction (McCarty, 1996). Dehydrohalogenation reactions of CAH in water usually involve the elimination of hydrogen halide from an alkane and the formation of an alkene (Vogel et al., 1987). For example, TCA forms 1,1-DCE as a result of dehydrohalogenation. According to McCarty (1996), TCA is the only major CAH that is likely to be transformed chemically in groundwater in less than one to two decades.

Comment #82. *Section 7.4, General:* HLA has not demonstrated that contaminant mass is being naturally degraded, and not simply redistributed by sorption, advection, dilution and dispersion. Physical parameters and inorganic chemistry data such as temperature, pH, alkalinity, sulfate, manganese, chloride, dissolved organic carbon/total organic carbon (DOC/TOC) are not discussed but are an integral part in any evaluation of biodegradation potential.

Comment #83. *Section 7.4.1, General:* HLA points to the fact that methane is being produced in the source area as an indicator of degradation of TCE. However, methanogenesis is a common occurrence in landfills where organic material is degraded, and HLA states that methane was detected during soil gas sampling beneath most of the site (p.4-23). HLA cannot conclusively demonstrate that this methane is attributable to biodegradation of TCE. By the same argument, although ADEQ does agree that ethene is a daughter product of the breakdown of vinyl chloride, HLA cannot conclusively demonstrate that this ethene is attributable to biodegradation of vinyl chloride, with other potential sources of ethene present (e.g., the landfill). Further, the presence of methane is often indicative of reducing and/or anaerobic conditions, under which TCE can dechlorinate to VC and VC to methane. However, HLA has not conclusively demonstrated that the presence of methane is attributable to the degradation of VC alone.

Comment #84. *Section 7.4.1, Page 7-14, Paragraph 2:* Four wells are selected to represent background, source and downgradient locations (EW-NE, EW-PZ1, EW-4 and EW-1) which are along the same flowpath. To demonstrate a more complete picture of site conditions, ADEQ recommends that wells EW-22, EW-E, and E W-9 be included in this evaluation. Furthermore, an explanation of why only one set of data (June 1995) was compared? If there are trends in the data, this should be presented.

Comment #85. *Section 7.4.1, Page 7-15, Paragaraph 3:* The site redox condition is described as iron reducing. This may be the case near the source area (see discussion below), however, it is not clearly demonstrated that this is the case for the entire site. To clearly demonstrate that iron reducing conditions predominate, the following must be shown:

- An increase in ferrous iron concentrations across the site (not only in the source area). It is highly likely that the same redox condition does not predominate across the site. In fact, HLA has indicated that redox conditions do change (pg. 7-16) downgradient of the source area.

- Depletion of other alternate electron acceptors. Electron acceptors are utilized by microbes according to their potential energy contribution. Oxygen, sulfate, nitrate and manganese (in order of utilization) will be depleted before iron is utilized. It should be demonstrated that alternate electron acceptor concentrations have decreased over time or remain low. As noted previously, manganese is not given any mention in the text.

Comment #86. ***Section 7.4.1, Page 7-15, Paragraph 3:*** "The presence of these iron reducing conditions, coupled with the presence of the VC degradation product ethene, suggest that a portion of the VC is being completely mineralized in the source area."

> First, complete mineralization refers to the transformation of a chlorinated organic to carbon dioxide, water and chloride. From the RI data, there is no proof that carbon dioxide or chloride concentrations are increasing. Therefore, the conclusion that VC is being completely mineralized appears suspect. Chloride concentrations may be examined (although naturally occurring sources of chloride may be high locally, as may be anthropogenic sources) in addition to carbon dioxide concentrations. Also, while the above mentioned conditions (low redox and ethene presence) do support the conclusion that VC has the potential to be degraded, there should also be an increase in chloride and carbon dioxide concentrations as vinyl chloride is transformed to ethylene (ethene), carbon dioxide and water.
>
> Second, if a "portion of the VC is being completely mineralized in the source area", what is the fate of the other portion? Is it not being degraded? What portion of the compound is being referred to here? This statement needs clarification.

Comment #87. ***Section 7.4.2, Page 7-17, Paragraph 3:*** The ultimate fate of VC across the entire site must be addressed. In fact, HLA states: "Furthermore, the dissolved oxygen (DO) concentrations in groundwater at EW-1 (2.36 ppm) indicate that microorganisms would have additional capacity to degrade excess residual (low µg/l) concentrations of VC."

> The above sentence implies that VC will be degraded, however HLA offers no proof (e.g., increases of CO_2 and chloride in these aerobic zones). Furthermore, there is a concentration range which supports microbial populations; at high concentrations, the contaminant becomes toxic to the microbes; at low concentrations the substrate (contaminant) is insufficient to support growth of the population. Therefore, low VC concentrations could be insufficient to support a population. What is stated above is simply proof that the conditions are appropriate for the *potential* biodegradation of VC.

Section 8.0 Assessment of Risk

Comment #88. ***Section 8.0, General: Per RAGS, page 8-12, col. 2, para. 2:*** "Resulting cancer risk estimates should be expressed using one significant figure only." For instance, 2.62×10^{-4} ILCR should be 3×10^{-4} ILCR. Per EPA's Risk Assessment Guidance for Superfund (RAGS), page 8-17, col. 2, para. 1: The same is true for noncancer health hazard because "...the uncertainty about the results is generally large (i.e., on the range of at least an order of magnitude or greater)" For instance, 1.45 HI is just as well stated as 1.5 HI.

Comment #89. ***Section 8.1, Page 8-1, Paragraph 4:*** "s are a screening level for identifying ~~chemicals that do not pose a potential risk.~~ **chemical concentrations that exceed a 1 in a million risk for a specific land use scenario.**" Also, screening against s doesn't necessarily protect groundwater; that's why EPA came up with the soil screening levels (SSLs). s don't protect against cumulative effects; 10 chemicals at 1x10^{-6} ILCR is 1x10^{5} ILCR and, according to the National Contingency Plan., requires risk management consideration to reduce or mitigate exposure. These two aspects must be addressed in the paragraph before COCs in soil can be dismissed. Also, RAGS, page 5-21 states that chemicals for which there are ARARs cannot be excluded from the RA. The ADEQ SRLs are applicable (if once exists for a particular COC) in this case and must be addressed before COCs are dismissed.

Comment #90. ***Section 8.1, Page 8-2, Paragraph 2:*** "*... present in less than 5% of the samples from any one media or area can be eliminated from further assessment (EPA, 1989b).*" Dismissing COCs at <5% frequency of detection (FOD) isn't necessarily recommended in RAGS. Per page 5-22 of RAGS, using a FOD rule (e.g.5% FOD) is dependent on meeting related criteria: "*... (1) the chemical is detected infrequently in one perhaps two environmental media, (2) it is not detected in any other sampled media or at high concentrations, and (3) there is no reason to believe that the chemical may be present.*" Further, if 5% is used, there must be at least 20 samples of the medium. Dismissing COCs using a 5% rule must address these criteria. An alternative for reducing the COC list is using the concentration-times-toxicity (C-dot-T) formalism, eliminating those COCs that contribute <x% of the total risk. However, all these techniques must be consistent with ARARs and absence of the dismissed COC in other media. The paragraph in the RA should address all this in more detail.

Comment #91. ***Section 8.1, Page 8-2, Paragraph 2:*** "... no s or other standards for soil gas samples." Ambient-air s constitute at least *to be considered* criteria for evaluating soil gas. Soil gas can be evaluated, as measured, or the Farmer model from the ADEQ Deterministic Risk Assessment Guidance can be used to model soil gas into the ambient air where the modeled concentration can be compared to ambient air s. My guess is that the soil gas measurements will pass the ambient-air s without the modeling or with only one model run to establish the concentration reduction factor for the rest of the measurements. The sentence must be revised to acknowledge ambient-air s and to reconcile the soil gas measurements in more detail than is presented.

Comment #92. ***Section 8.1, Page 8-2, Page 3:*** "*... extremely conservative ....*" Qualitative terms such as this have no scientific reference and should be avoided. Also see page 8-5, para. 1, line 2.

Comment #93. ***Section 8.1, Page 8-2, Paragraph 3:*** "Groundwater near the Salt River bed is generally unsuitable for potable use due to natural factors. In addition, other sources of groundwater contamination have been identified offsite." In Arizona, groundwater is being protected as a resource and all aquifers are classified as *Potable Use*, unless classified otherwise by the Director of ADEQ. Therefore, groundwater remediation must meet either applicable requirements (comparable to CERCLA's ARARs) or risk-based criteria at the point of contamination. Contaminants impacting groundwater must meet criteria at that point.

Comment #94. ***Section 8.3, General:*** ADEQ recommends that the risk assessment thoroughly reference the SCM. The requirement for conceptual site models (current and future land use) is prevalent throughout USEPA guidance (RAGS). Additional evaluation of groundwater standards such as Arizona Aquifer Protection Standards and the preamble to the National Oil & Hazardous Substance Contingency Plan (NCP) (residential standards), should be evaluated before a non-residential scenario is utilized.

Comment #95. ***Section 8.3.1.4, Page 8-5, Paragraph 2:*** "... exposed to industrial use of groundwater ... evaluated, in accordance with EPA guidance (EPA, 1989a)." RAGS (Vol. 1, Part B, page 13, col. 2, para. 4, l. 7) states: *Even if a site is located in an industrial area, the ground water underlying a site in an industrial area may be used as a drinking water source for residents several miles away due to complex geological interconnections.* Probably more important is compliance with AZ aquifer protection standards as ARARs. An industrial future offsite exposure may not be the appropriate receptor. Clarification of the basis for an industrial ground water exposure is requested.

Comment #96. ***Section 8.3.3, Page 8-7, Paragraph 1:*** "Dose is defined as the amount of chemical assimilated into the body over a given period of time." This is not consistent with RAGS. RAGS is based on intake, the administered dose (intake), not the absorbed dose. [lead and one or two others, like Cd, are based on absorbed dose, primarily because the research supports a bio-kinetic uptake model useful for risk assessment.

Comment #97. ***Section 8.3.3, Page 8-7, Paragraph 2:*** The equation justified by EPA, 1989a (specifically, exhibits 6-11 through 6-18) does not contain B = Bioavailability (percent); it doesn't belong in the equation as justified by the reference given. Also, revise as follows: C = ... (air: mg/m^3 or water: mg/l); IR = Intake rate (air: m^3 /day or water: l/day); RAGS, Volume 1, Part A (EPA, 1989a) is a large document. Where the reference is useful for a specific justification, a more specific reference should be cited, for instance: chapter, page, column, paragraph, line.

Comment #98. ***Section 8.3.3.1, Page 8-8, Paragraph 1:*** Add a sentence at the end of the paragraph: "Detailed description of the RME and the average exposure scenario may be found in Appendix C, section ___." or elaborate on the definition of *RME.*

Comment #99. ***Section 8.4, General:*** Due to the claim that 10^{-5} cancer risk is greater than the de minimis level 10^{-6}, the NCP requires further consideration to reduce exposure, i.e., institutional controls, risk management, or realistic modification of default parameters. These requirements should be mentioned in discussion of cancer risk.

Comment #100. ***Section 8.4.2.1, Page 8-12, Paragraph 2:*** "... are within the acceptable range for a nonresidential Site in the State of Arizona ..." A reference should be provided for this statement.

Comment #101. ***Section 8.4.2.2, Page 8-13, Paragraph 2:*** "The point of departure for risk management in the state of Arizona for a receptor at a non residential Site is 1×10^{-4} for the 95th percentile individual (ADEQ, 1995)." Provide a more specific reference or description of this statement.

Comment #102. ***Section 8.4.3, Page 8-14, Paragraph 3:*** "... higher degree of scientific validity ..." This statement needs to be clarified. Is this referring to the EPA policy paper on using Monte Carlo simulation modeling for risk assessment (EPA/630/R-97/001)? Or possibly, that averaging each well before averaging all the wells is better correspondence to the Central Limit Theorem and therefore is more valid than the ADHS approach? More description would promote easier understanding.

Section 9.0 Community Involvement Plan

No Comments

Section 10.0 Summary and Conclusions

Comment #103. ***Section 10.0, Page 10-2, Paragraph 2:*** The statement "One source is located onsite and the other two are offsite" needs to be revised or removed. See following comment for more details.

Comment #104. ***Section 10.0, Page 10-2, Paragraph 2:*** *Onsite Sources* - the report mainly identifies the liquid waste disposal pit. However, based on the lack of confirmation data from the Landfill relocation, results of the soil gas survey and groundwater sample results along the northern landfill wells, there is potential that other onsite sources of VOCs may be present in the existing and former landfill areas.

> *Offsite source(s) to the south* - Sufficient data has not been presented to preclude *contribution* of release(s) at Estes Landfill to VOC concentrations in reported groundwater south of the Site. (See Comment #s 5, 6, 72, & 75.)
>
> *Offsite source(s) to the north* - Sufficient characterization of the groundwater flow regime, potential contaminant sources or evaluation of more recent well data has not been conducted to preclude *contribution* of release(s) at Estes Landfill to VOC concentrations reported in groundwater north and northwest of the Site. It is most likely that the contamination to the north and northwest did originate from the landfill or past landfill location. The groundwater chemistry, which is used to define the plume boundary, indicates that the only origin of vinyl chloride is the landfill itself.

Comment #105. ***Section 10.0, Page 10-3, Paragraph 2:*** In terms of the signature chemicals, ADEQ believes that further evaluation of other compounds of interest is still necessary (See Comment #s 11 and 50).

Comment #106. ***Section 10.0, Page 10-3, Paragraph 3:*** The following statements should be revised: "The northern lateral extent is more difficult to define due to the presence of an additional source north of the Site. However, assuming a dispersion pattern to the northwest is similar to the dispersion noted to the southwest, the northern lateral extent would be in the vicinity of well EW-11". Further evaluation of the north and northwest extent of the VOC plume is required before citing sole contribution of VOCs at well EW-22 from sources to the north. See Comment #s 72 & 75. ADEQ's Site Boundary Map (December 1998, enclosed) shows the site's plume extending beyond well EW-22.

Comment #107. ***Section 10.0, Page 10-4, Paragraph 1:*** In terms of defining the vertical extent of groundwater contamination of VOCs, it would appear that based on the results of the deepest well onsite (EW-15), the vertical extent has not been fully characterized (See Comment #s 74 and 76).

Comment #108. ***Section 10.0, Page 10-4 and 10-5:*** Refer to Comment #s 78 through 87.

OVERALL CONCERNS AND RECOMMENDED ACTIONS

1. Evaluation of Onsite Sources of VOCs

ADEQ does not believe that sufficient investigative activities have been performed to determine onsite sources of VOCs, other than the liquid waste disposal pit. This is based on the following observations of the RI report:

- No data was presented regarding confirmation of the relocated portion of the old Estes Landfill; concern is that there may have been areas of VOC residuals in the vadose soils or saturated soils.

- Soil gas survey data inferred sources of VOCs at locations other than the liquid waste disposal pit.

- The effort to determine the waste depth of the landfill appears to have been concentrated on the removed section of the landfill, and the east (relocated landfill) section. However, it appears that insufficient effort was made to characterize landfilled wastes and waste depths in the central and west portions of the landfill. In addition, chemistry analyses of soil samples collected seems to have been concentrated on the eastern portion of the landfill and within close proximity to the disposal pit.

- Groundwater sample data indicated TCE concentrations at well EW-19, and VC and cis-1,2-DCE concentrations at EW-11 and EW-22.

ADEQ recommends a more comprehensive analysis of the previous soil gas, soil boring and groundwater investigation data for the Site. Based on evaluation of the data, additional borings may be warranted in the former and current landfill locations, to the north and west of the inferred source area. In addition, further characterization of central and western portions of the landfill is warranted to determine the depth of landfill wastes, impact of constituents in subsurface soils, and identification of other potential sources of VOCs.

2. VOC Impact to Groundwater North and Northwest of Site

HLA contends that another source is causing, or at least contributing, to VOC contamination at wells north and northwest of the landfill, specifically EW-11 and EW-22. Further, HLA states that EW-11 defines the northern boundary of the VOC plume attributed to Estes. However, ADEQ does not believe that the data supports these conclusion based on the following observations of data reported in the RI report:

- Evaluation of the groundwater elevations, for the June 1996 sampling event, indicate an inferred groundwater flow direction of west/northwest in the area of wells EW-19, EW-9, EW-11 and EW-22.
- The June 1996 data also suggests that there may be degradation/dilution of VC and cis-1,2-DCE to the northwest along the path of EW-19, EW-9, EW-11, and EW-22.
- VC concentrations have consistently exceed ADEQ AWQSs in groundwater samples collected at well EW-22, since its initial sampling in June 1995.

ADEQ recommends evaluation of subsequent groundwater elevation and sample analytical data from 1996, 1997, and 1998 for these wells to confidently verify these observations. If this evaluation supports this observation, an additional well may warrant installation to the northwest of EW-22, along the (inferred) predominant groundwater flow path.

3. Vertical Characterization of VOCs in Unit F4

Contrary to the HLA statement that "...the vertical extent of VC appears to be limited to the upper alluvial units of F1, F2, and F3....," the high concentrations of VC found at well EW-15 (unit F4) would indicate that the vertical extent of VC in groundwater has *not* been fully determined. VOC concentrations in groundwater samples collected at well EW-15 have consistently exceeded respective AWQSs for VC and cis-1,2-DCE, since sampling was initiated at this well in December 1993.

ADEQ recommends further assessment at the source area to determine the vertical migration VOCs in Unit F4 and underlying units, if warranted. This may entail drilling of a boring into

Unit F4 with continuous core sampling and possible downhole geophysical logging to determine lower boundaries of the unit. Hydropunch or equivalent equipment can be used for depth specific (insitu) sampling of groundwater within the borehole, to determine an accurate VOC contaminant profile. Pending results of the sample and logging, a discretely screened well may be warranted for completion, to be used for future monitoring of the deeper impacted zone.

4. <u>Use of Soil Remediation Levels (SRLs) vs. Health Based Guidance Levels (HBGLs)</u>
When this report was submitted to ADEQ for review, the Soil Rule was not yet finalized. However, this rule was finalized on December 4, 1997, and the SRLs are now legally binding cleanup levels. Thus, when applicable, the SRLs should be referenced instead of the HBGLs, unless an SRL does not exist for a specific contaminant.

5. <u>Natural Degradation of VOCs in Soil and Groundwater</u>
ADEQ does not believe that adequate characterization has been conducted of the natural degradation potential and conditions at Estes, as supported by comments to Section 7.0 of the draft RI report.

ADEQ recommends the following in support of establishing a comprehensive understanding of the natural VOC degradation potential at the Estes site:

- Mechanisms that may create an anaerobic/aerobic degradation environment;
- Further evaluation and demonstration of iron reducing conditions;
- Further evaluation and demonstration of chloride and CO_2 concentrations as they relate to the degradation of VC;
- VC concentration populations required to support microbial degradation processes;
- Methane production and distribution relative to TCE degradation; and
- Utilization of accepted screening protocol and ranking systems for a natural attenuation remedy (Wiedemeier, et. al., 1996).

Data already exists for evaluation of Several of the above items, however, the following is suggested to augment the existing data:

<u>*Analyze groundwater for chloride and carbon dioxide*</u>

Chloride concentrations increase in areas where reductive dechlorination of CAH is occurring, when a chlorine atom is removed from the CAH and substituted for by a hydrogen atom. Although naturally occurring and anthropogenic sources of chloride in the region may be present, the cost of adding this analysis is minimal and may provide additional data in support of natural attenuation (currently only limited evidence exists in the source area of biodegradation--see Table 1).

Carbon dioxide (CO_2) is the ultimate byproduct of the complete mineralization of vinyl chloride under reducing conditions. Addressing the ultimate fate of VC at the site, it is important to determine if vinyl chloride is being oxidized or reduced. If VC is being oxidized, the following sequence of parent and daughter products may be observed:

$$\text{VC} \rightarrow CO_2 + H_2O + Cl^- \quad \text{[Equation 1]}$$

In the instance of the reduction of VC, one of the following two sequences may be observed:

$$\text{VC} \rightarrow \text{Ethene} + Cl^- \rightarrow \text{Ethane} \rightarrow \text{Methane} \qquad \text{[Equation 2]}$$
$$\text{VC} \rightarrow CO_2 + H_2O + Cl^- \quad \text{[Equation 3]}$$

VC in Equation 3 can be directly mineralized during reduction of iron (III) to iron (II) (Bradley and Chapelle, 1996).

Generally, a sequential anaerobic/aerobic system is most effective in terms of rate and complete mineralization in the biodegradation of CAH, with an anaerobic system most effective in initially reducing the highly chlorinated CAH (e.g., TCE, DCE) and an aerobic system later oxidizing the less chlorinated CAH (e.g., VC) (Vogel, 1994). Monitoring of dissolved oxygen (DO), ORP (oxidation reduction potential or redox) and alternate electron acceptors consistently at select locations across the site is necessary to determine the prevailing type (aerobic/anaerobic) of system.

Sample additional wells for natural attenuation parameters
The Air Force Center for Environmental Excellence (AFCEE) protocol requires data from a minimum of six wells, over a sufficiently lengthy time period so as to eliminate seasonal, analytical and sampling variability. In support of natural attenuation, few wells have been monitored in more than one sampling round. The addition of two wells which would define the lateral extent of the plume and, in addition, at least one more well within the plume, such as EW-18, would be required to confirm CAH natural attenuation.

Determine the CAH soil/water distribution coefficients (K_d) and organic carbon/water partition coefficients (K_{oc}), the fraction of organic carbon content in soil (f_{oc}) and the CAH retardation factors (R_d)

The retardation factor, R_d, represents the attenuation of a plume's frontal advancement due to sorption, i.e., temporary storage, on soil grains. Examples of analyses for which retardation must be considered include (1) calculation of the time required for contamination to reach a given downgradient location, and (2) determination of the time required to remediate a contaminated aquifer. The retardation factor is defined by the following relationship (Freeze and Cherry, 1979):

$$R_d = 1 + \rho_b K_d / n_e$$

where ρ_b is the bulk dry density of the soil (mass/volume), n_e is the effective porosity of the soil (volume of voids/total soil volume), and K_d is the soil-water partition coefficient (volume/mass), often referred to as the distribution coefficient.

The soil-water partition coefficient is the relative magnitude of the chemical concentration on solid particles and in pore water for a particular soil (Lyman et al., 1982):

$$C_s = K_d C_w$$

where,
C_s = concentration of the compound sorbed to the solid phase of the soil (mass chemical/bulk dry mass soil), and
C_w = concentration of the compound in the pore water of the soil (mass/volume).

In this expression it is implicitly assumed that an equilibrium exists between the solid and water phases and that the sorption process is linear (Freundlich isotherm with exponent equal to unity) over the range of concentrations considered.

For non-ionic organic compounds such as VOC, K_d can be estimated from the measured fraction of organic carbon naturally occurring in the soil, f_{oc} (grams organic carbon/gram dry soil), and the organic carbon sorption coefficient, K_{oc}, as long as $f_{oc} \geq 0.001$.

$$K_d = f_{oc} K_{oc}$$

Values of K_{oc} for many common organic compounds are available in the literature. K_{oc} is also related to the octanol-water partition coefficient, K_{ow}, for which a large data base is also available (e.g. Hansch and Leo, 1979). For fine-grained soil particles, K_{oc} and K_{ow} can be related as follows (Karickhoff et al., 1979):

$$K_{oc} \cong 0.63 K_{ow}$$

Chemical-specific relationships between K_{oc} and K_{ow} also exist for several VOC (e.g., Lyman et al., 1982).

NOTE: Estimation of f_{oc} will require collection of subsurface soil samples.

Threshold Concentrations
Microbes responsible for biodegradation of CAH must expend energy necessary to sustain normal metabolic cell processes. Additional energy derived from oxidation of organic compounds is required to facilitate cell growth, reproduction and population growth. At low concentrations of CAH, minimal energy is available from CAH oxidation to be utilized as maintenance energy, to permit the microbes to remain alive, but not to facilitate cellular or population growth. Therefore, although CAH may oxidized, the population size does not increase, nor is there a noticeable decrease in CAH concentrations or increase in daughter products (Alexander, 1994). Therefore, in the instance of VC in groundwater at the Estes Landfill, it is not guaranteed that biodegradation will effect the fate of residual concentrations of VC. Conversely, at high concentrations, CAH may potentially be toxic to populations of microorganisms in the subsurface (Atlas and Bartha, 1993), inhibiting growth and reproduction.

6. **Methane Production at Estes Landfill**
It was stated in Section 6.3.3 that methane was detected at 23 of 26 locations sampled at the Site. Based on the sample concentrations, the production of methane is inferred to be low. In addition, methane is suspected of migration from the Bradley Landfill to the south. Because no data was presented in the report, and no reference concentration were evaluated, ADEQ is concerned that methane production may be at potentially explosive levels, within zones of the landfill.

ADEQ recommends that the existing data be thoroughly evaluated, and monitoring is continued. These results will dictate the necessity for future recovery of methane produced at the Site

7. **Chemicals of Interest for Soil**
The report discusses chemicals of interest for groundwater; however, chemicals of interest for soil are not discussed. These should be included in this report.

If you have any questions regarding this letter, or would like to schedule a meeting to discuss these comments, please contact me at 207-4180. As you are aware, ADEQ's contractor, QST, is available to conduct timely reviews on behalf of the ADEQ. For planning purposes, ADEQ would appreciate a response from you regarding an estimated time frame for addressing these comments.

Sincerely,

Nancy Nesky, E.I.T.
Project Manager
Remedial Projects Unit

Enclosure (ADEQ Site Boundary Map, Dec. 1998)

cc: Cynthia Parker, City of Phoenix
Don Hanson, HLA
John Mieher, QST
Kurt Zeppetello, ADEQ

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