Mason County Sanitary Landfill
Final Closure Plan

Mason County Department of Public Works
Shelton, Washington

April 1991

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MASON COUNTY SANITARY LANDFILL

FINAL CLOSURE PLAN

Prepared for:

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MASON COUNTY SANITARY LANDFILL

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EXECUTIVE SUMMARY

Introduction

This report presents the Final Closure and Post-Closure Plan for the Mason County Landfill in Mason County, Washington. This plan has been prepared in accordance with the Minimum Functional Standards for Solid Waste Handling (WAC 173-304). It includes an evaluation of site hydrological and hydrogeological conditions; a recommended plan for landfill operations, maintenance and environmental monitoring; a description of the recommended closure configuration and cost estimates for closure implementation and post-closure monitoring and maintenance.

Existing Conditions

The 77-acre Mason County Landfill is owned and operated by Mason County. A private contractor performs refuse placement, compaction and covering under supervision of County staff. County personnel also operate the toll booth. The landfill receives about 23,400 tons of MMSW and 2,600 tons of demolition waste annually. Demolition wastes are currently being co-disposed with other solid wastes in the central disposal area of the landfill. To prolong the site life of the existing landfill, a separate demolition disposal area will be constructed immediately north of the MMSW landfill.

The landfill site is relatively flat, re-graded, sandy gravel surface soils with few trees and scattered vegetation. The sandy gravelly soils create a site drainage which is predominately internal with very little ponding or runoff, although some local ponding of surface water is apparent in low areas. An existing swale located south of the site discharges surface water from the area south of the landfill.

Groundwater beneath the site occurs in two aquifers located within 200 feet of the ground surface. Groundwater in the uppermost aquifer flows to the southeast and is separated from the lower aquifer by a silt aquitard consisting of fine sand, silt and clay.

Groundwater sampling at the landfill indicate some impact to the uppermost aquifer in the vicinity of the landfill. However, in most cases, sampling results were well within State Primary MCLs (WAC 173-304) and Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200). Elevated parameter levels relative to the background well, have been detected in down gradient monitoring wells and in an offsite well, known as the Blucher (shallow) well, also located downgradient of the site. Only one other well draws groundwater from the uppermost aquifer within 2,000 feet of the landfill, the Auto Yard well. However, this well does not appear to lie down gradient of the site. The Blucher (shallow) well has been replaced by a new deep well which is currently included in the quarterly monitoring program.

Five new monitoring wells have also been installed at the landfill and are currently part of the groundwater monitoring program.

Landfill Closure

Waste disposal at the landfill is proposed to continue through April 1993. The time extension to operate through April 1993 is necessary to allow Mason County to collect funds for closure construction; to allow the landfill to reach final grade, and to allow the County to secure additional disposal capacity.

Closure features include the construction of an extremely low permeable cover system which will reduce leachate production to less than 1% of precipitation. The cover system will utilize a minimum 50 mil geomembrane with a high permeable soil drainage layer, topsoil layer and seeding.

A passive gas vent and flare system is also proposed. This system would vent gas through the cover and burn it in flares. Six dual-completion probes will be installed to the east, west and south of the landfill to monitor gas migration. Should gas migration exceed regulatory limits, the passive system will be upgraded by phase to an active system.

Closure of the landfill also includes development of a surface water management plan. The objectives of the plan are to prevent run-on of surface water onto the existing landfill, prevent storage of surface water upgradient of the landfill, limit erosion from the landfill and prevent peak flows from exceeding their present values.

Post Closure Activities

Periodic inspection and maintenance of the closure system will be required to ensure that their performance meets design standards. Major closure systems which require inspection and maintenance include the following:

- Final Cover System
- Surface Water Management System
- Gas Management System
- Site Access Roads
- Groundwater, Gas and Surface Water Monitoring Facilities

A regularly scheduled monitoring program will be required for the site after closure. Quarterly monitoring of groundwater, surface water and gas migration probes will be required through an approximately twenty year post-closure period.

Economic Analysis

Budget level estimates for capital and post closure costs have been made for both closure of the landfill and for a post closure period of 20 years. Total capital costs in 1991 dollars are estimated at $943,000. The total annual post-closure costs are estimated at $80,150 for 1994-1995 and at $63,950 for 1996 through 2014.

1.0 INTRODUCTION

1.1 Purpose and Scope

This report presents the proposed operation, closure and post closure approach for the Mason County Sanitary Landfill in Mason County, Washington. It is written to comply with WAC 173-304, Minimum Functional Standards for Solid Waste Handling (MFS).

The report includes a hydrogeological assessment of the facility, including a discussion of groundwater quality and current public and private use of the underlying aquifer. The closure concept for the site is presented together with the associated cost estimate. Operation of the site is discussed and a phasing plan to achieve final closure is presented.

This report also includes post-closure monitoring and maintenance procedures. These are long term activities which are necessary to ensure that the landfill does not impact public health and safety or degrade the natural environment. Maintenance and monitoring cost estimates for the site have been provided assuming a twenty year post closure maintenance period.

1.2 Site Description

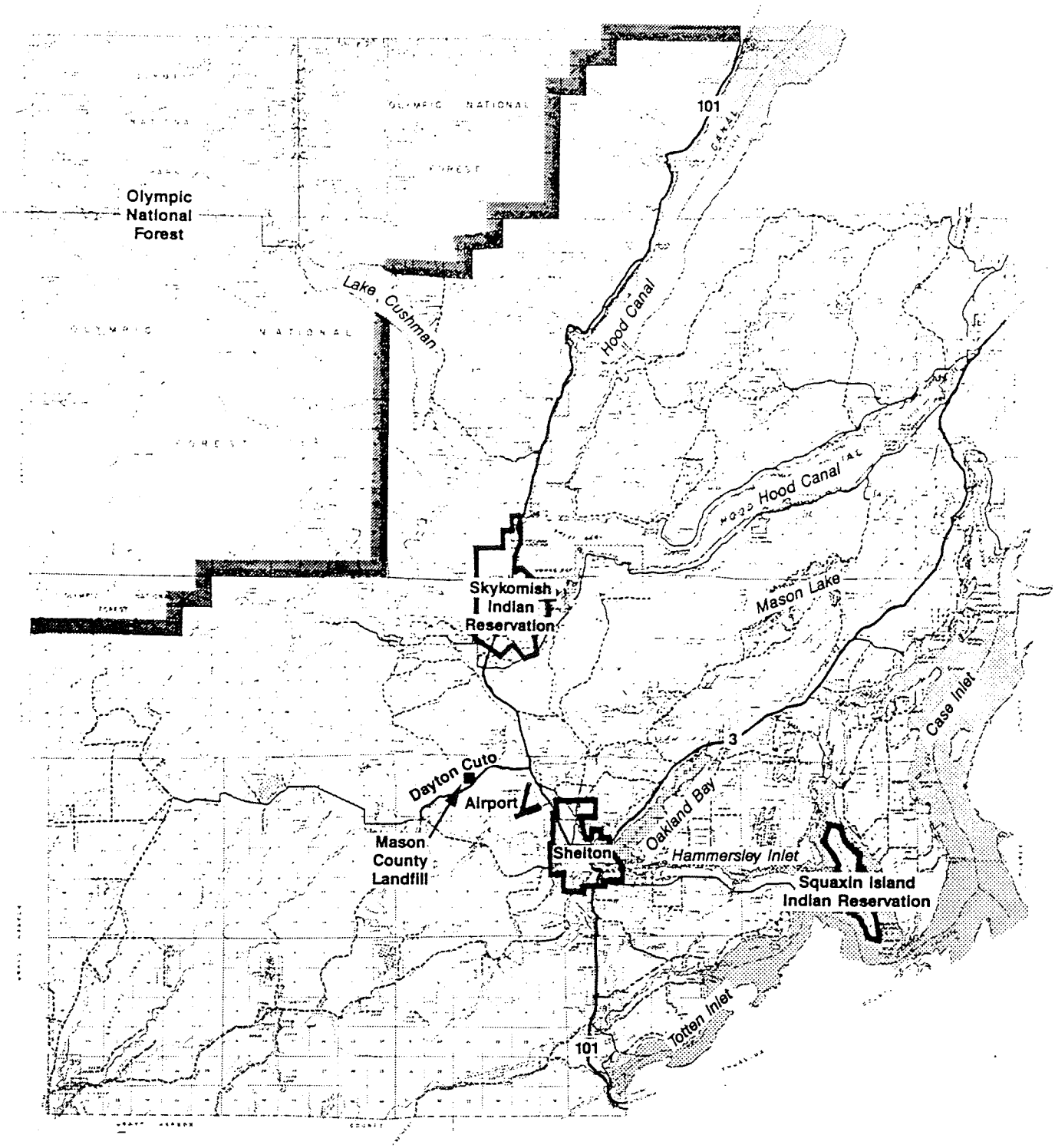
The Mason County Landfill is located about 4 miles northwest of the City of Shelton, approximately 2 miles west of the airport as shown on Figure 1.1. The Landfill is a 77 acre site in the southeast quarter of Section 4, T20N, R4W. The current active landfill occupies approximately 8 acres of the southeast portion of the site as shown in Figure 1.2. Mason County is currently in the process of acquiring a 300-foot wide strip along the south property line. This additional property will be used as a buffer and no refuse placement will occur in conjunction with operation of the existing 8 acre active area.

Surrounding areas to the north and west are sparsely developed and are used predominately for Christmas tree farming. Located approximately 1,500 feet east of the site is an auto wrecking yard, while the Washington State Corrections Center is located 2,000 feet south of the landfill.

The site elevations vary from 320 feet Mean Sea Level (MSL) at the northwest corner, to 286 feet MSL at the southeast corner. Surface water drainage flows southeasterly from the site.

1.3 Site Operation

The landfill site is owned and operated by Mason County. Compaction, refuse placement and daily cover placement is performed by private contractor in accordance with a previously developed operations plan (Parametrix, 1987). Mason County oversees operation of the landfill to ensure compliance with the operations plan. County supervision includes directing disposal locations and areas of operation as well as toll booth operation.



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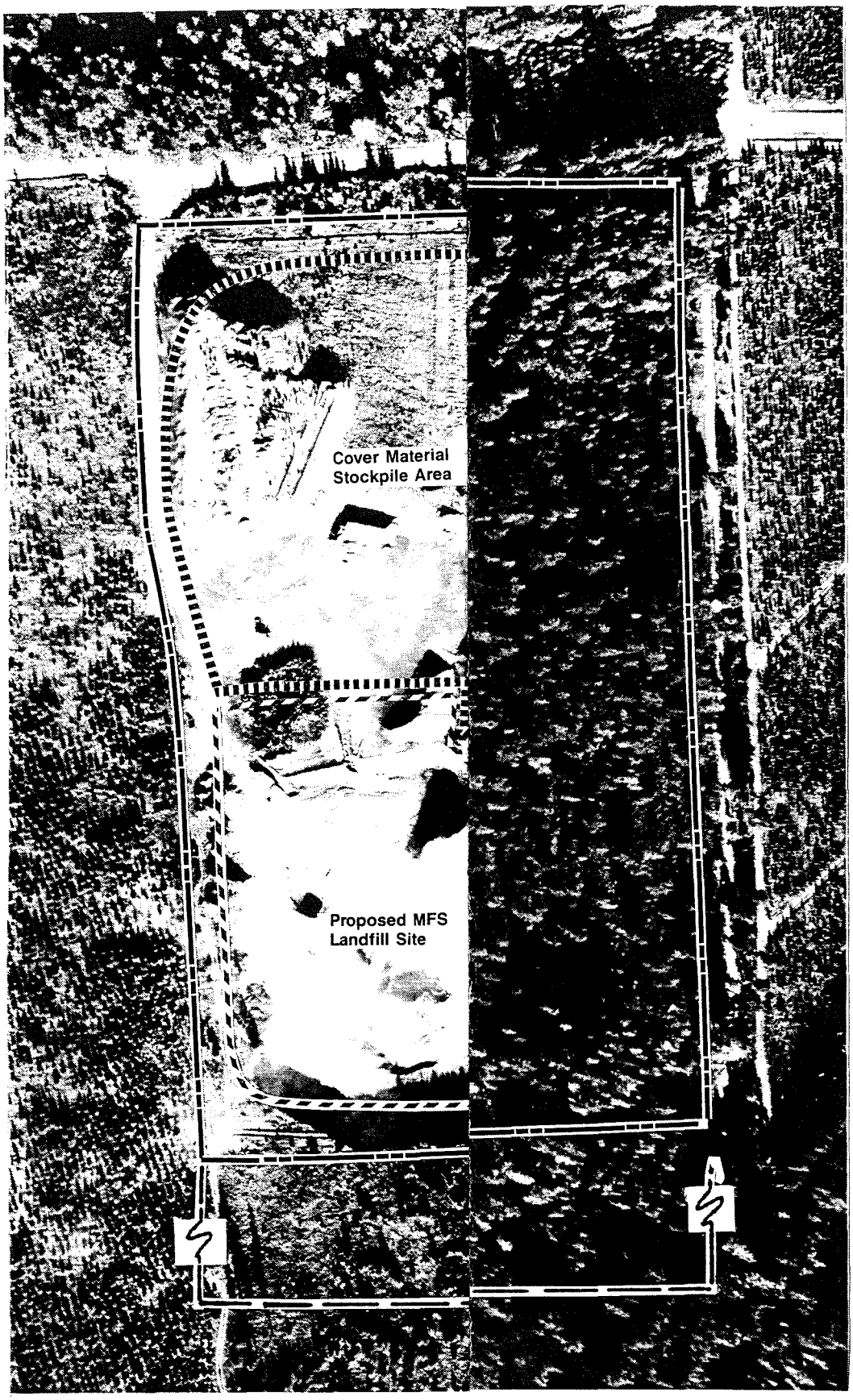
Scale in Miles

Figure 1.1: Vicinity Map



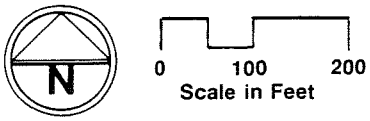


Figure 1.2: Site Plan

Mixed municipal solid waste (MMSW) received at the site is disposed of in the active disposal area located at the southeastern corner of the landfill site as depicted in Figure 1.2. Currently, demolition material is also disposed in the MMSW landfill. Refuse is placed in cells, compacted, and covered daily. Cover material consists of on-site spoil material from a County operated rock crushing operation.

A variance request was submitted in December 1989 which requested that final closure construction of the landfill occur in summer 1993. The variance was never formally approved, however the landfill has continued to receive conditional one-year permits. The current permit expires December 27, 1991.

Closure construction of the landfill in summer 1993 continues to have merit, allowing Mason County time to secure additional landfill capacity. Mason County will end receipt of refuse at the landfill April 30, 1993 and commence closure construction May 1, 1993. Complete closure of the landfill will be achieved by December 1, 1993.

In order to extend the existing landfill capacity through April 1993, a program to separate solid waste from demolition waste is currently in progress. Under this program, a demolition disposal site will be located immediately north of the MMSW landfill in the northeast corner of the site. As discussed in the following section, demolition waste accounts for approximately 20% of the total volume of waste (estimated 10% by weight) received at the site. By segregating the demolition wastes from MMSW and grading the landfill to the proposed final closure contours, the capacity of the existing landfill can be extended to allow sufficient time for new disposal capacity to secured.

Other operations on the landfill site include a County mining operation located in the southwest corner of the site, a septage handling facility in the north central portion of the site, a public drop box station and recycling facilities.

1.4 Waste Stream

The Mason County Landfill is the County's only operating solid waste landfill. In addition to residential and commercial pickup service, refuse from the north end of the County is collected at the Hoodsport, Union, and Belfair Transfer Stations and disposed of at the landfill. Refuse from the City of Elma, the Evergreen State College and the Washington State Dept. of Administration is also disposed of at the site.

Estimated waste tonnages disposed of at the site between 1987 and the projected closure date of early 1993 are listed in Table 1.1. Waste quantities for the years 1987 through 1990 represent historical quantities as determined by the toll booth attendant. Waste quantities are tabulated by volume and converted to tons using a general conversion of 500 lb/cy by Mason County.

The estimated average annual growth rate for the waste stream in Mason County including the City of Shelton is approximately 1.6 percent. This growth is derived from an estimated 2 percent annual growth in the County and a zero growth rate for the City of Shelton. The City of Shelton has not experienced any population growth between 1980 and 1987 (Washington State Security Department 1987). The 1.6 percent annual growth rate was used in Table 1.1 to project the waste stream through closure of the landfill.

Updated topography taken in July 1990 indicates that approximately 142,000 cubic yards of solid waste capacity remain at the landfill site. According to projections in Table 1.1 approximately 145,000 cy of solid waste capacity and 10,800 cy of demolition capacity will be required to provide for site operation from July 1990 through April 1993. This is assuming demolition waste is separated and disposed of in the demolition area by mid 1991.

Calculations show an expected shortage of approximately 3000 cubic yards of solid waste capacity. This amounts to less than one month of solid waste disposal. However taking into consideration the conservative conversion factor used by Mason County to generate tonnage (500 lb/cy) it is believed that no shortage of capacity will occur. In addition, settlement was not taken into account in the evaluation of landfill capacity. If the landfill settles as little as 5% over the next two years, sufficient capacity will have been recovered to operate through April 1993.

TABLE 1.1 MASON COUNTY WASTE STREAM

Year	Estimated Total Tonnage[1,2]	Estimated Demolition (T/Yr)	Estimated Solid Waste T/Yr
HISTORICAL DATA			
1987	27,100		
1988	30,700		
1989	32,200		
1990	25,700		
PROJECTED WASTE STREAM			
1990(1/2)	12,850	—	12,850
1991	26,100	1,300	24,800
1992	26,500	2,650	23,850
1993(1/3)	9,000	900	8,100
Total Tonnage		4,850 T	69,600 T
Total Yardage		10,670 cy	145,000 cy

1 Includes demolition waste.
2 Derived using Mason County conversion (500 lb/cy) and landfill records.
3 Volume in-place, assumes 1000 lbs/cy density, 10% daily and intermediate cover by volume.
4 Volume in-place, assumes 1200 lbs/cy density, 25% daily and intermediate cover by volume.

2.0 HYDROGEOLOGIC ASSESSMENT

This section presents an assessment of the hydrogeologic characteristics of the Mason County Landfill and nearby surrounding area. Items discussed include a description of the regional and local geologic and hydrogeologic conditions, aquifer and aquitard hydraulic properties, groundwater flow, groundwater sampling, groundwater quality, surface waters, and beneficial users in the vicinity.

The information presented in this report consists of data collected during recent field investigations and previous work conducted at the site. Previous work includes the original site groundwater report (Richard Rongey 1973) and two subsequent reports (Hart-Crowser, Inc. 1986 and 1989).

2.1 Climate

Southeastern Mason County has a mild maritime climate generally typical of the Puget Sound lowland. The climate is characterized by mild, wet winters and dry summers. Prevailing southwesterly storms that carry moisture laden air from the Pacific Ocean bring 82 percent of the annual precipitation during the six month period of October through March (Molenaar and Noble 1970).

Precipitation. Collection of precipitation data at the Mason County landfill began in January 1990. The Shelton Weather Station is located approximately 5 miles southwest of the Mason County Landfill, and also collects precipitation data. The normal annual precipitation at the Shelton Station ranges from 0.92 inches in July to 11.45 inches in December. Precipitation at the landfill ranges from a trace in September to 19.4 inches in January. Figure 2-1 is a bar graph showing annual precipitation data from the Shelton Weather Station for 1990.

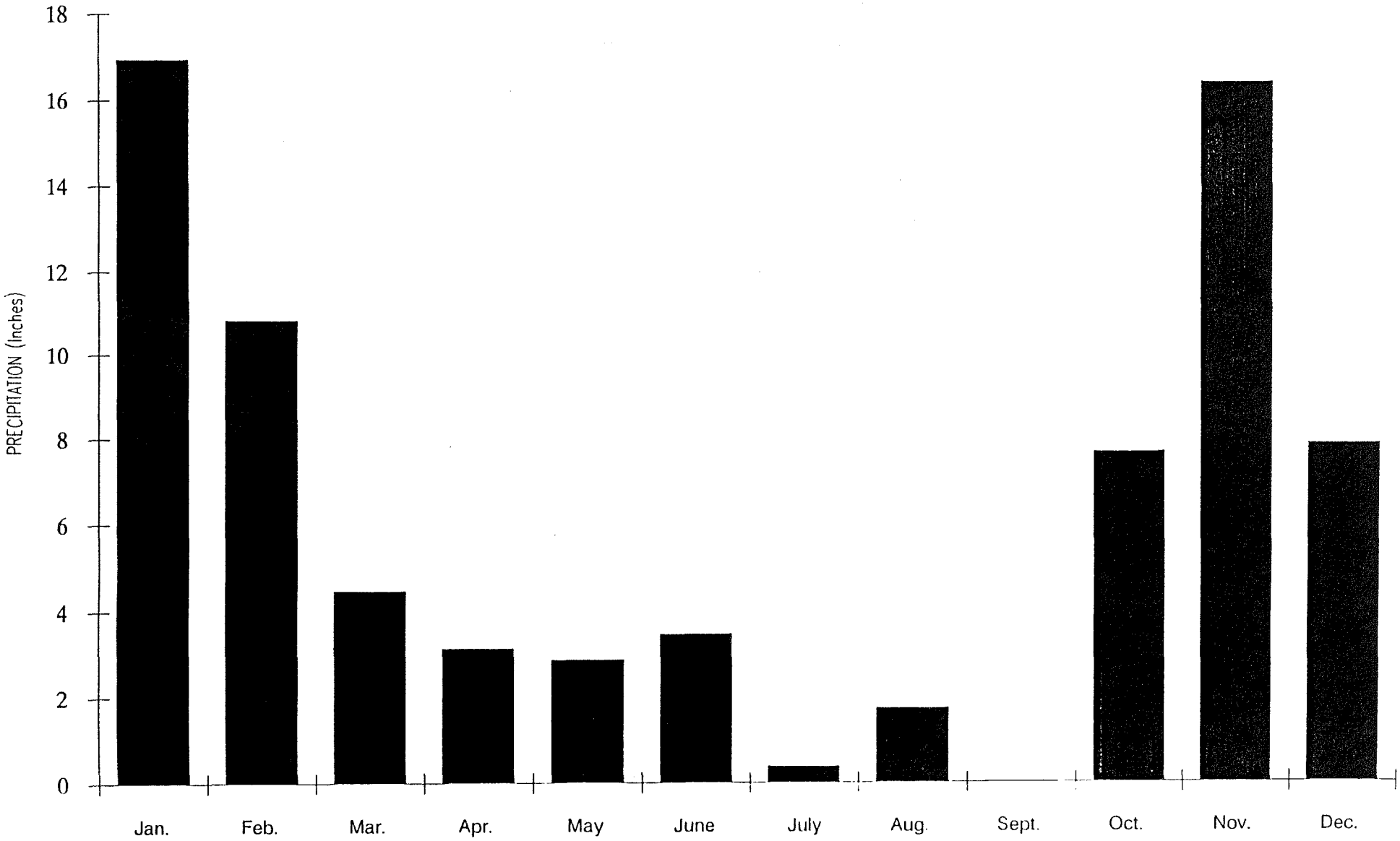
2.2 Regional Hydrogeologic Conditions

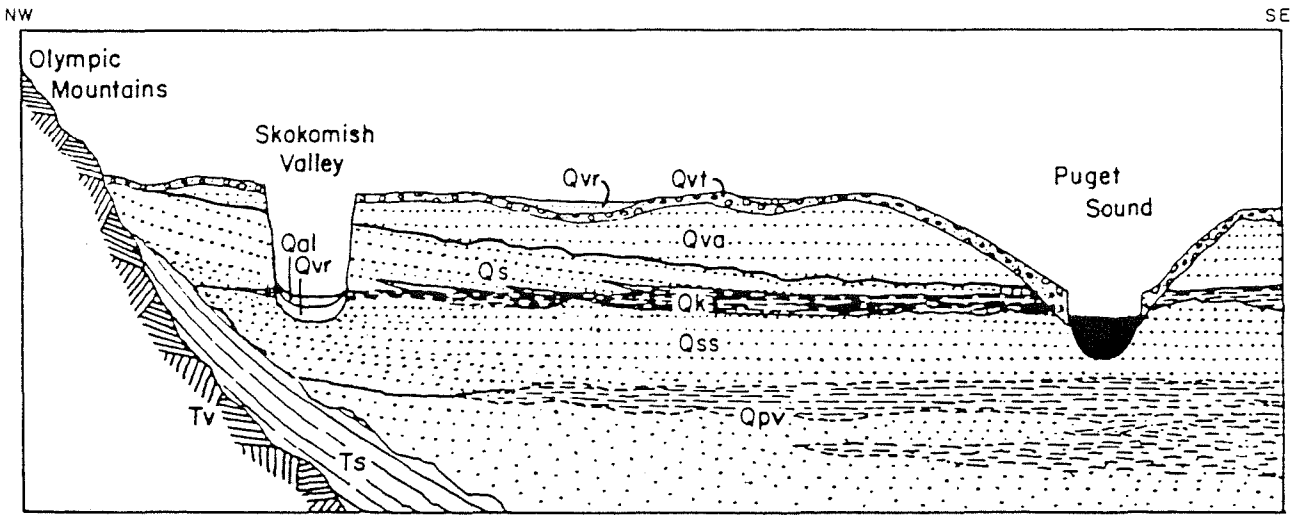
2.2.1 Geology

The Mason County Landfill is underlain by a thick sequence of unconsolidated glacial and non-glacial deposits of Pleistocene age. Typically the deposits consist of interbedded layers of glacial outwash sands and gravels, till, and occasional fluvial and lacustrine deposits from interglacial periods. These deposits are associated with a series of glacial and interglacial stratigraphic units including (from oldest to youngest) Salmon Springs Drift and older undifferentiated sediments, Kitsap Formation, Skokomish gravel and Vashon Drift. In some areas of the western outwash plain, the depth of these deposits are known to exceed 900 feet below sea level (Molenaar and Noble 1970). Figure 2-2 shows the major stratigraphic sections in southeastern Mason County.

FIGURE 2-1

1990 PRECIPITATION DATA





Qal	Alluvium
Qvr	Vashon Recessional Outwash
Qvt	Vashon Till
Qva	Vashon Advance Outwash
Qs	Skokomish Gravel
Qk	Kitsap Formation
Qss	Salmon Springs Drift
Qpv	Pre-Vashon Deposits
Ts	Tertiary Sedimentary Rocks
Tv	Tertiary Volcanic Rocks

Source: Geology and related groundwater occurrence southeastern Mason County, Washington (Molenaar and Noble, USGS Water Supply Bulletin No. 29

Figure 2-2.
Major Stratigraphic Units Southeastern Mason County

Bedrock conditions underlying the unconsolidated deposits in the vicinity of the site are largely unknown but are likely related to Eocene volcanic rock exposed to the south in the Black Hills and north in the foothills of the Olympic Mountains. Bedrock conditions are not considered to be of significance to the hydrogeologic characteristics of the site.

2.2.2 Groundwater

The major source of groundwater recharge in the region is through infiltration of precipitation. Recharge occurs through the more permeable unconsolidated deposits where a large percentage of the precipitation percolates to reservoirs below.

The major water-bearing hydrostratigraphic units in the region are found in the Vashon outwash deposits, the Skokomish Gravel, and the Salmon Springs Drift and older undifferentiated deposits.

In most places, the water table (where present) is within 50 feet of the land surface. In general, the water table rises away from major waterways and stream valleys, and assumes a configuration similar to the rising land surface. Most groundwater discharge takes place beneath the surface of streams, lakes and surrounding waters. Minor amounts of water are discharged to the surface as springs where some aquifers are intersected by valley sides, sea cliffs, and road cuts (Molenaar and Noble 1970)

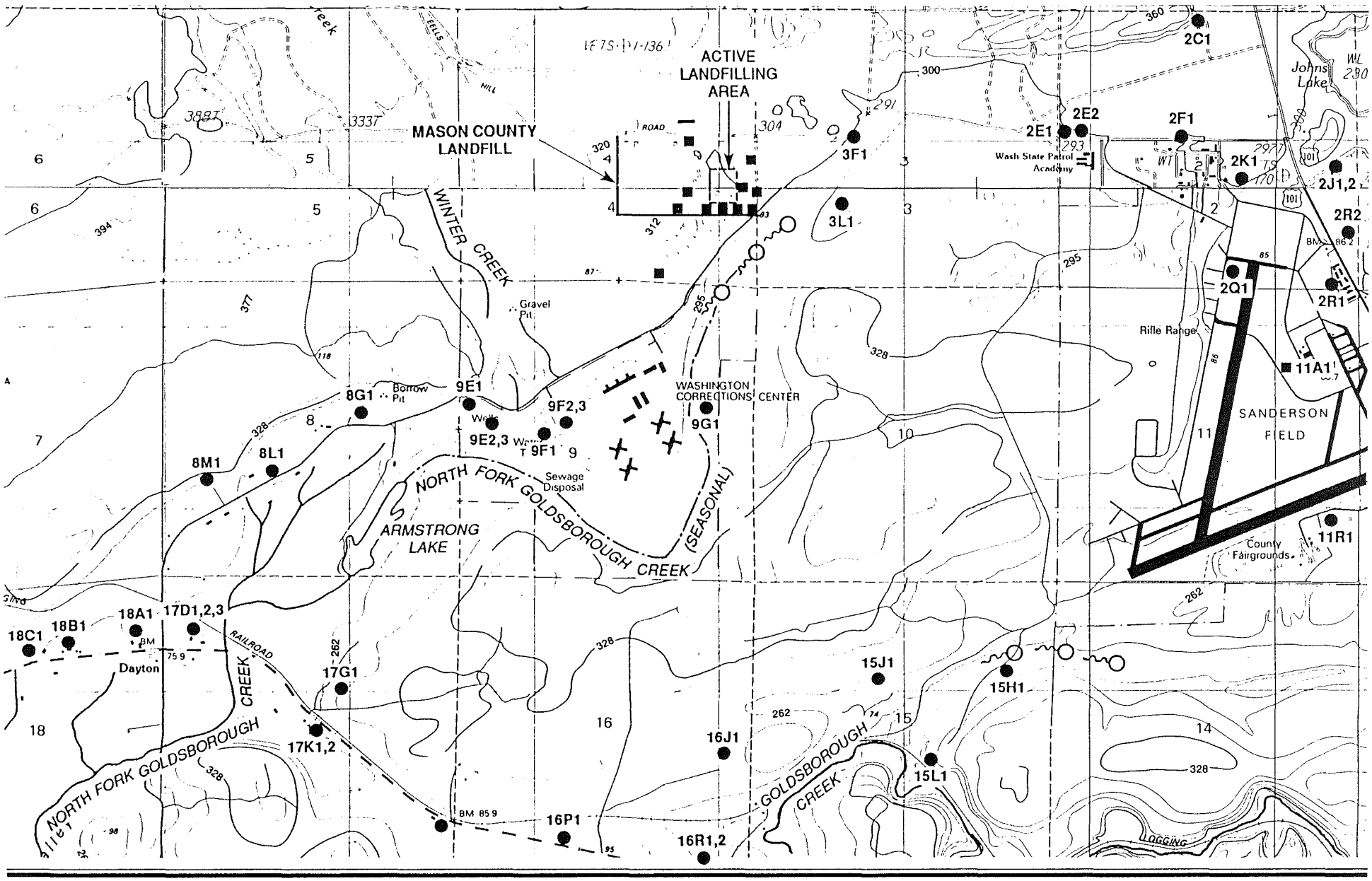
Regional well yields typically range from 25 to over 500 gpm in the relatively shallow aquifers in the outwash deposits of the Vashon Drift and have been known to exceed 4,000 gpm in the deeper aquifers of the Salmon Springs Drift and older undifferentiated deposits.

Figure 2-3 shows approximate locations of wells located within 2 miles of the landfill. Their well logs are contained in Appendix 2-1.

2.2.2.1 Beneficial Use

All wells within approximately two miles of the landfill with drillers logs on file with the Department of Ecology, or which have been field located are shown in Figure 2-3. Available well logs are found in Appendix 2-1. These wells include 28 domestic supply wells and six institutional supply wells of the Washington State Corrections Center. All wells are located east, west and south of the landfill property.

Two beneficial users of groundwater are located within a 2,000 foot radius of the landfill. These include two private domestic supply wells: one at the Blucher residence (3L1), and one at the Auto Yard (3F1). Only the well at the Blucher residence appears to be located directly downgradient of the landfill. Both of these wells have been included in quarterly sampling program to date.



SCALE IN FEET

0 2,410

N

■ Monitoring Wells

● Domestic Supply Wells

Springs

Figure 2-3. Locations of Wells and Springs

No water rights are currently on file with the DOE for groundwater or surface water use for locations within a 2,000 foot radius of the landfill. The nearest users with water rights on file are the six institutional supply wells of the Washington State Corrections Center located approximately 3,000 feet to the south of the landfill property. A tabulation of water rights on file with DOE for these and other users in Sections 1 through 19 is included in Appendix 2-2.

Approximately three miles to the southeast of the Mason County Landfill (in section 18, T20N, R3W) (Note: Landfill is located in T20N, R4W) are the Shelton Springs, which emanate from the local shallow aquifer (City of Shelton Water System Plan, 1988). The City of Shelton taps these springs as an intermittent water supply source. The springs are usually not used during wet winter and spring months correlating to high water table conditions as a precaution to potential bacteriological contamination. As discussed in section 2.3.2.4, groundwater away from the landfill appears to flow in a more southerly direction (based upon limited available data) and does not appear to flow toward these springs.

2.3 LOCAL HYDROGEOLOGIC CONDITIONS

Site specific subsurface information is largely based on data collected during the drilling and installation of wells. These include three initial test wells installed by Rongey (TH-1 through TH-3, 1973), five subsequent monitoring wells installed by Hart-Crowser (MW-1B through MW-5B, 1986-1988) and most recently, five additional monitoring wells installed by Parametrix (MW-6 through MW-10). Additional information has been obtained through reviewing well logs from nearby supply wells, primarily those of the Washington State Corrections Center (WSCC). Figure 2-4 is a site map showing the location of monitoring wells. Their well logs are contained in Appendix 2-1.

2.3.1 Geology

Previous studies at the site have grouped the geologic materials beneath the site into four distinct stratigraphic units. These are stratigraphic Units A, B, C, and D. For the sake of convenience, the same groupings are used in this report.

Figure 2-5a through 2-5c are generalized geologic cross sections with reference to Units A through Units C. These cross sections have been compiled from interpretation and interpolation of boring and well logs at and near the site. Locations of cross sections are shown on Figure 2-5.

Unit A lies immediately beneath the landfill and consists of a poorly sorted mixture of loose sandy gravel with occasional lenses of moderate to well sorted sand. The thickness of this unit at the site ranges from between approximately 62 feet at MW-1 to 77 feet at TH-1. This material is likely associated with Vashon outwash deposits.

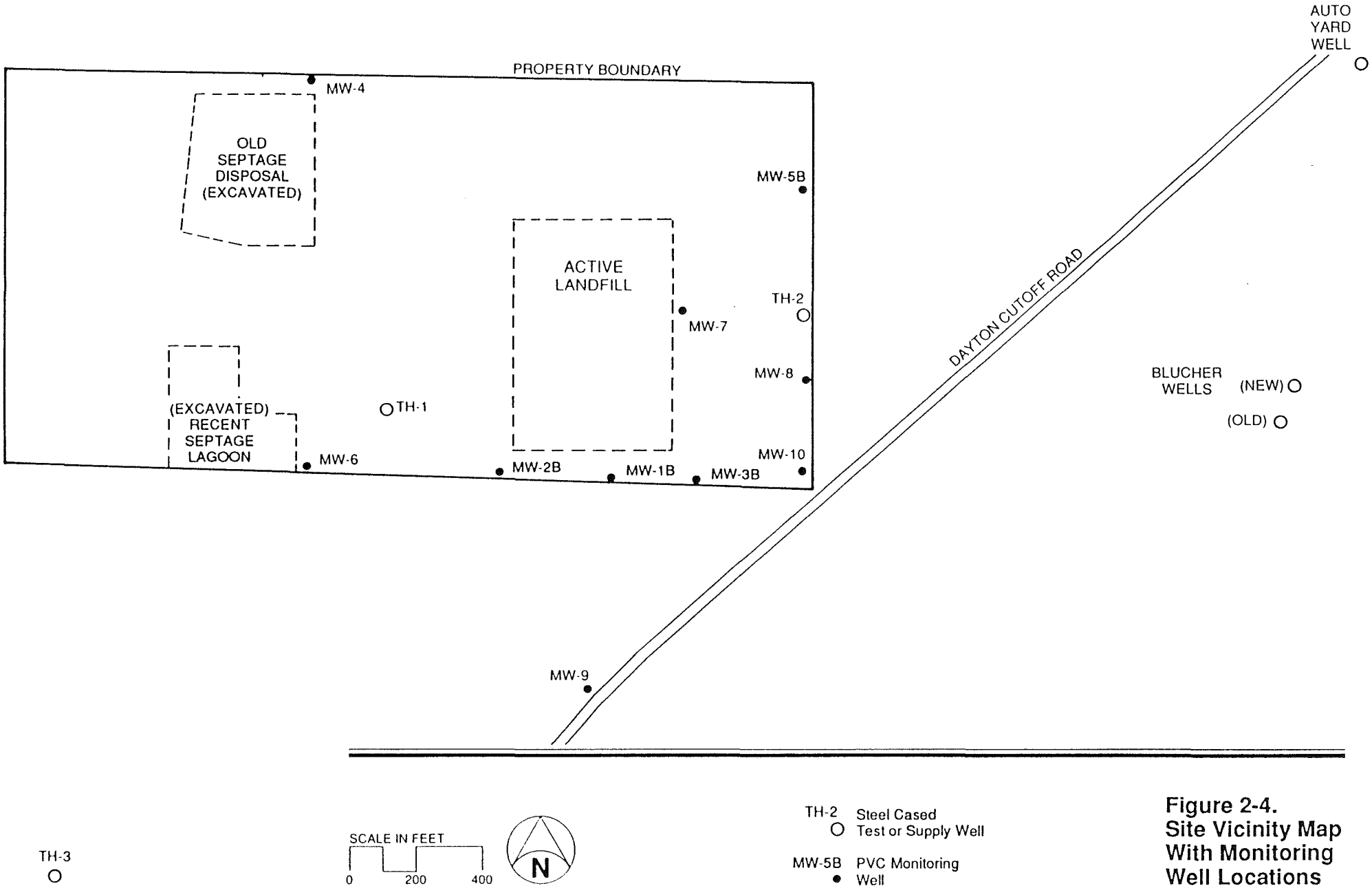


Figure 2-4.
Site Vicinity Map With Monitoring Well Locations

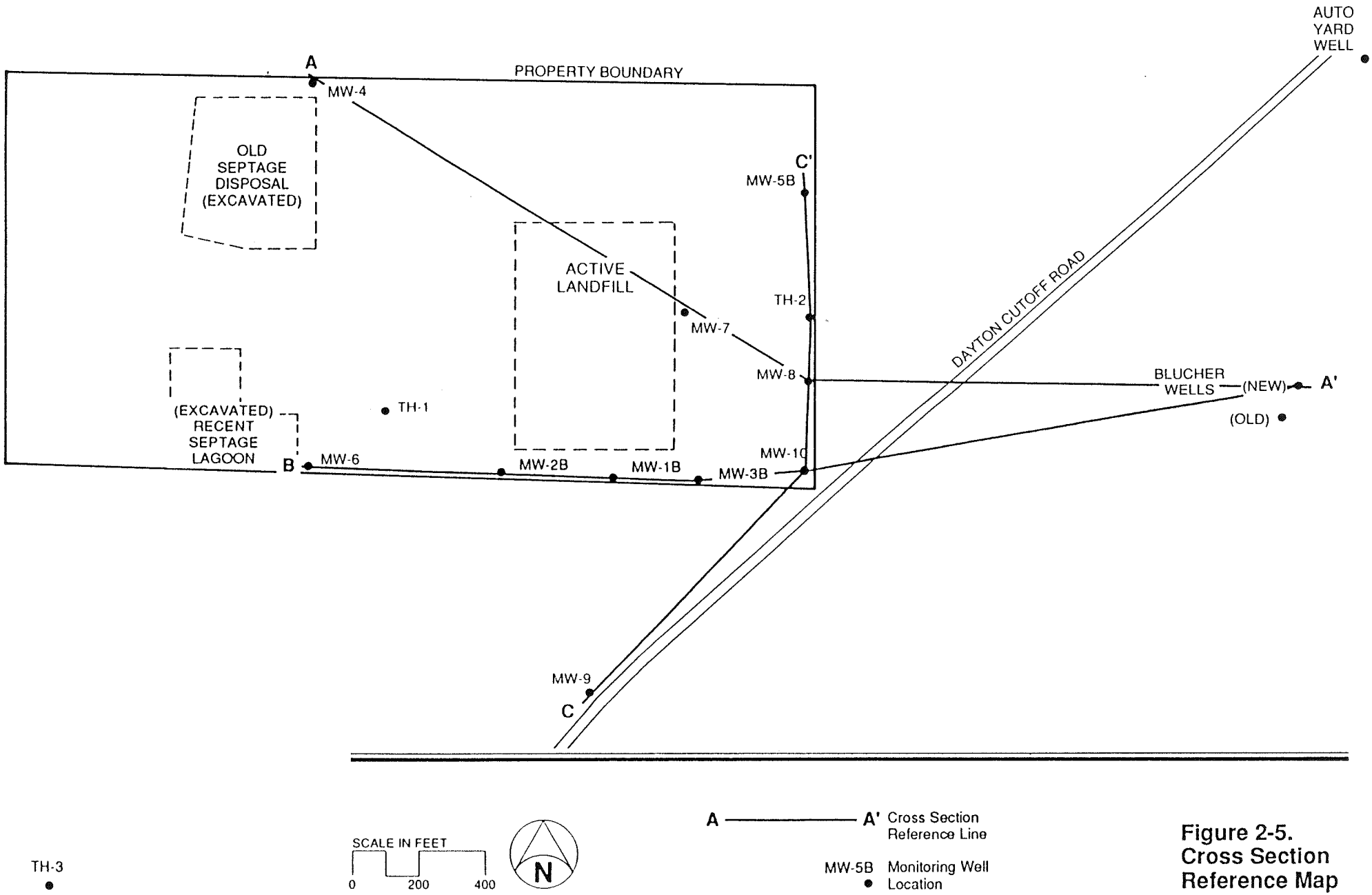
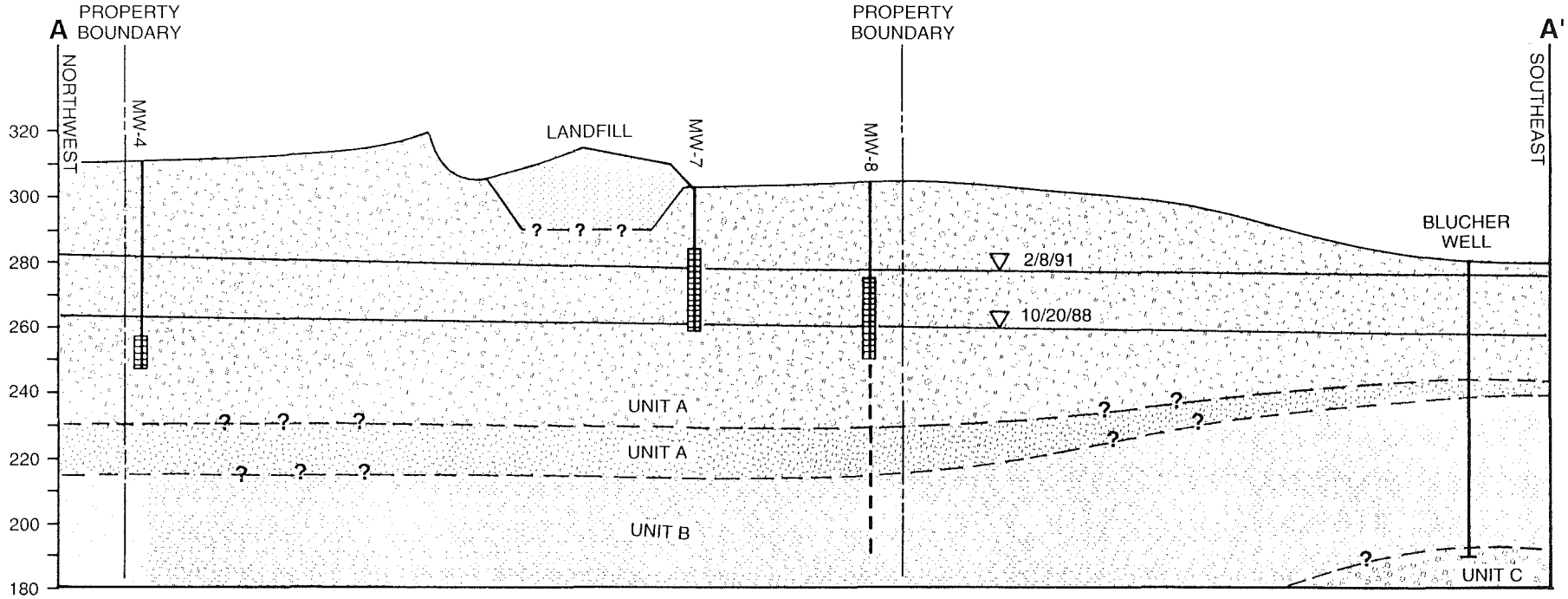


Figure 2-5.
Cross Section
Reference Map



Note: Cross Section Compiled From Interpretation and Interpolation Between Existing On Site and Offsite Wells

Geologic Contact

MW-4 Well Number

Land Surface

Approximate Water Table Elevation With Date

Screened Interval

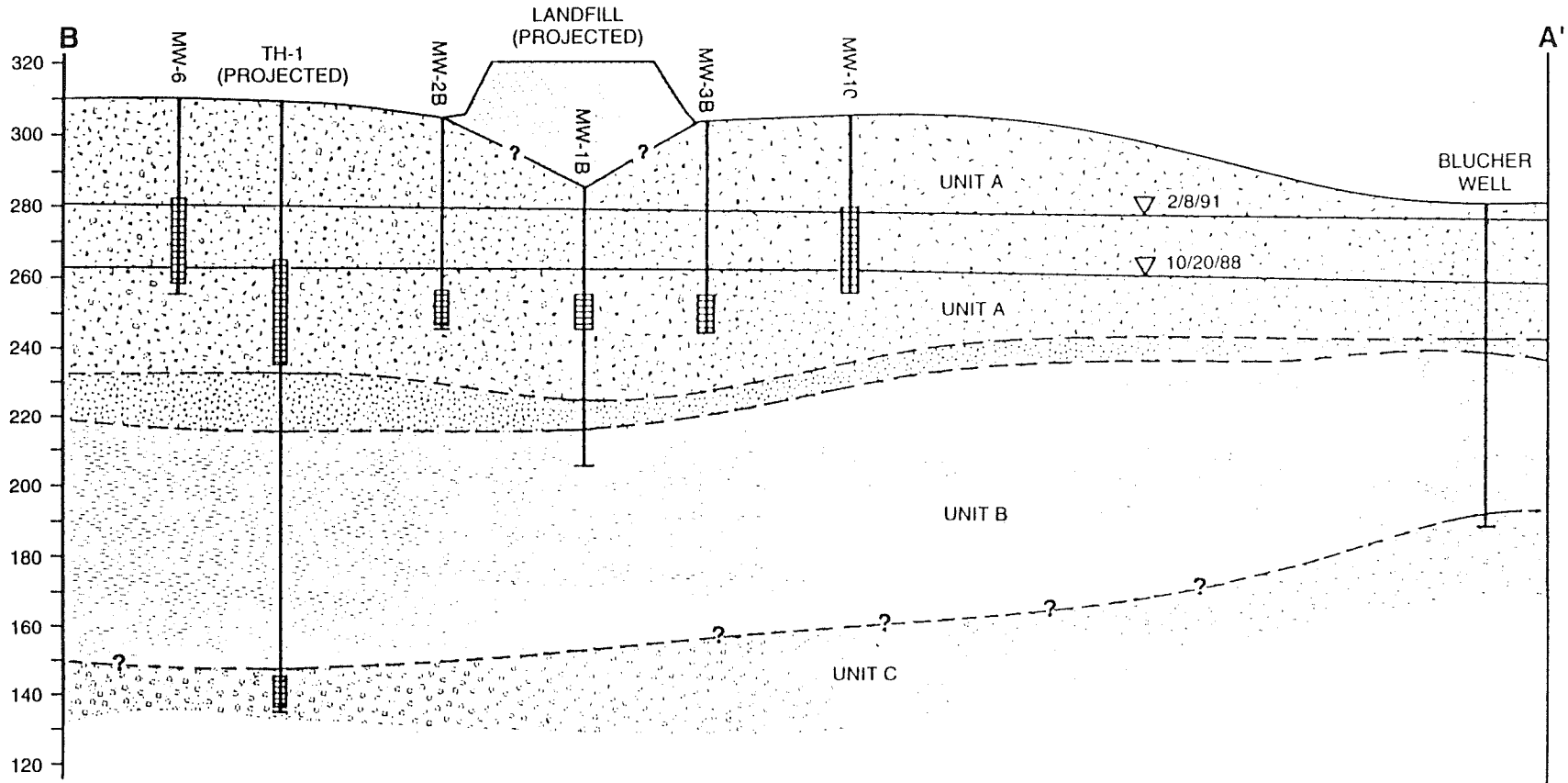
Abandoned Boring Section (Sealed With Bentonite)

Bottom of Boring

SCALE IN FEET
HORIZONTAL: 1 INCH = 400 FEET
VERTICAL: 1 INCH = 50 FEET

Geologic Units	Hydrostratigraphic Units
Refuse	
Sand and Gravel Mixture, Poorly Sorted, Sub-Rounded to Round, Loose	Unit A
Sand, Fine to Coarse, Moderate to Well Sorted, Loose	Unit A
Silt and Very Fine Sand with Some Clay, Soft, Wet	Unit B
Sandy Gravel with Thinly Interbedded Coarse Sand, Water Bearing	Unit C

Figure 2-5a. Generalized Geologic Cross-Section A to A'



Note: Cross Section Compiled From Interpretation and Interpolation Between Existing On Site and Offsite Wells

Geologic Contact, Dashed Where Approximate, Queried Where Inferred

MW-2B Well Number

Land Surface

Approximate Water Table Elevation With Date

Screened Interval

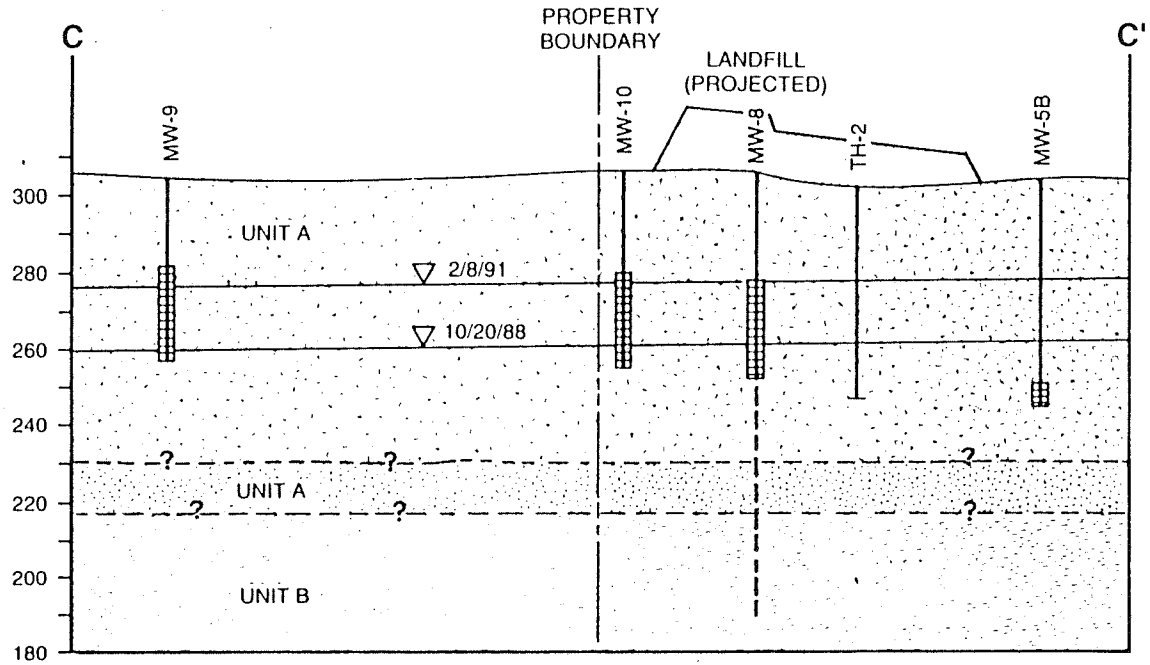
Abandoned Boring Section (Sealed With Bentonite)

Bottom of Boring

Geologic Units	Hydrostratigraphic Units
Refuse	
Sand and Gravel Mixture, Poorly Sorted, Sub-Rounded to Round, Loose	Unit A
Sand, Fine to Coarse, Moderate to Well Sorted, Loose	Unit A
Silt and Very Fine Sand with Some Clay, Soft, Wet	Unit B
Sandy Gravel with Thinly Interbedded Coarse Sand, Water Bearing	Unit C

SCALE IN FEET
HORIZONTAL: 1 INCH = 400 FEET
VERTICAL: 1 INCH = 50 FEET

Figure 2-5b. Generalized Geologic Cross Section B to A'



Note: Cross Section Compiled From Interpretation and Interpolation Between Existing On Site and Offsite Wells

Geologic Contact

MW-9 Well Number

Land Surface

Approximate Water Table Elevation With Date

Screened Interval

Abandoned Boring Section (Sealed With Bentonite)

Bottom of Boring

SCALE IN FEET
HORIZONTAL: 1 INCH = 400 FEET
VERTICAL: 1 INCH = 50 FEET

Geologic Units	Hydrostratigraphic Units
Refuse	
Sand and Gravel Mixture, Poorly Sorted, Sub-Rounded to Round, Loose	Unit A
Sand, Fine to Coarse, Moderate to Well Sorted, Loose	Unit A
Silt and Very Fine Sand with Some Clay, Soft, Wet	Unit B
Sandy Gravel with Thinly Interbedded Coarse Sand, Water Bearing	Unit C

Figure 2-5c. Generalized Geologic Cross Section C to C'

Beneath the Unit A sand and gravel deposits is a layer of soft silt with some very fine sand and clay, referred to as Unit B. The geologic logs from borings TH-1D, MW-1B, and MW-6 indicate they have penetrated into this unit. The only boring at the site to penetrate the entire thickness of Unit B is TH-1D. Data from this boring indicates this unit is approximately 68 feet thick at that location. Interpretation of well logs from nearby offsite domestic wells indicate Unit B is approximately 48 feet thick at well 3L1 (Blucher, deep well) and 116 feet thick at well 9E2 (WSCC well).

Unit C consists of a sandy pebbly gravel with an approximate thickness of 15 to 20 feet (Rongey 1973). The only boring at the site drilled into Unit C is TH-1D.

Rongey (1973) defined Unit D as all material below Unit C to a depth of more than 300 feet below sea level. This was based on his interpretation of drillers logs from wells at the Washington State Corrections Center located southwest of the landfill. He describes Unit D as primarily low permeable silt and clay materials stratified with gravel clay hardpan. None of the onsite borings have been drilled into Unit D materials.

2.3.2 Groundwater

2.3.2.1 Hydrostratigraphy

Two aquifers are located within 200 feet below the surface of the landfill. These include an uppermost unconfined aquifer which occupies the permeable Unit A sand and gravel material, and a lower confined aquifer hosted by the Unit C sandy pebble gravel. The low permeable Unit B silt layer acts as an aquitard separating the two aquifers. Deeper aquifers may exist beneath the site but at considerable depth. The drillers log from a deep well (9G1) drilled at the WSCC indicates that a three-foot thick gravel deposit at a depth of 440 feet below ground surface was the only significant water bearing unit to a depth of more than 300 feet below mean sea level.

Depth to the uppermost aquifer ranges from between 10 and 30 feet beneath the site (high water table conditions) to between 25 and 45 feet (low water table conditions). Seasonal water level fluctuations in excess of 16 feet have been observed in some of the wells. This corresponds to a saturated thickness of the uppermost aquifer ranging from approximately 25 feet (low water table conditions) to 45 feet (high water table conditions). Approximate high and low water tables at the site are indicated in the cross sections shown in Figures 2-5a through 2-5c. Water level elevation data for the period from November, 1986 through February, 1991 is given in Table 2-1.

Depth to the lower aquifer in Unit C is approximately 162 feet at the site, based upon the well log from TH-1D. Away from the site, it was encountered at approximately 90 feet at well 3L1 (Blucher, deep well) and 162 feet at well 9E2 (WSCC).

2.3.2.2 Hydraulic Properties

The hydraulic conductivity of the Unit A aquifer beneath the site was estimated based on rising and falling head tests (slug tests) by both Hart-Crowser (1986) and most recently by Parametrix in tests performed during the recent installation of monitoring wells MW-6 through MW-10 (January, 1991).

Because the relatively permeable sand and gravel materials beneath the landfill were of a potentially larger hydraulic conductivity than the sand filterpack material used in monitoring well construction, tests by Parametrix were conducted in two ways. These included tests in both completed monitoring wells and tests in the open-bottom drill casing prior to monitoring well installation. The reason for the two methods was to compare results of tests with and without incorporating the effects of the monitoring well materials (i.e. sand filterpack and well screens).

Results of tests in the open-bottom drill casing yielded hydraulic conductivity values ranging from 0.73 cm/sec to 0.86 cm/sec. Results of tests in monitoring wells yielded values ranging from 0.015 cm/sec to 0.019 cm/sec. Comparison of results from the two methods indicate the open-bottom method yields a higher hydraulic conductivity value which is likely more representative of the Unit A materials. It should be noted that the earlier tests performed by Hart Crowser (1986) which were performed in completed monitoring wells MW-1B through MW-4 yielded hydraulic conductivity values ranging from 0.05 to 0.10 cm/sec, also lower than the open-bottom method.

The hydraulic conductivity value for the Unit B aquitard is based upon laboratory analysis of an undisturbed soil sample representative of Unit B recovered during drilling at boring MW-8. The sample was collected from a depth of 115 feet (approximately 40 feet below the Unit A/Unit B contact) and tested for hydraulic conductivity using a flexible wall permeameter. Results of this test indicated a hydraulic conductivity value of 8.6×10^{-7} cm/sec. Grain size analysis of the same sample indicated the material to be predominantly silt (77% passing # 200 sieve) with some (20%) fine to very fine sand and some clay (5%). The natural moisture content of the sample was 26%. Assuming a specific gravity of 2.70, the sample was determined to be 100% saturated, suggesting some degree of hydraulic connection between the Unit A and Unit B aquifers. Laboratory results of soil property tests are found in Appendix 2-3.

The hydraulic conductivity value reported for Unit B, as measured in the sample from MW-8, is substantially lower than the previous estimate of 1×10^{-4} cm/sec (Hart-Crowser, 1986). However, the previous estimate was based only upon grain-size analysis of a sample.

2.3.2.3 Flow Rates

The rate of horizontal groundwater flow in the Unit A aquifer has been estimated assuming hydraulic conductivity values ranging from 0.73 cm/sec to 0.86 cm/sec, an average gradient of 0.0023 (based upon February, 1991 water table elevation data), and an effective porosity ranging

from 20% to 35%. Using these values, the estimated rate of flow in Unit A aquifer ranges from 16 feet per day (fpd) to 28 fpd. With these figures, the travel time to the nearest downgradient user (approximately 1,600 feet) from a directly upgradient point along the landfill boundary (at approximately monitoring well MW-5) ranges from approximately 57 to 100 days.

The rate of vertical groundwater flow through Unit B has been estimated assuming a vertical hydraulic conductivity of 8.6×10^{-7} cm/sec, fully saturated conditions, an effective porosity ranging from 1% to 30 %. The result using these assumptions ranges from 0.0081 fpd to 0.24 fpd. These values yield an approximate vertical travel time through the Unit B aquitard to the Unit C aquifer (assuming an approximate thickness of 68 feet) ranging from 0.77 to 23 years.

2.3.2.4 Direction of Groundwater Flow

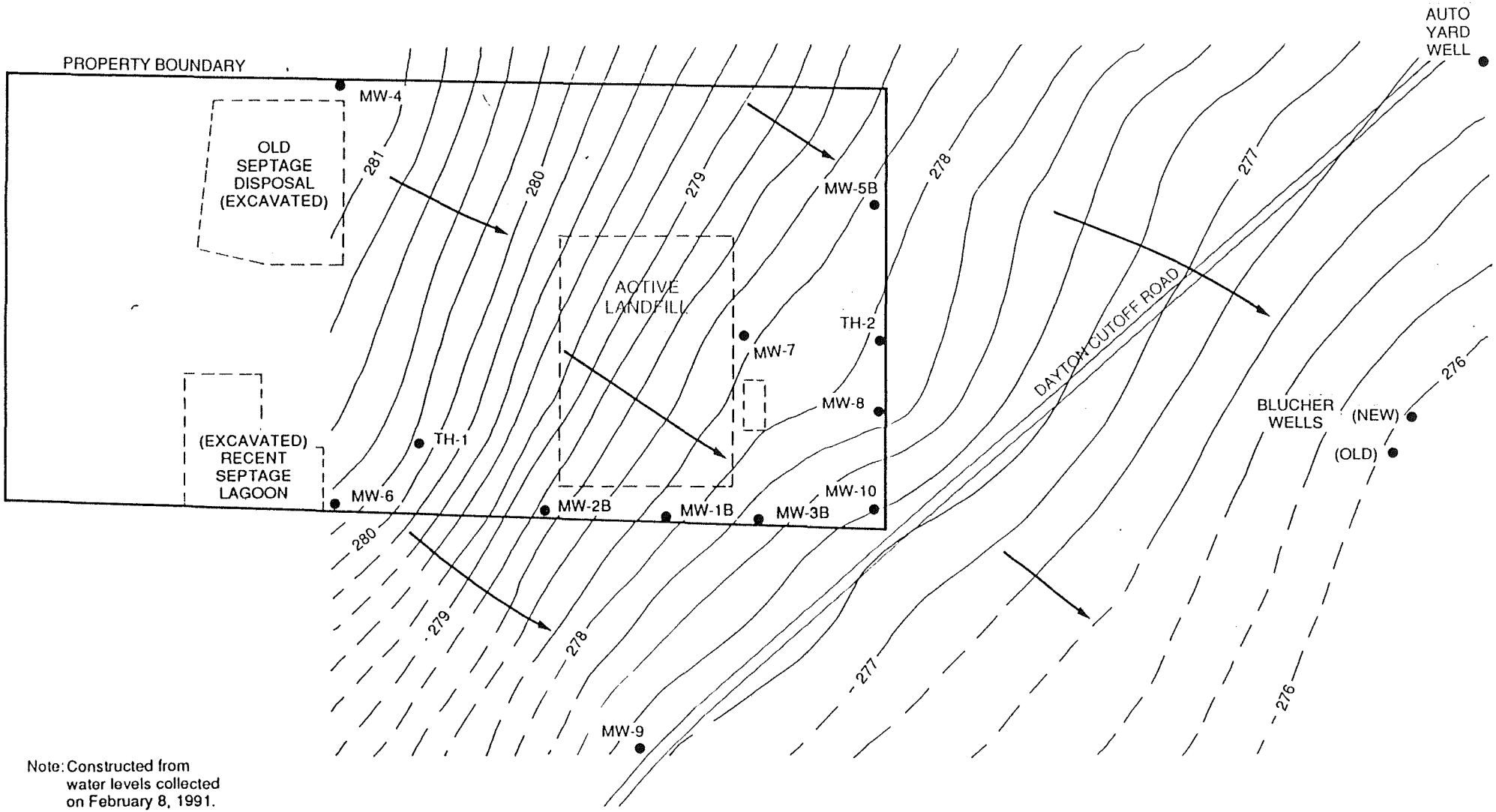
Water level elevation data collected during groundwater sampling events indicate that groundwater within the vicinity of the site flows to the east-southeast. Figure 2-6a is a local potentiometric surface map of the uppermost aquifer compiled from data collected during the February, 1991 sampling round. Table 2-1 gives historical water level elevations collected from the site.

Further downgradient of the landfill, groundwater in the uppermost aquifer appears to flow in a more south-southeast direction toward apparent discharge points along Goldsborough Creek and nearby springs in the north part of Section 14. Figure 2-7 is a generalized regional potentiometric flow map of groundwater downgradient of the landfill. The map was compiled from water level elevation measurements collected at five of the nearest offsite measuring points. These include monitoring well MW-10 at the landfill, two shallow wells at the WSCC, a major spring discharge point in the northeast corner of Section 15, and a shallow monitoring well at Sanderson Field in the northeast corner of Section 11. Measurements at these locations were collected on March 21, 1991.

2.3.3 Seasonal Groundwater Discharge and Springs

The nearest groundwater discharge point from the Mason County Landfill is a seasonal (high water) discharge point located along the extreme upper reaches of the North Fork Goldsborough Creek. The upper reaches are indicated by a dashed line on Figure 2.7 and are located north and east of Armstrong Lake. This portion of the creek and associated springs flow only during the high groundwater table months of winter and spring, and progressively "dries up" as the water table lowers during summer and early fall.

Because of the seasonal fluctuation of the water table, during dry periods corresponding to low water table conditions no flow is observed anywhere east (or upstream) of Armstrong Lake. During the wettest months corresponding to higher water table conditions, flow in the creek appears to originate from the southwest corner of Section 3 where the creek is shown to



Note: Constructed from water levels collected on February 8, 1991.

SCALE IN FEET
0 200 400

N

Groundwater Flow Direction

282 Potentiometric Contour Lines With Water Level Elevation Contour Interval 0.2 Feet

MW-4 Well Location

Figure 2-6 Potentiometric Surface Map February, 1991

Table 2-1. Summary of Monitoring Well Data and Water Level Elevations

Well:	MW-1B	MW-2B	MW-3B	MW-4	MW-5B
Date Installed:	9/86	10/86	11/86	11/86	10/87
Boring Depth:	80.0	60.0	60.5	65.0	59.0
Casing Material:	PVC	PVC	PVC	PVC	PVC
Screened Length:	10.0	10.0	10.0	10.0	5.0
Top of Screen Elev.	255.4	255.7	254.0	255.5	249.9
Bottom of Screen Elev.	245.4	245.7	244.0	245.5	244.9
Measuring Pt. Elev.*	286.91	307.1	306.37	312.01	305.54
Ground Elevation	285.4	305.7	304.5	310.5	303.9
Water Level Elevations:					
1/6/86	261.70	262.00	262.00	263.00	--
11/13/86	261.97	261.97	261.71	263.16	--
1/13/88	264.04	263.95	262.60	265.28	263.90
4/1/88	268.10	268.21	267.98	269.88	268.90
4/18/88	271.72	272.92	271.41	273.89	271.58
7/29/88	265.26	265.34	265.03	266.75	265.22
10/20/88	261.80	--	261.56	263.14	261.75
11/30/89	264.20	264.40	264.10	265.40	264.20
2/21/90	278.10	278.80	278.00	281.60	278.30
5/10/90	271.70	271.70	271.40	273.30	271.80
8/8/90	265.90	266.20	265.90	267.70	266.10
11/7/90	262.55	264.83	264.52	270.19	--
2/8/91	278.07	278.56	277.73	281.37	--
3/21/91	276.58	276.88	276.36	278.97	276.61

-- Data not available.
* Sounding port in pump plate.

Table 2.1 (Cont.)

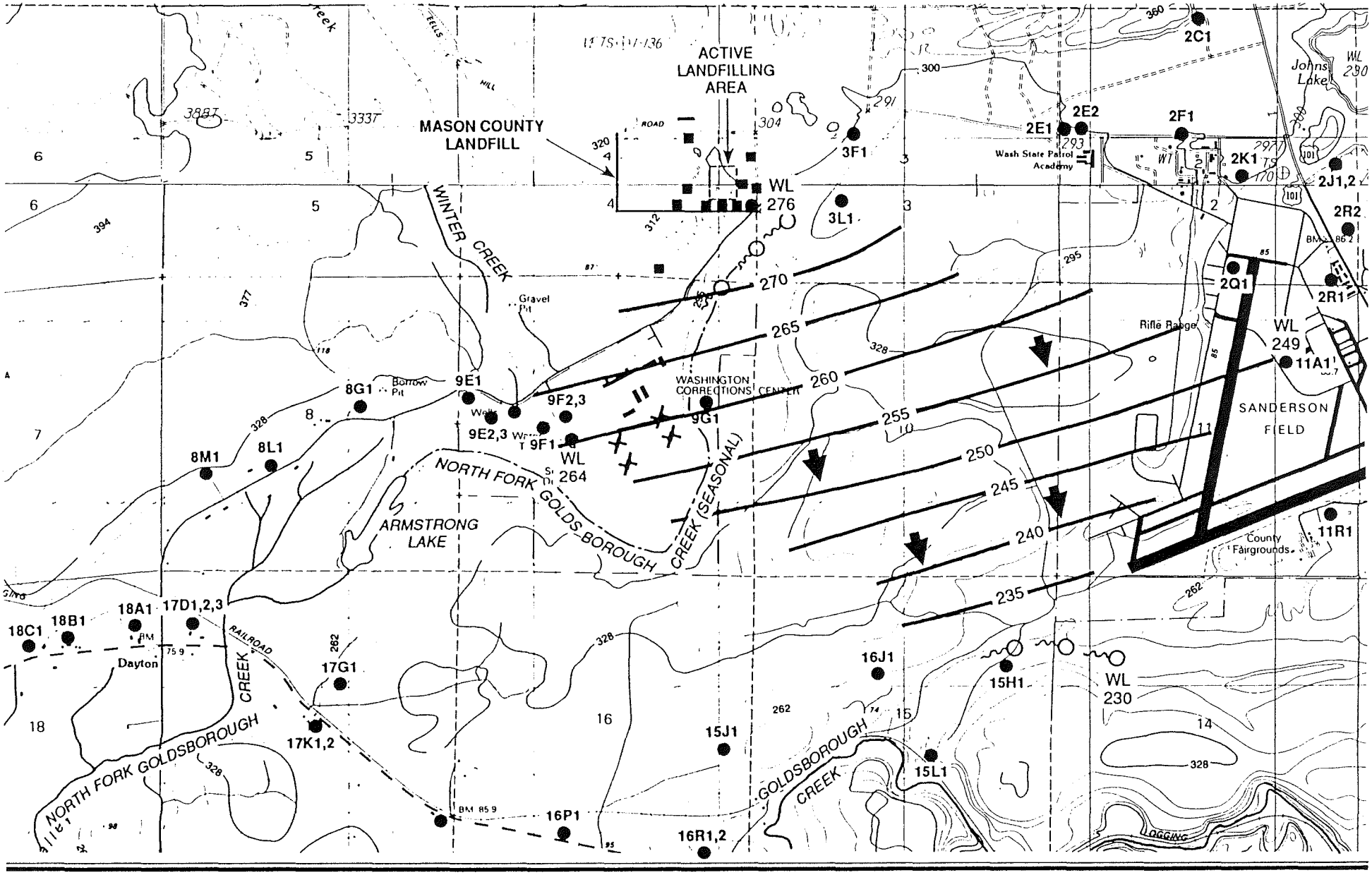
Well:	MW-6	MW-7	MW-8	MW-9	MW-10
Date Installed:	1/91	1/91	1/91	1/91	1/91
Boring Depth:	53	48	117	48	51
Casing Material:	PVC	PVC	PVC	PVC	PVC
Screened Length:	25	25	25	25	25
Top of Screen Elev.	280.7	281.5	274.5	281.5	278.2
Bottom of Screen Elev.	255.7	256.5	249.5	256.5	253.2
Measuring Pt. Elev.*	311.21	303.95	306.23	306.43	306.74
Ground Elevation**	310.0	303.0	305.2	304.8	305.2
Water Level Elevations:					
2/8/91	280.35	278.17	277.98	277.22	277.31
3/21/91	278.02	276.67	276.56	276.00	276.16

* Sounding port in pump plate.
** Surface of Concrete Slab.
-- Data not available.

Table 2.1 (Cont.)

Well:	TH-1S	TH-1D	TH-2	TH-3
Date Installed:	6/73	6/73	6/73	6/73
Boring Depth:	174	174	55	60
Casing Material:	Steel	Steel	Steel	Steel
Screened Length:	30	8	open bottom	open bottom
Top of Screen Elev.	262	142	--	--
Bottom of Screen Elev.	232	134	249	249
Measuring Pt. Elev.*	313.3	313.3	305.3	311.3
Ground Elevation	312.8	312.8	301.9	309.9
Water Level Elevations:				
1/6/86	--	--	--	--
1/13/86	--	--	--	--
1/13/88	--	--	263.78	264.25
4/1/88	--	--	268.04	268.59
4/18/88	--	--	271.52	272.50
7/29/88	--	--	--	265.48
10/20/88	--	--	--	--
11/30/89	--	--	264.10	--
2/21/90	--	--	279.40	--
5/10/90	--	--	271.70	--
8/8/90	--	--	266.20	--
11/7/90	--	--	265.60	--
2/8/91	280.18	--	--	--
3/21/91	278.00	--	276.51	277.45

* Top of steel casing.
-- Data not available.



SCALE IN FEET
0 2,410

N

■ Monitoring Wells
● Domestic Supply Wells
Springs

Compiled from Water Level Elevation Data Collected on March 21st, 1991

Groundwater Flow Direction
WL 276 Well with Water Level Elevation

Figure 2-7.
Generalized Groundwater Flow, Uppermost Aquifer

originate. However, even during high water table periods, flow in this area is low and does not appear to represent a major point of discharge of the uppermost aquifer.

Comparison of the groundwater flow map from the landfill (Figure 2-6) with the location of the seasonal springs indicate that some of the groundwater which passes beneath the landfill may discharge at these springs, but only during very high water table conditions.

2.3.4 Surface Water

Four surface water bodies are found within one mile of the Mason County Landfill. These include Woeful Lake, located approximately 1-mile northeast of the landfill; Winter Creek, located approximately one-half mile to the west of the landfill; the northern reaches of the North Fork Goldsborough Creek, located approximately one-mile to the south of the landfill; and Armstrong Lake, located over one-mile southwest of the landfill.

With the exception of North Fork Goldsborough Creek (previously discussed in Section 2.3.3), none of these surface water bodies appear to be located downgradient of the landfill. No information on surface water quality is available since no surface water monitoring has been conducted in the area. Goldsborough Creek is located approximately two miles south of the landfill.

2.4 GROUNDWATER MONITORING AND WATER QUALITY ASSESSMENT

2.4.1 Groundwater Monitoring System

A total of ten onsite and three offsite wells have been included in quarterly sampling events since November, 1989. The onsite wells include monitoring wells MW-1B, MW-2B, MW-3B, MW-4, MW-5B, MW-6, MW-7, MW-8 and MW-10, and the onsite supply well TH-1 (shallow and deep completions). Offsite wells include monitoring well MW-9 (located south of the landfill on Simpson Timber Co. land) and two private domestic supply wells referred to as the deep Blucher (3L1) and Auto Yard (3F1) wells. Two additional wells are also located near the landfill but are not currently included in sampling events. These are wells TH-2 and TH-3. Locations of the monitoring wells are shown in Figure 2-4. Table 2-1 summarizes well details of all existing onsite monitoring wells.

Wells TH-1 through TH-3 were installed in 1973 as part of the original site groundwater investigation by Richard Rongey. All are steel cased supply-type wells and are not screened across the surface of the water table making them inappropriate as monitoring wells. TH-1 was constructed as a dual completion well and serves as the onsite supply well. The shallow well (TH-1S) is screened in the uppermost (Unit A) aquifer and the deep well (TH-1D) is screened within the lower (Unit C) aquifer. An intermediate seal separates the two wells. Both the shallow and deep completions of TH-1 are included in current monitoring events. TH-2 had been included in previous sampling events but was recently dropped with the addition of

monitoring wells MW-7 and MW-8. TH-3 is not located downgradient of the landfill and has not been included in recent sampling events.

Onsite monitoring wells MW-1B through MW-5B were installed by Hart-Crowser during their investigations and monitoring of the site. All are two-inch diameter PVC monitoring wells. MW-1B through MW-4 were installed during September through November, 1986 and MW-5B was installed during October, 1987. These wells range in depth from 40 to 65 feet, placing the bottom of each well at an approximate elevation of 245 feet. MW-1 through MW-4 were completed with ten-foot length screened sections and MW-5 was completed with a five-foot length screened section. None of the wells were constructed with screened sections across the seasonal water table. Of these wells, MW-4 serves as the background monitoring well and is located along the northern site boundary. Wells MW-1 through MW-3 are located along the southern boundary of the active landfill area and monitoring well MW-5 is located along the east site boundary.

Monitoring wells MW-6 through MW-10 were installed during January, 1991 by Parametrix through assistance from the Department of Ecology Grant Assistance Program. These wells range in depth from 48 to 57 feet, and are constructed with 20-foot length screened sections placed such that they cross the surface of the seasonal water table. MW-6 is situated along the southern boundary of the site and has been located to monitor potential impact of the former septage disposal area. MW-7 is located along the east side of the active landfill area at the refuse boundary at the point of compliance. MW-8 and MW-10 are both located along the east property boundary and lie directly downgradient of the active landfill. MW-8 also lies in a direct line between the landfill and the nearest offsite well (Blucher). MW-9 is located due south of the active landfill in the direction of the uppermost reaches of North Fork Goldsborough Creek.

Hydrostar (TM) dedicated sampling pumps have been installed in monitoring wells MW-1B through MW-10.

2.4.2 Sampling History

Routine quarterly sampling of groundwater at the Mason County Landfill was first conducted during 1988 by Hart-Crowser. Samples collected during this period were analyzed for the MFS parameters listed in WAC 173-304-490 and the Primary and Secondary Maximum Contaminant Levels (MCLs) for drinking water found in WAC 248-54-175.

No routine sampling was conducted at the landfill during the first three quarters of 1989. However, samples were collected by the Department of Ecology during June, 1989 and analyzed for volatile and semi-volatile organic compounds and nutrients (nitrogen).

Routine quarterly sampling was again established during November 1989 by Parametrix and has continued to the present. In addition to the MFS parameters and the Primary and Secondary

MCLs, samples collected since November, 1989 have also been analyzed for dissolved metals (Priority Pollutant List) and the volatile and semi-volatile organic compounds found on the EPA Hazardous Substance List. Pesticides/PCBs were also analyzed for during the November, 1990 sampling event. Two offsite domestic wells (shallow Blucher and Auto Yard wells) were sampled for total petroleum hydrocarbons (TPH, EPA Method 418.1) during the February, 1990 sampling event. No pesticides/PCBs or total petroleum hydrocarbons were detected in any of the samples.

Prior to 1988, one sampling round was conducted by Hart-Crowser following the installation of monitoring wells MW-1 through MW-4. Periodic samples were also collected from the landfill supply well (TH-1S and TH-1D) and less frequently from well TH-2 from 1975 to 1986. These samples were analyzed for fewer analytical parameters than samples following 1988.

2.4.3 Groundwater Quality

Tabulated results of groundwater sampling are found in Appendix 2-4a through Appendix 2-4c. Appendix 2-4a lists results for those samples collected through 1988; Appendix 2-4b lists results for those samples collected by Ecology in June, 1989; and Appendix 2-4c lists results for those samples collected following November, 1989. Groundwater monitoring results indicate that the upper aquifer underlying the site has been impacted by the landfill. However, in most cases sampling results were well within state primary MCLs (WAC 173-304) and Water Quality Standards for Groundwaters of the State of Washington (WAC 173-200).

2.4.3.1 Pre-1988 Sample Data

Results of groundwater samples collected prior to 1988 are found in Appendix 2-4a. Sample collection was sporadic during this period and samples were tested for limited analytical parameters. No discussion of these results is included in this text.

2.4.3.2 1988 Sample Data

Results of groundwater samples collected during the 1988 routine sampling events (Appendix 2-4a) indicated levels of iron, manganese, total coliform, and pH present in samples from some downgradient wells at concentrations which exceeded the respective MCLs for those substances. Of these occurrences, the levels of iron were attributed to steel well casing materials; the levels of coliform were attributed to sampling techniques, and pH readings were attributed to naturally low groundwater pH in the vicinity (Hart-Crowser, 1989). The levels of manganese were interpreted to be caused by leachate migration. Other parameters such as chloride, sulfate, nitrite, and nitrate were also observed in higher concentrations in some downgradient wells compared to the background well and were also thought to be the result of leachate migration. However, the concentrations for these parameters were at levels less than their respective MCLs.

2.4.3.3 Ecology Sampling Data, June, 1989

Data from the June, 1989 sampling (Appendix 2-4b) by the Department of Ecology indicated the presence of some volatile and semi-volatile organic compounds in samples from some of the wells. These included acetone, 2-butanone, carbon tetrachloride, benzene, toluene, ethylbenzene, xylenes (total), naphthalene, 2-methyl-naphthalene, and diethylphthalate. The levels of benzene and toluene detected in the sample from MW-3B and the levels of benzene and carbon tetrachloride detected in the sample from MW-2B exceeded their respective Federal MCLs.

2.4.3.4 November, 1989 to Present

Results of quarterly groundwater sampling events conducted at the landfill since November, 1989 (Appendix 2-4c) have been generally similar to results of earlier sampling events and indicate that the landfill has impacted groundwater within the upper aquifer beneath the site. During this period, results from several downgradient wells have shown consistently elevated concentrations for many of the parameters tested compared to concentrations detected in the background well. However in most cases, results were well within State Primary MCLs (WAC 173-304) and Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200). Only one sampling event has been conducted since the installation of monitoring wells MW-6, MW-7, MW-8, MW-9, and MW-10.

Federal or State Primary MCLs have been exceeded in samples from three of the wells (MW-1B, MW-2B, and MW-3B) on one or more occasions during this period. These include carbon tetrachloride (MCL = 5 μg/l) detected in a sample from MW-1B (November, 1989 - 6.6 μg/l) and in samples from MW-2B during the August, 1990 (17 μg/l) and November 1990 (7.7 μg/l) sampling events. Tetrachloroethane (MCL = 0.8 μg/l) detected in the sample from MW-3B during the February, 1991 sampling event at a observed concentration of 2 μg/l.

State Secondary MCLs for pH (MCL = 6.5 - 8.5), iron (MCL = 0.3 mg/l), and manganese (MCL = 0.05 mg/l) have been exceeded in at least a few of the wells in all of the sampling rounds during this period. However, secondary MCLs are established for aesthetic purposes such as appearance, taste , and odor and are not believed to cause adverse health effects.

Conventional Parameters

Of the conventional parameters included in laboratory analysis of the samples, at least specific conductivity, chemical oxygen demand, nitrate, total organic carbon, hardness, total dissolved solids, chloride, and sulfate have been elevated in samples from many of the downgradient wells. However, in all cases the concentrations observed have been well within the respective MCLs for these parameters. One exception is high pH which appears to be naturally occurring as observed in samples from the background well (MW-4).

The highest observed concentrations of these parameters have been observed in those wells located directly downgradient of the active landfill, particularly MW-3B, and more recently MW-7, MW-8, and MW-10. As mentioned previously, the observed concentrations in samples from these wells are within the respective MCLs for these parameters. Some of these parameters have also been observed at elevated concentrations (relative to the background well) in samples from the shallow Blucher well during one or more of the sampling events. Those parameters include specific conductivity, total organic carbon, total dissolved solids, chemical oxygen demand, and chloride and potentially indicate some impact from the landfill.

While fluctuations have been observed in the concentrations of those conventional parameters, no overall improvement or decline has been apparent during this sampling period.

Metals

Results of metals analysis (EPA Priority Pollutant List) during this period indicated that most of the metals were either not detected or detected in very low concentrations. Metals that were observed at elevated concentrations in many downgradient wells included calcium, manganese, magnesium, and sodium. Iron was also detected at elevated concentrations in a few of the downgradient wells, primarily those downgradient and closest to the landfill (MW-3B and MW-7) and those wells with steel casings (TH-2 and Blucher).

No Primary MCLs were exceeded for any of the metals detected in any of the samples. The Secondary MCL for iron (0.30 mg/l) was exceeded in samples from MW-3B, MW-7, TH-1S, TH-2, and both the deep and shallow Blucher wells on one or more occasions during the sampling period. However, the presence of iron in samples from TH-1S, TH-2, and Blucher may be attributable to steel well casing materials. The Secondary MCL for manganese (0.05 mg/l) was also exceeded in samples from MW-1B, MW-2B. MW-3B, MW-7, MW-8, MW-10, TH-1S, TH-2, and the deep and shallow Blucher wells on one or more occasions. As mentioned previously, Secondary MCLs are established for aesthetic purposes and the presence of these parameters is not believed to cause adverse health effects.

As with the conventional parameters, no overall improvement or decline in the concentrations of the metals present was apparent during this period.

Volatile and Semi-Volatile Organic Compounds

Results of the November, 1989 sampling round verified in part the findings of the Ecology sampling event (June, 1989) with respect to the presence of some volatile organic compounds in groundwater samples. However, many of the organic compounds detected in samples collected by Ecology were not detected in November 1989. At the same time, compounds were detected in the November round which were not detected in the Ecology sampling. In most cases, these compounds were detected in very low concentrations near or below the laboratory

detection limits. The only Federal MCL exceeded during the November sampling was carbon tetrachloride in samples from MW-1B (6.6 μg/l) and MW-2B (51 μg/l).

Results of volatile and semi-volatile organic analyses for the samples collected during the four 1990 sampling events indicated generally fewer organic compounds present and in lower concentrations than observed in the June 1989 sampling event by Ecology and the November, 1989 sampling event. Carbon tetrachloride was present in samples from MW-1B and MW-2B during each of the 1990 sampling events. However, only the concentrations of carbon tetrachloride present in samples collected from MW-2B during the August (17 μg/l) and November (7.7 μg/l) sampling events were in excess of the MCL of 5 μg/l. Carbon tetrachloride was also detected in the sample from TH-1S in the February sampling at an estimated concentration of 0.7 μg/l, an estimated value below the detection limit of 1 μg/l.

Other organic compounds detected in one or more wells on one or more occasions during these sampling events included benzene, 4-methyl-2-pentanone, and 1,1,2-trichloro-1,2,2-trifluoroethane. The presence of 1,1,2-trichloro-1,2,2-trifluoroethane in the background well (MW-4) indicates the active landfill may not be the source this compound. All of these compounds were detected at concentrations well below their respective MCLs, where established.

Results of the February, 1991 sampling event provide the first data from wells MW-6 through MW-10. Data from this sampling event indicated the presence of several organic compounds in samples from some of the wells, particularly MW-7 which is located nearest to the active portion of the landfill. However, only the concentration of tetrachloroethane detected in the sample from MW-3B (2 μg/l) exceeded the State Ground Water Quality Criteria for tetrachloroethane of 0.8 μg/l. No Federal Primary MCLs were exceeded in any of the samples collected during this event. Other organic compounds detected in samples during this event included 1,1-dichloroethane, cis-1,2-dichloroethene, 2-butanone, trichloroethene, benzene, tetrachloroethane, toluene, chlorobenzene, ethylbenzene, xylene (total), and 1,1,2-trichloro-1,1,2-trifluoroethane. All of these occurrences were below respective MCLs where established and most were detected in very low concentrations near or below the detection limits for these compounds. It should be noted that the occurrence of 1,1,2-trichloro-1,1,2-trifluoroethane in the sample collected from the new deep Blucher well was the first observed organic compound detected in samples from either Blucher well. Since this well was installed relatively recently, the occurrence of this compound may be related to well construction activities and may not represent impact from the landfill. Future sampling results from this well will be monitored closely for the detection of any additional organic occurrences.

Additional volatile and semi-volatile organic compounds present in many samples (including blank samples) during most of the sampling events since November, 1989 include diethylphthalate, bis(2-ethylhexyl)phthalate, acetone, chloroform, methylene chloride, and toluene. The presence of these compounds in both blank and well samples may be attributable

Table 2.2: Sources and Uses of Selected Volatile Compounds

Acetone	Solvent for cellulose and nitrocellulose resins, sealants and adhesives, paints and varnishes. Manufacturing of paints, lacquers, varnishes, smokeless powder, sealants, adhesives, and chemicals.
Benzene	Solvent and manufacturing use in paints, resins, rubber, plastics and coatings. Component of gasoline, naphtha and many petroleum solvents.
Toluene	Solvent for paints and coatings, resins, gums, and vinyl films. Thinner for nitrocellulose resins and lacquers. Adhesive solvent for plastics. Component of gasoline, naphtha and many petroleum solvent.s
Carbon Tetrachloride	Solvent for paints and coatings, resins, gums, and vinyl films. Thinner for nitrocellulose resins and lacquers. Adhesive solvent for plastics. * USEPA B2 Carcinogen: Probable Human Carcinogen; based on evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans.
Ethylbenzene	Present in automotive and aviation fuels. Also used in manufacture of cellulose acetate, styrene, and synthetic rubber. Used as a solvent or diluent for paints, insecticide sprays, gasoline blends, rubber and plastics industry.
Xylenes	Used as solvent; common constituent of paints, lacquers, varnishes, inks, dyes, adhesives, cements, cleaning fluids, aviation fuel, and chemical feedstocks for manufacture of plastics and synthetic textiles. Also used in manufacture of quartz crystal oscillators, hydrogen peroxide, perfumes, insect repellants, epoxy resins, pharmaceuticals, and in the leather industry.
Naphthalene	Chemical feedstock for manufacturing of dyes, synthetic resins, lampblack, smokeless powder, celluloid. Formerly used as a moth repellant.

Table 2.2: Sources and Uses of Selected Volatile Compounds (Continued):

2-Methyl Naphthalene	No Information. Since this is a PAH, it may be associated with coal tar, creosote, or similar materials.
Diethyl Phthalate	Solvent for cellulose esters, vehicle in pesticide sprays, fixative and solvent in perfumes, alcohol denaturant, plasticizer (e.g., few solid rocket propellants).

to either PVC sampling equipment, field decontamination procedures, or laboratory analytical procedures.

Table 2-2 lists sources and uses of some organic compounds detected from sampling.

The sporadic occurrence and frequently low concentrations of the organic compounds detected indicate no clear improvement or decline in groundwater quality with respect to volatile and semi-volatile organic compounds. However, as previously mentioned, the concentrations and/or number of organic compounds detected in the 1990 and 1991 sampling events appear to be less than those observed in the June 1989 (Ecology) and November 1989 sampling events. If so, this may have resulted from installation of the temporary plastic cover over the active portion of the landfill, and possibly the termination of septage disposal practices and subsequent removal of septage from the landfill. Septage disposal at the landfill was terminated in January, 1990 and septage wastes were excavated and covered during April, 1990. The temporary plastic cover system over the landfill was installed during the spring of 1990.

2.5 REGULATORY COMPLIANCE AND CORRECTIVE MEASURES

2.5.1 Regulatory Compliance

The current monitoring system at the Mason County Landfill exceeds groundwater monitoring requirements of the MFS in both the number of downgradient wells and the analytical parameters routinely tested. Results of groundwater samples are reviewed in detail by Parametrix and are also provided to and reviewed by the Mason County Health Department and the State Department of Ecology. This procedure shall continue and results shall be reviewed in accordance with the most recent groundwater quality criteria including Chapter 173-200 WAC *Water Quality Standards for Ground Waters of the State of Washington* and applicable Federal Regulations (40 CFR, Part 141).

2.6.2 Corrective Measures

Because of the findings indicating degradation of groundwater quality at the site, a number of actions have been implemented with the cooperation of the client, the Mason County Health Department, and Ecology. These included installation of additional monitoring wells located within downgradient flow gaps and constructed with screened sections across the seasonal water table. Data collected from these borings were necessary to further assess and characterize the hydrogeologic conditions and groundwater contamination at and near the site.

Corrective actions included placement of a temporary cover system over the active landfill to reduce infiltration of precipitation into the refuse, and excavation and removal of the former septage disposal wastes. While results of these measures are yet inconclusive, the installation of the final cover system should reduce further degradation of groundwater passing beneath the site through reduction of leachate generation.

A close communication shall be maintained between the County and Ecology regarding results of future monitoring events in order to determine if any future corrective measures are warranted. Additional corrective actions can be implemented by the County through the MFS (WAC 173-304) and the State through Chapter 173-340 WAC *The Model Toxics Control Act* and Chapter 173-200 WAC *Water Quality Standards for Ground Waters of the State of Washington.*

3.0 LANDFILL OPERATIONS, MAINTENANCE, AND MONITORING

3.1 General Operating Procedures

3.1.1 Hours of Operation

The Mason County Landfill will be open for waste disposal from 8:00 a.m. to 4:00 p.m., seven days per week. Access to the site is restricted by a lockable gate at the entrance to the facility. When not operating the site will be locked.

3.1.2 Waste Accepted

The Mason County landfill accepts waste from industrial, commercial, residential and demolition sources per WAC 173-304.

Septage waste is accepted at a septage handling facility located in the north central portion of the site. Septage waste is collected in two 20,000 gallon tanker trailers and is exported for treatment. Continuation of this program will depend on continued operation and acceptance of septage waste at the out-of-county facility. Mason County may implement a septage waste compost project as an alternative method of handling this waste stream depending on its feasibility versus that of a continued export program.

No radioactive, hazardous, explosive or dangerous wastes will be accepted at the Mason County Landfill.

Waste will be inspected by the toll booth operator as it is brought on-site. If the toll booth operator has any question as to whether a material is either a dangerous or a hazardous waste, he/she will contact the Mason County Health Department for a determination. No disposal of such waste will be allowed in the Mason County Landfill.

3.1.3 Traffic Control

All vehicles will enter the site through the main entrance north of the landfill. Vehicles will proceed through the toll booth to the tipping face as follows. Public self-haulers will dispose of waste at the public drop box station. Commercial and industrial haulers will continue to haul directly to the working face. Public self hauler and commercial hauler operations will be kept separate. No scavenging will be permitted on the landfill site.

Traffic control will be provided on-site by signing on the main access road. Additional direction to collection vehicles and self-haulers will be provided at the toll-booth. Entry during non-operating hours will be restricted by the entrance gate. If additional traffic control devices become necessary, they may be fabricated from barrels, tires, logs or other materials available on site. Signs may also be posted to route traffic.

3.1.4 Recording Wastes

Wastes will be recorded by volume upon entering the site. Categories for waste recording are:

- No. of 30 gallon cans
- Loose Yards
- 55 gallon containers
- Tires
- Batteries
- Dead animals
- Commercial loose and compacted yardage
- Septic tank pumpings
- Asbestos waste
- Miscellaneous

All wastes to be disposed of in the demolition landfill will be recorded by volume. In addition to the volume; the source, type, and owner of the waste will also be recorded. Additional categories of wastes may be added to the list of those requiring recording, as required.

3.2 Waste Placement and Handling Plan

3.2.1 Landfill Method

The method of waste placement will be the ramp area method which utilizes temporary roads and dumping pads to provide access to the tipping face. Temporary roads and pads are constructed over refuse and therefore will require surfacing to provide all weather access for collection vehicles. Ramps will be constructed where necessary for collection vehicles to access successive lifts.

3.2.2 Refuse Placement and Cells

The 8 acre existing landfill will be closed April 30, 1993 to receipt of refuse. Closure construction will commence May 1, 1993 and continue through summer/fall 1993 with closure complete by December 1, 1993.

Mason County is currently considering replacement landfill capacity both in-county and out-of-county. However, conservation of landfill capacity is critical at this site so that capacity can be maintained through April 1993. For this reason demolition waste will be separated and disposed in a demolition area northeast of the landfill active area while MMSW disposal continues in the main landfill area.

Refuse will be placed in the main landfill area in daily cells approximately 50 feet wide. This will allow space for a minimum of three vehicles at a time to tip onto the working face. Cell

height will range up to 10 feet depending on the depth required to conform to final grade. This may mean a sloped lift varying from less than one foot at the edge to 10 feet high in the center. Cell depth will vary according to the daily waste stream, but will range from 5 to 10 feet. The size of the daily cell will also vary seasonally due to increased numbers of residents and associated solid waste volume in the summer months.

The top of each lift of refuse will be graded and sloped to provide adequate drainage to prevent ponding of water. Any settlement areas that develop will be filled, compacted and regraded promptly.

Maintenance of a compact daily cell will be necessary to operate in areas without intermediate cover for as long as possible. Once filling in the active open area is complete, intermediate cover will be placed in the "old" operating area, removed from the "new" area and operations commenced. The amount of active open area without intermediate cover will be limited to one acre unless circumstances warrant a larger area. Controlling the operation in this manner and using intermediate cover will reduce leachate production. Intermediate cover is discussed further in Section 3.2.6.

Refuse placement will begin in the southerly portion of the site and work generally toward the north. The filling sequence and phasing are described in a following section in additional detail.

3.2.3 Demolition Waste Placement

Demolition wastes will be disposed of in the demolition disposal area northeast of the main landfill area.

As defined by the MFS, demolition wastes are largely inert solid wastes consisting of concrete, brick, bituminous concrete, wood and masonry, composition roofing and roofing paper, steel, and minor amounts of other metals such as copper. Demolition wastes do not include plaster board, sheetrock, treated lumber, asbestos, wood wastes or stumps. These materials will be disposed of in the sanitary landfill.

Demolition materials will be deposited in an orderly manner in the demolition area, but not necessarily in daily cells. As bulky material is placed, the operator will periodically compact the waste using the compactor, if possible, and cover and grade the material.

Daily covering of demolition materials is not required under the MFS; however, timbers, wood and other combustible waste will be covered as needed during the summer months to avoid a fire hazard. In addition, covering to prevent emission of fugitive dusts will be employed when weather conditions or climate indicate that transport of dust is liable to create a nuisance.

3.2.4 Special Waste Disposal

Various types of wastes accepted at the Mason County Landfill which could present special disposal problems include bulky wastes, dead animals, infectious wastes, asbestos and industrial wastes.

Wastes not to be accepted include radioactive materials, explosives, and hazardous and dangerous wastes. The possibility exists that small quantities of these wastes may be mixed in with the incoming waste stream. The operating personnel will be continually observing for these wastes to prevent their inadvertent disposal in the landfill.

WAC 173-304-460 (3)(a)(ii) prohibits the disposal of free liquids such as non-containerized liquids and sludge unless approved by the local health department. Septage wastes and other liquid and semi-liquid wastes that are acceptable must be mixed with drier wastes or soil to limit moisture content and to be workable unless otherwise approved by the Health Department. Currently septage waste is collected in two 20,000 gallon tanks located in the north central portion of the site and is removed by Solganics. Septage wastes may also be composted as an alternative to export.

Bulky waste may include appliances, demolition and construction wastes, furniture, crates, barrels, tree stumps and other items. Some of these wastes will be disposed in the demolition area. Others will be compacted and flattened before being placed within the landfill cell. Appliances are placed in a designated area for breakdown and salvage.

Low density wastes, such as grass and brush clippings, which tend to rebound after being compacted, will be spread evenly in layers less than one foot in thickness and covered with heavier material to compress and keep the low density waste in place. Yard wastes may also be used in a compost project as directed by the Department of Public Works.

Reinforcing bars, pipe and coils of wire can become caught in the landfill equipment and cause mechanical damage to equipment or injury to personnel. These wastes will be placed and covered immediately.

The Mason County Landfill accepts locally generated asbestos waste. Asbestos will be handled in accordance with the following requirements.

- The asbestos contractor shall obtain and complete the appropriate Public Works Department form which describes the source and quantity of asbestos to be disposed.
- Asbestos must be wetted and double bagged.
- The landfill operator must be notified prior to bringing asbestos on-site.

- A special trench will be prepared for the waste in a designated portion of the landfill and as the material is disposed it will be immediately covered with 6 inches of soil.

- Handlers of asbestos wastes are required to wear protective clothing and filter masks.

Hospital and infectious wastes in Mason County are generally incinerated at the hospital. However receipt of this waste from various clinics in the area is possible. This waste will be immediately covered upon receipt.

3.2.5 Compaction

Proper compaction of solid waste will be crucial to operation of the Mason County Landfill. Good compaction will not only conserve capacity but can also control litter, allow easier covering, result in less settlement that occurs more evenly and create an aesthetic operation.

The equipment used for spreading and compaction and the equipment operating procedures will affect the density achieved. Heavy, wheel type, landfill compactors are the preferred equipment for refuse compaction at the Mason County Landfill; however, bulldozers of comparable size are also acceptable with County approval. Equipment for compaction will be capable of achieving a minimum compaction of 1200 pounds per cubic yard.

Compactors are most effective when working with level waste placement. However this would require a large working area. A slope of 5H to 1V is preferable for the working face when adequate space is available. A maximum working face slope of 3H to 1V is allowed, if required.

At the Mason County site, refuse will be spread in thin layers on the working face and compacted to eliminate cushioning and bridging. Testing has indicated a large drop in density for layer thicknesses above 1-1/2 feet. This should be the normal maximum thickness and in no case should a 2-foot thickness be exceeded. Also the number of passes affects the in-place density. Normally 3 to 5 passes should be made over each layer. More than 6 to 7 passes will not produce significant compaction for the effort expended.

Consistency of the compaction effort together with mixing of various types of waste will contribute to more even settlement. Compacting the top of a cell lift to a smooth surface will allow for easier covering with less material.

3.2.6 Cover Material

Three types of cover will be employed at the Mason County Landfill as follows:

Daily Cover. A minimum of 6 inches of cover material will be placed, spread and compacted over the exposed solid waste on the top and sides of the cell at the end of each day's operations. No solid waste will be visible after the placement of daily cover. Daily cover will consist of high permeability native sands and gravels.

Intermediate Cover. Intermediate cover will be placed over all surfaces of completed cells which will be exposed for an extended period of time (three months or more). Intermediate cover will consist of a temporary plastic cover placed over a 12" layer of native soil. The plastic cover will be held down by sandbags or tires and will be removed prior to resumption of landfilling. Intermediate cover will be placed over the MMSW landfill and be removed and replaced as landfilling progresses. Active landfill area not covered by intermediate cover will not exceed one acre unless the operation warrants a larger area.

Final Cover. Final cover will be placed at the end of operations at the landfill once final grade is achieved.

3.2.7 Inclement Weather Operations

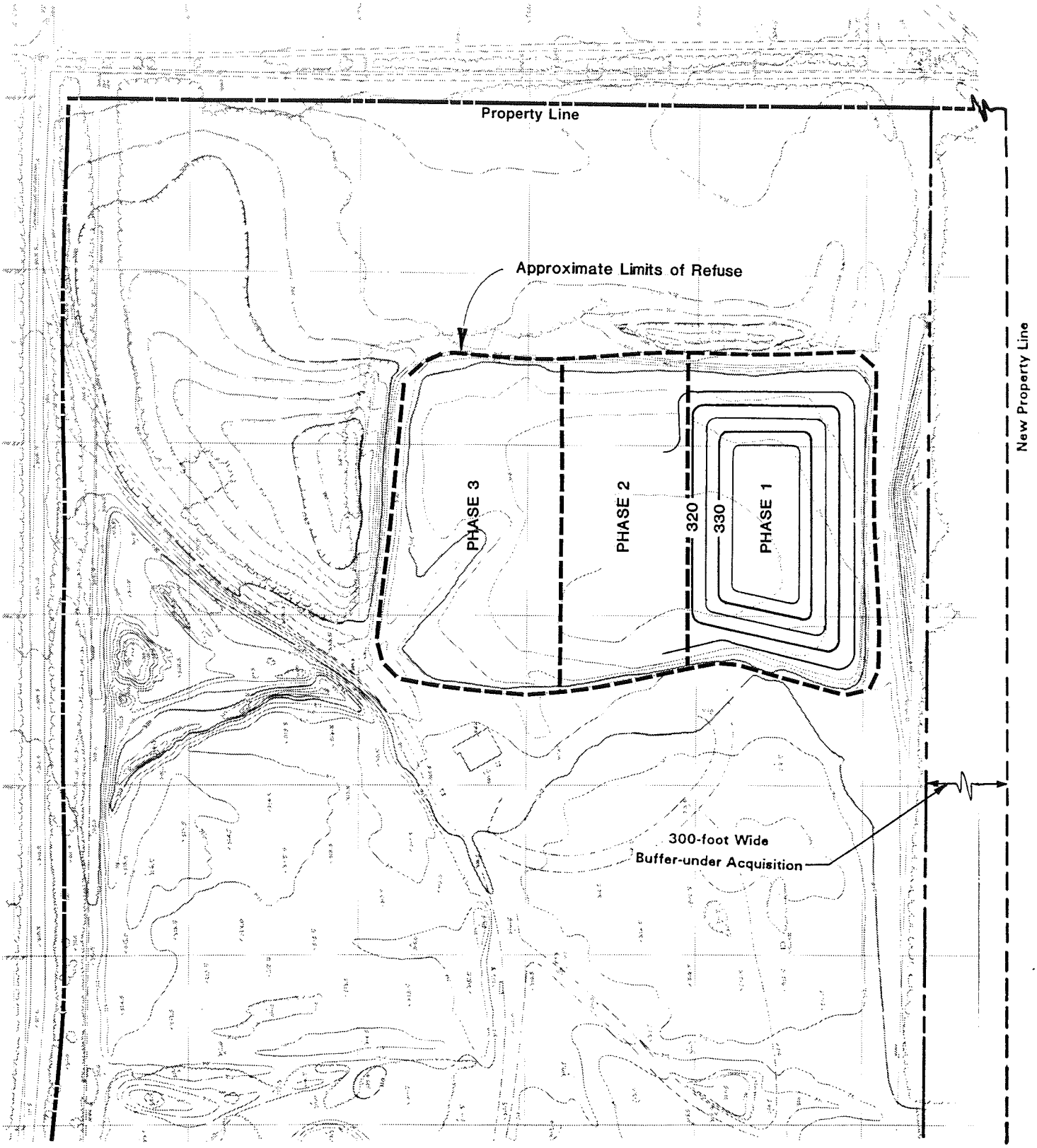
To maintain continuous, effective operations during wet weather, it is essential that all weather access roads and tipping areas be prepared. During wet weather it may be necessary to limit unloading to the prepared areas, and push the waste to the working area for placement.

Maintenance of the access and haul roads during wet weather will be performed frequently to provide a sound, smooth, free draining surface. Ditches along the roads, culverts, and catch basins will be cleaned to remove debris, vegetation and silt buildup.

3.2.8 Landfill Phasing

Fill Sequence: Figures 3.1 and 3.2 indicate the general filling sequence at the landfill. Basically, filling occurs in four phases as follows: Phases I, II, and III raise the existing grade at the south, central, and north portions of the landfill, respectively, to approximately 340 feet. Phase IV utilizes overfilling of Phases I through III to bring the landfill to its final grades.

The reason for the phased filling sequence is to take advantage of settlement as a means of increasing landfill capacity. The phasing sequence also allows for sequentially removing and replacing interim plastic cover in areas as they are filled. A maximum of one acre will be open for filling unless special circumstances warrant a larger area.



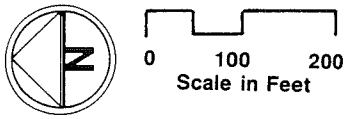
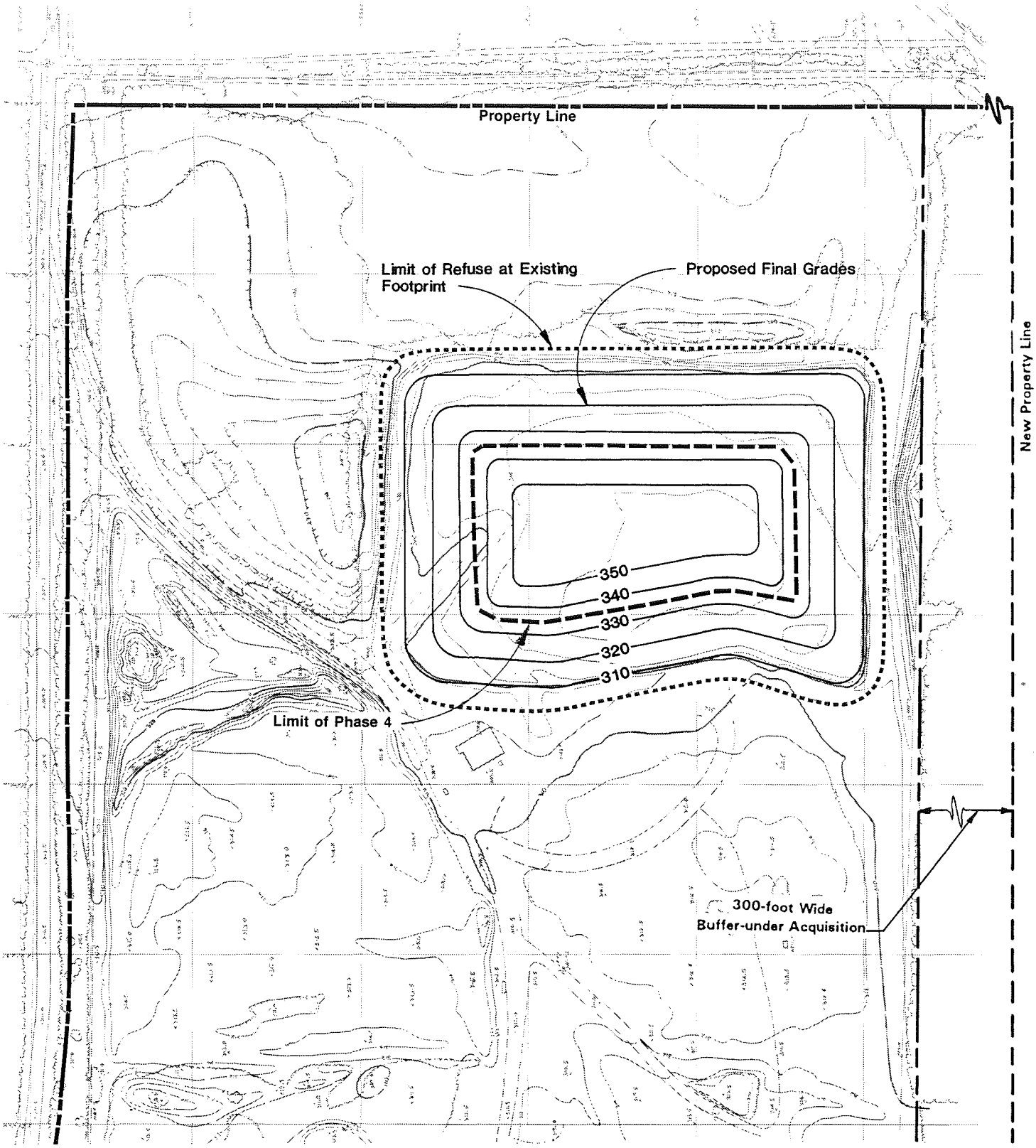


Figure 3.1: Mason County Landfill Filling Sequence (Phase 1 Complete)



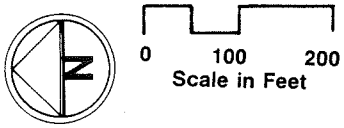


Figure 3.2: Mason County Landfill (Phase 4 Complete)

Overfilling will be executed in the following manner. Filling will start in the south end of the landfill and proceed to the north until an elevation of 335 to 340 feet is reached throughout the landfill. An access road to the top of Phases I through III will allow overfilling to commence at the south end of the landfill (which should have settled several feet). This overfilling will make maximum use of the landfill area to provide capacity.

During Phase IV overfilling, the placement of waste will take into account the amount of time remaining until final closure. For example, if a short period of time remains to May 1, 1993, then waste will be placed in shallow lifts to provide a uniform slope and final elevation.

Side Slopes: During Phase I, II, and III operations, the side slopes will be constructed to a slope of 4H:1V. It is anticipated; however, that settlement will result in final side slopes of less than 5H:1V. Phase IV side slopes should be constructed at a slope of 5H:1V to assure constructability of the final cover. A final slope of 5H:1V or less will ensure constructability of a drainage layer on a flexible membrane liner. At slopes greater than 5H:1V, construction becomes difficult and there is a greater chance of slope failure due to sliding.

Intermediate Cover: Intermediate cover, including the plastic cover is to be placed throughout the landfill during operations. All areas not actively open and receiving waste should have intermediate cover placed over them. During Phase I operations intermediate cover can be placed throughout the north and central portion of the landfill and on the side slopes, as well as over a portion of Phase I. As one area is completed intermediate cover can be removed from the subsequent area and used to cover the recently completed area. This process should be used throughout the landfilling process to limit the open area to one acre unless special operations require additional area.

Access Roads: Permanent access roads will be constructed around the perimeter of the site by the County. These roads will provide access for monitoring, ditch cleaning and other general maintenance. A permanent access road to the top of the landfill will be constructed as part of Phases III and IV. This access road will proceed up the north slopes of the landfill. This access road is discussed and illustrated in Section 4.0.

3.2.9 Recycling/Salvaging

Recycling bins are provided near the entrance compound of the Mason County Landfill by Exceptional Foresters, Inc. These bins collect newspaper, glass and aluminum.

The Mason County Landfill staff salvage selected materials from the disposal area. These materials include metals and tires.

Waste oil and batteries are also collected at the landfill in the equipment and general storage building. The building is covered, has a concrete floor and is open on three sides for public access. The containment area holds two 300 gallon containers for waste oil and a 5 gallon

container for public disposal of oil. Oil deposited in the 5 gallon container is tested prior to emptying into the larger containers. Vehicle batteries are stacked in the containment area on pallets and a separate bin is provided for collection of household batteries.

3.3 Site Maintenance

3.3.1 Blowing Litter Control

Litter will be controlled by four general techniques:

- Waste handling and disposal methods
- Wind Shielding
- Catching
- Collecting

The principle means of reducing litter problems are proper waste handling and disposal methods. As refuse is disposed at the tipping face, prompt spreading, compaction and covering of the refuse will greatly reduce the opportunity for the wind to scatter the light wastes.

Wind shielding is accomplished by trees, berms and depressions. The Mason County landfill is contained on three sides by a treed buffer which also provides some shield from the wind.

Portable fences and windscreens may be used to catch litter. Portable fences may be placed around the perimeter of the open area to collect blowing litter. The treed buffer will also serve as a barrier to blowing litter.

All litter captured by portable fences and windscreens as well as any litter that is blown off the active area of the landfill will be collected as time permits and at least weekly and disposed of in the landfill.

3.3.2 Dust Control

During dry summer and fall months, dust may become a problem at the landfill. Special practices including: immediate covering of dusty materials, orientation of the working face to be protected from the wind and use of water trucks will be implemented as necessary.

3.3.3 Noise Control

Noise limitations imposed by the Department of Labor and Industries must be observed to protect employees from hearing damage.

Measures to limit noise include:

- Maintain proper mufflers on vehicles and operating equipment
- Provide ear protection devices for operators
- Maintain perimeter buffer zones of trees and berms
- Limit operating hours.

3.3.4 Employee Facilities

Employee facilities are provided in the entrance compound of the Mason County Landfill. An office, eating area, potable water, shower, toilet and hand washing facilities are provided in the maintenance building.

3.3.5 Vector Control

Vectors which may create health hazards and a nuisance include: flies, mosquitoes, rodents and birds. Flies and rats will be most effectively controlled by proper spreading, compaction and daily covering of incoming wastes.

Mosquitoes will be controlled by avoiding ponding, stagnant water through proper grading of surfaces and installation of needed drainage facilities. Tire piles which hold water and are excellent breeding grounds for mosquitoes are to be avoided.

Bird populations, often very large at landfills, create nuisances on-site and off-site, but are not considered a health hazard. Birds may cause damage to the temporary plastic cover and they can pose a safety hazard to aircraft in the neighboring airport.

To limit the bird population, the refuse placing operation should be confined to as small an area as practical to discourage bird flocks from forming. Placing cover routinely and promptly will limit the available food source for the birds.

3.4 Safety and Emergency

3.4.1 Fire Protection

Equipment fires and landfill fires can occur at a disposal site. The best remedy for this occurrence is prevention, but in the event of a fire, prompt action can limit injury and damage.

All equipment will be equipped with a portable, dry chemical fire extinguisher for prompt response to a fire. A 15 to 20 pound fire extinguisher is recommended for each operating machine. Operators and other personnel will be trained to watch for equipment fires, to know where the extinguishers are carried and to call for assistance.

Spontaneous combustion may start within a landfill when a combustible material is present, oxygen is available and sufficient heating occurs to achieve the ignition temperature of the combustible materials. The heat required is first generated by either aerobic or anaerobic decomposition of the waste and the local area is insulated by the refuse. Air is made available to the location by open cracks and fissures, gas piping, etc. Evidence of a subsurface fire is noted by:

- Unusual or rapid settlement
- Venting of smoke
- Elevated landfill gas temperatures

Locating and determining the extent of the fire can be difficult. This may be done using thermographic scans, excavations, borings and test wells.

A landfill fire on or near the surface may be extinguished by covering with dirt. A water truck standing by can also be effectively used. If the fire extends below the immediate surface, excavating the burning materials will be necessary. This may have to be done in layers to be sure all burning and smoldering materials are excavated and cooled. Care must be taken to prevent injury to the operator and damage to the equipment.

For deeper fires, or if excavation is not practical, it may be necessary to extinguish the fire by cooling the burning mass in place and/or restricting the available oxygen. Closing off cracks, fissures and piping systems can limit the oxygen.

Injection of water or gas can both cool and displace oxygen. Any opening caused by the increased pressure must be sealed.

3.4.2 Hazardous Environments

Hazardous environments at a landfill may be caused by the physical handling of wastes, hazardous materials being deposited or exposure to products of decomposition. Operators should be continually aware of sharp and jagged items, moving machines and falling objects. Protective clothing, including safety shoes, gloves, hard hats, safety glasses and goggles, respirators, bright colored reflective vests and clothing should be used when necessary.

Hazardous wastes are prohibited from being deposited at all but specially designated landfill sites. It is possible such wastes may inadvertently or illegally be delivered with other wastes or in carelessly discarded containers. Incompletely drained or emptied containers can pose hazards to personnel, cause fires or contribute to pollution.

Landfill employees will be trained to recognize drums, bags or boxes containing any solid sludge or liquid materials. Labels may be an indication of the material, but should not be totally relied

upon. If hazardous or unknown wastes are delivered to the site they will be isolated, the driver and truck identified and the Health Department notified.

Decomposition of solid waste creates leachate and gases. Landfill leachate will normally have a very high organic content and elevated chemical levels. It is recommended that personnel contact with leachate be avoided.

The landfill gases can create hazardous conditions. Upon depletion of oxygen in the landfill, decomposition becomes anaerobic producing methane and some limited amounts of hydrogen sulfide. Hydrogen sulfide is a noxious gas that produces the smell associated with rotten eggs. Methane is explosive when present in air at concentrations between 5 and 15%. It is odorless and colorless and by itself can be difficult to detect. Other gases produced will be detected by odors produced. Hydrogen sulfide has an especially strong odor and is produced when sulfate, such as gypsum board, are present.

3.5 Monitoring Requirements

3.5.1 Groundwater Monitoring

The groundwater monitoring system described in this section meets or exceeds groundwater monitoring requirements of WAC 173-304-490. Additional details of the monitoring wells and sampling results are described in Section 2.4.1.

3.5.1.1 Sampling Methods

A total of 14 samples will be collected for analysis each quarter. These will include samples from wells MW-1B, MW-2B, MW-3B, MW-4, MW-5B, MW-6, MW-7, MW-8, MW-9, MW-10, TH-1S, TH-1D, Blucher (deep well), and a duplicate sample from one of the wells for purposes of analytical quality assurance.

Samples will be collected from dedicated sampling pumps in the ten monitoring wells, and from spigots or openings nearest the well from domestic supply-type wells. Specific procedures will include the following:

1. Prior to sample collection activities, depth to water measurements will be taken at <u>all</u> well locations using an electronic water level indicator. The probe of the water level indicator shall be decontaminated between each use.

2. Each well shall be purged of a minimum of five well casing volumes of standing water as calculated from depth to water measurements. Field measurements for specific conductivity, pH, and temperature will be recorded periodically during purging and water shall be purged until field readings stabilize. Purged groundwater shall be disposed of on the ground surface away from the well.

3. Samples will be collected and transferred directly to pre-labeled sample containers prepared by the analytical laboratory. Samples collected for dissolved metals analysis will be field filtered immediately upon collection using disposable filters.

4. Immediately following collection, samples will be stored in a chilled cooler (approximately 4 degrees centigrade) for transport to the analytical laboratory.

3.5.1.2 Analytical Parameters

The analytical program for the closure and post closure period will include conventional MFS parameters, dissolved metals, and volatile organic compounds on a quarterly basis. The dissolved metals selected for analysis are those that have been detected during past sampling events.

A summary of the analytical parameters is as follows:

Conventionals:
- pH
- Specific Conductivity
- Temperature
- Chloride
- Fluoride
- Nitrate, Nitrite, and Ammonia as nitrogen
- Sulfate
- Chemical Oxygen Demand (COD)
- Total Organic Carbon (TOC)
- Total Dissolved Solids (TDS)

Dissolved Metals:
- Barium
- Calcium
- Iron
- Magnesium
- Manganese
- Sodium
- Zinc

Volatile Organic Compounds: EPA Method 8240

In addition, semi-volatile analysis (EPA Method 8270) will be performed on an annual basis (at the end of the wet season) on samples collected from wells located most directly downgradient from the active landfill. These include wells MW-1B, MW-2B, MW-3B, MW-7, MW-8, and MW-10.

Following appropriate review of analytical data, the analytical program described here may be reduced or expanded during the closure/post closure period with approval of the Health Department and Ecology.

3.5.1.3 Quality Assurance

The following quality assurance measures will be observed during sample collection and analysis:

1. Sample Collection: Samples shall be collected using dedicated sampling pumps and teflon discharge tubing at each well. Pump discharge tubing and shall be rinsed with a 0.1N HCl solution and a deionized water final rinse following each use. Filters and tubing used for field filtering samples shall be discarded and replaced between each well.

2. Field Duplicates: One duplicate sample shall be collected during each sampling event to determine sampling and analytical variability. Duplicate samples will be collected simultaneously and handled identically with regular samples from the well, but will be labeled separately.

3. Chain of Custody: Standard chain of custody protocol shall be practiced in order to maintain the legal integrity of the samples from the time of collection to the time of analysis.

4. Laboratory Quality Analysis: Analytical procedures will be evaluated through review of surrogate recoveries, matrix spikes, duplicate samples, and transport blank samples prepared from laboratory reagent grade water.

3.5.1.4 Data Reporting

Laboratory analytical data from each of the quarterly sampling events shall be evaluated and tabulated by a Parametrix Quality Assurance Officer. Tabulated results shall be provided to Mason County which include quality assurance notes on laboratory analytical data. Laboratory certificates from analytical data will be furnished to the County or regulatory agencies upon request.

3.5.1.5 Statistical Analysis

A statistical method shall be developed for comparison of background to downgradient water quality. The statistical method used shall meet the approval of the Mason County Health Department and Ecology.

3.5.2 Surface Water Monitoring

Surface water is not presently monitored at the Mason County Landfill. The highly permeable nature of the soils in the area generally results in a lack of run-off from the site.

Upon closure of the site and installation of the final cover system, increased levels of runoff will be generated. Collected water will be carried south of the site into a settling basin and be discharged through natural drainage channels. Surface water will be monitored at the point of

discharge.

Surface water samples will be monitored for the following parameters:

- Temperature
- pH
- Specific Conductivity
- Turbidity
- Total Suspended Solids
- Dissolved Oxygen (DO)
- Fecal Coliform

Sampling of surface water will be conducted on a quarterly basis. The samples will be recovered by allowing direct flow into sample bottles provided by the analytical laboratory.

Chain of custody protocol for surface water samples will be the same as for groundwater samples. If contamination were to occur, it may be a result of failure of the final cover system. If surface water quality were to indicate contamination, an inspection of the integrity of the final cover would be conducted and any necessary repairs made.

3.5.3 Gas Monitoring

WAC 173-304, (MFS) requires methane concentrations on and around the landfill to be within the following parameters:

- Less than the lower explosive limit (5% by volume) at or beyond the landfill property boundary.

- Less than 1.25% by volume in buildings on the site.

- Less than 100 parts per million by volume of hydrocarbons (expressed as methane) in off-site structures.

The high permeability and porosity of the soils around the site will facilitate the migration of landfill gas. Migration of gas occurs primarily during periods of high barometric pressure when the gas, having a density similar to that of air, is held in the ground and may dissipate downward and/or outward. During falling barometric conditions the gas will rise upward toward the land surface and vent to the atmosphere.

Six dual completion monitoring probes will be installed near the property boundaries of the landfill for the purpose of monitoring for landfill gas migrating away from the site. Gas probes will be located near property boundaries as follows: two on the north property line, two on the east property line, two in the 300 foot buffer which is under acquisition. No gas probes will be located on the west property line due to the distance from the active area (over 1400 feet). Gas monitoring probe locations are illustrated in Figure 4.6.

Sampling Methods. Monitoring of the gas probes will be conducted quarterly at the Mason

County Landfill, preferably during times of falling barometric conditions. Sampling will be performed by connecting the inlet hose of a combustible gas indicator (CGI) to a ballcock valve attached to the probe, allowing the CGI to draw a sample of the gas in the probe.

The gas management system at the Mason County Landfill will be designed to be upgraded to an active system by phase. If measurements taken during sampling indicate that landfill gas is migrating away from the site in levels exceeding the MFS, the system will be upgraded to an active system. Refer to Section 4.5 for additional detail.

4.0 CLOSURE PLAN

4.1 Introduction

The closure plan concepts presented in this chapter are designed to minimize leachate production and mitigate potential environmental and public health and safety impacts associated with solid waste landfills. The proposed concepts are in accordance with the Minimum Functional Standards (MFS) as delineated in WAC 173-304. They include a grading plan, final cover system, surface water management system, gas management system and access roads.

The closure plan elements presented in this report are conceptual in nature and were developed for review and approval by Ecology and the Mason County Health Department. Final plans and specifications will be prepared subsequent to approval of these concepts.

4.2 Final Site Plan

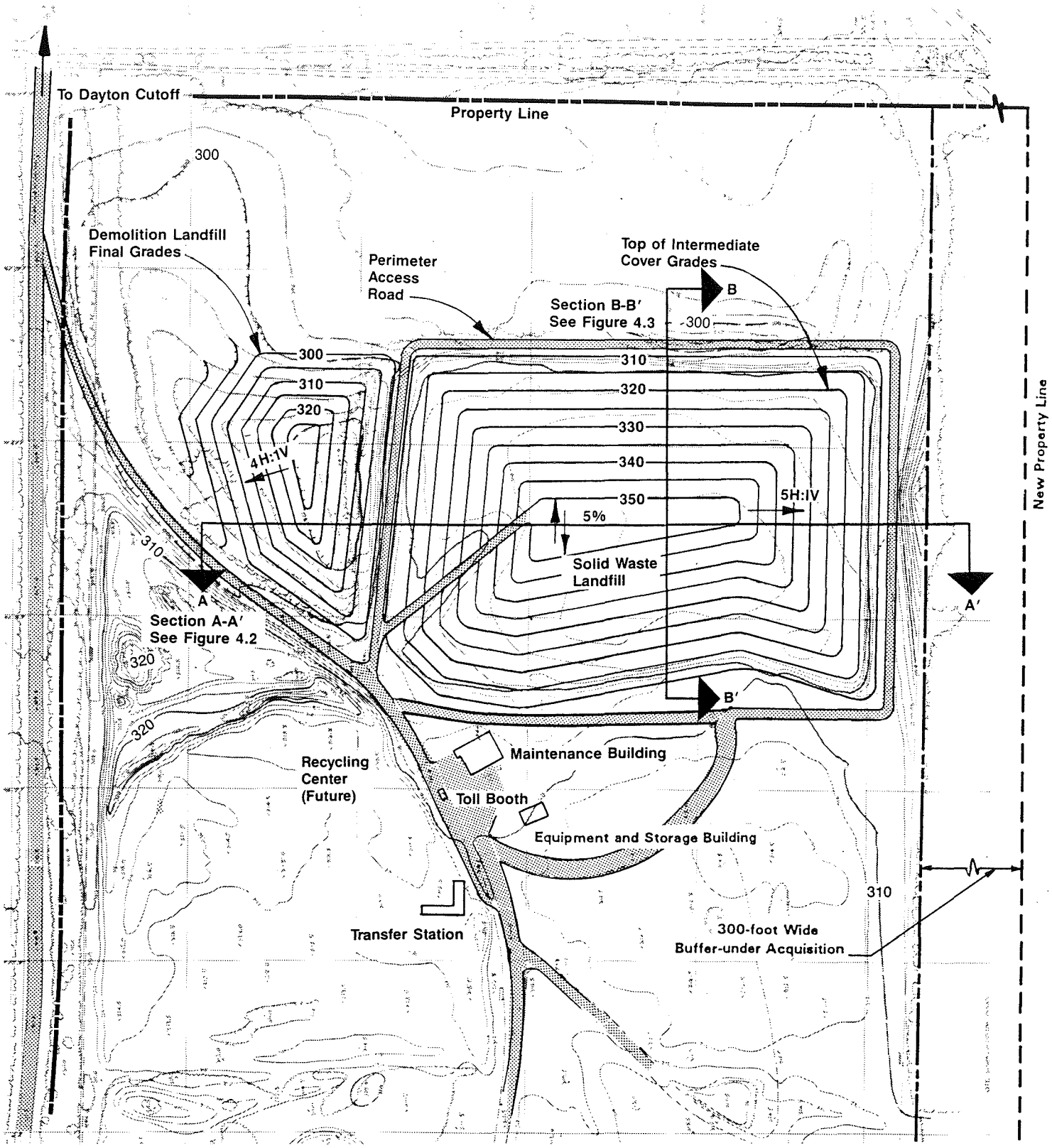
Mason County has submitted a variance application to close the Mason County Sanitary Landfill during summer 1993. The County requested a variance from the November 1989 MFS compliance deadline to provide for solid waste disposal until new landfill capacity can be established. Mason County intends to operate the landfill through April 30, 1993 with closure commencing May 1, 1993. Closure construction will be complete by December 1, 1993.

The final grading plan for the landfill site is necessary to provide sufficient refuse capacity up to the closure date. The final site plan for the Mason County Landfill is illustrated in Figure 4.1. This site plan includes the grading configuration for the active solid waste landfill and the demolition disposal area.

4.2.1 Solid Waste Landfill

Top of intermediate cover grades are shown in Figure 4.1. To reach the final refuse grade, the remaining capacity in the existing footprint is filled at a 4H:1V slope to a final elevation of 350 feet MSL. At this level, landfill grade will continue at a slope of approximately 5% to a peak elevation of 355 feet MSL. Settlement will reduce the side slopes to less than 5H:1V and may eventually result in a final peak elevation of as little as 337 feet MSL. Typical landfill sections are illustrated in Figures 4.2 and 4.3. Site capacity to landfill closure is approximately 142,000 cubic yards in-place refuse and cover, as estimated from July 1990 topography.

Some initial construction tasks, such as access road construction, and surface water improvements may occur concurrently with filling operations. Major construction items; however, such as liner placement, cover soil placement, and hydroseeding will begin upon



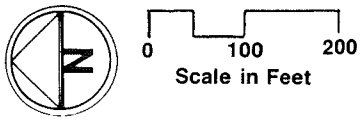
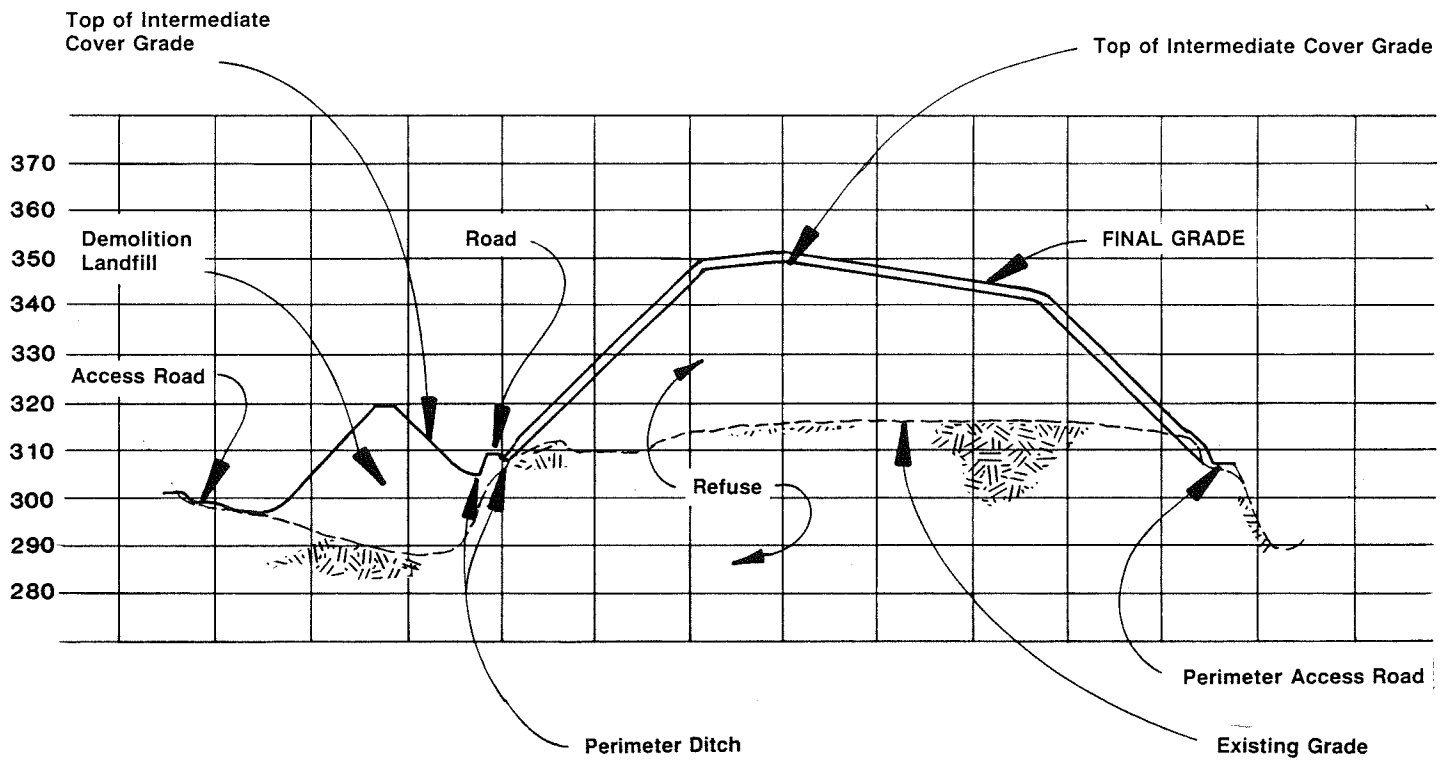


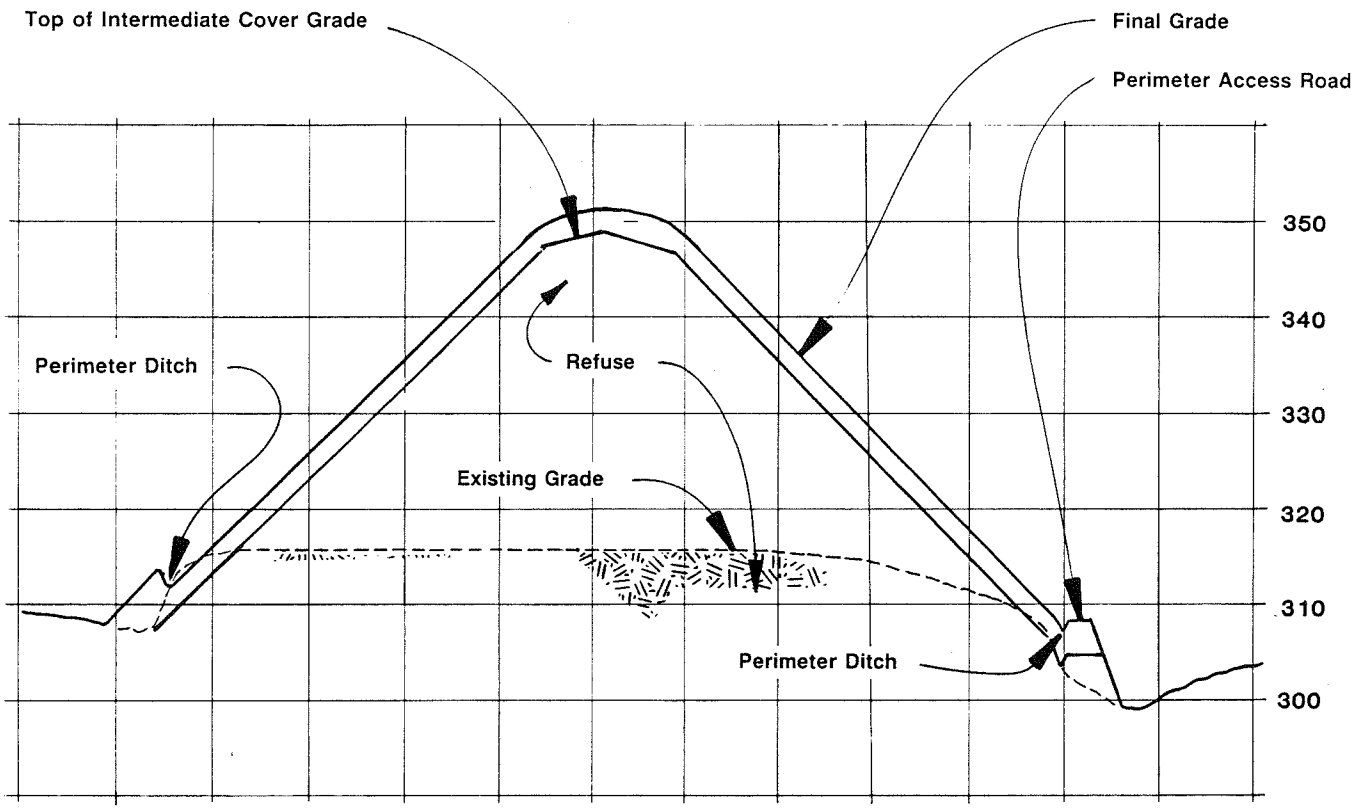
Figure 4.1: Mason County Landfill
Final Site Plan



Section A–A'

Vertical : 1"–40'
Horizontal : 1"– 200'

Figure 4.2: Landfill Section A–A'



Section B–B′

Veltical : 1″–20′
Horizontal : 1″–100′

Figure 4.3: Landfill Section B–B′

closure of the landfill to receipt of refuse (May 1, 1993) and proceed through summer 1993. Temporary cover will be used to limit open areas of the landfill until the final cover system is installed.

4.2.2 Demolition Disposal Area

Figure 4.1 shows the demolition area grading plan. The demolition area is located just north of the existing landfill footprint. The demolition area will be graded to a maximum side slope of 4H to 1V on all sides. Maximum demolition elevation will be 325 feet MSL. The demolition area has an estimated capacity of 50,000 cubic yards. Assuming the waste stream is composed of 10% demolition waste by weight the demolition area will be ready for closure in six to eight years (1997 to 1999). The date of closure is only a rough approximation because demolition waste tends to be highly variable due to fluctuations in the construction market.

4.2.3 Septage Disposal Trenches

Prior to January 1990, Mason County disposed of septage waste in trenches located in the north and south central portions of the site. On January 19, 1990, the practice of collecting septage waste in a tanker for export to an out-of-county compost operation was begun. This program is currently in operation. During spring 1990, the old septage trenches were excavated and stockpiled for later use as topsoil material at the landfill. Mason County intends to continue the collection of septage for export as long as the compost facility is operational and the program remains feasible.

Mason County may develop a septage composting facility to be used for disposal of septage generated within the County if export of septage becomes less feasible over time.

4.2.4 Borrow and Stockpile Area

Borrow for daily and intermediate cover, and some soil layers in the final cover system will be obtained on-site. Tailings piles from the gravel pit operations west of the site can be used for daily and intermediate cover and road base material. This material has a permeability of approximately 6.5x10-5 cm/sec (Rittenhouse, Zeman, and Associates, 1989). However, recent testing of in place sand and gravel at the landfill as part of groundwater well installation (See Section 2.3.2) indicates a hydraulic conductivity of approximately 10-2 cm/sec. Further testing will indicate the material's usefulness as a drainage material.

4.3 Final Cover System

4.3.1 Background

The final cover system represents the most important component of the closure design. It is important because it is the principal system proposed to control the generation and migration of

leachate at the site. The final cover system will significantly reduce the quantity of leachate generated at the site such that the potential for groundwater contamination is minimized.

The final cover system serves other purposes as well. It isolates the wastes from disease carriers such as insects, birds, and rodents. It also supports a vegetative cover that reduces erosion and provides an aesthetically pleasing appearance.

As surface water is prevented from infiltrating into the landfill, it is collected as runoff in perimeter drainage ditches. Since this water does not penetrate the barrier layer or come in contact with refuse, it is not contaminated and may be discharged to surface water drainage courses. Runoff is handled in the surface water management system and is discussed in Section 4.4.

4.3.2 Proposed Final Cover System--Landfill

Figure 4.4 shows the proposed final cover system at the Mason County Landfill. This cover system conforms to WAC 173-304 and consists of the following layers:

1) Intermediate Cover: Consists of a one foot thick layer of on-site material and serves as a cover for refuse until closure construction occurs. This layer will be placed by the landfill operator as part of the filling operation. The intermediate cover also includes interim plastic which will be removed prior to placement of subsequent layers of refuse. Plastic cover may be shredded prior to placement of final cover and left in place. Top of intermediate cover grades shown in Figure 4.1 indicate the top of this layer.

2) Subgrade Layer: This is a six-inch thick layer placed, graded, and smoothed to provide a suitable base for the membrane cover. The surface is to be free of rocks, sticks, and other materials that may damage the membrane cover.

3) Geomembrane Cover: Consists of a minimum 50 mil High Density Polyethylene or other synthetic material. The geomembrane cover will be textured on side slopes of 5H:1V or steeper to ensure stability of soils placed over it.

4) Drainage Layer: Consists of 18 inches of clean sand with a high permeability. This layer carries water that percolates through the topsoil layer to perimeter drainage ditches. Depending on the materials used for the drainage layer and topsoil layer a filter may be required between the two materials. The filter will likely consist of a geotextile although a soil filter may also be used.

   The 18" drainage layer is assumed to consist of sand of permeability 10-2 cm/sec or greater. However during the detailed design phase, alternate materials such as geocomposites or alternative soils may be shown more economical with no loss

in performance. Should an alternative system become available it will be submitted for review and approval.

5) Topsoil Layer: Consists of twelve inches of on-site material excavated from septage trenches or on-site soil amended with compost as necessary to improve vegetation growth.

6) Grass Hydroseeding: Provides a vegetative cover and erosion control.

The lateral extent of the final cover cap was determined based on landfilling history as verified by the treed buffer and pits dug to determine the extent of refuse. For example, original grades prior to landfilling are readily apparent on the north, south and east side of the landfill by the existence of the treed buffer. On the west side of the landfill, pits were dug to determine the extent of refuse. Final cover will extend over all areas of the existing landfill which contain refuse.

This system can be expected to significantly reduce or virtually eliminate leachate production as discussed in Section 4.3.4. Capital cost calculations for the cover system are included in Section 6.0.

In the detailed design phase of the project, work will be done to develop material specifications which correspond to the conceptual design included here. Sources will be investigated in addition to testing and modeling actual materials to ensure proper operation and stability of the system.

A Construction Quality Assurance (CQA) Plan will be developed as part of the detailed design phase and submitted for review and approval as part of the construction plans and specifications.

4.3.3 Final Cover System--Demolition Landfill

The MFS do not require a low permeability final cover for a demolition landfill. When the demolition landfill has reached its final grades the material will be compacted, graded and covered by a one to two foot layer of native material, a minimum six inch layer of topsoil and hydroseeded.

4.3.4 Site Water Balance

To determine the effectiveness of a given cover system, a water balance must be prepared for the final cover. The model used in this report to evaluate the cover system is the "Hydrologic Evaluation of Landfill Performance" (HELP) computer model developed by the U.S. Corps of Engineers for the Environmental Protection Agency.

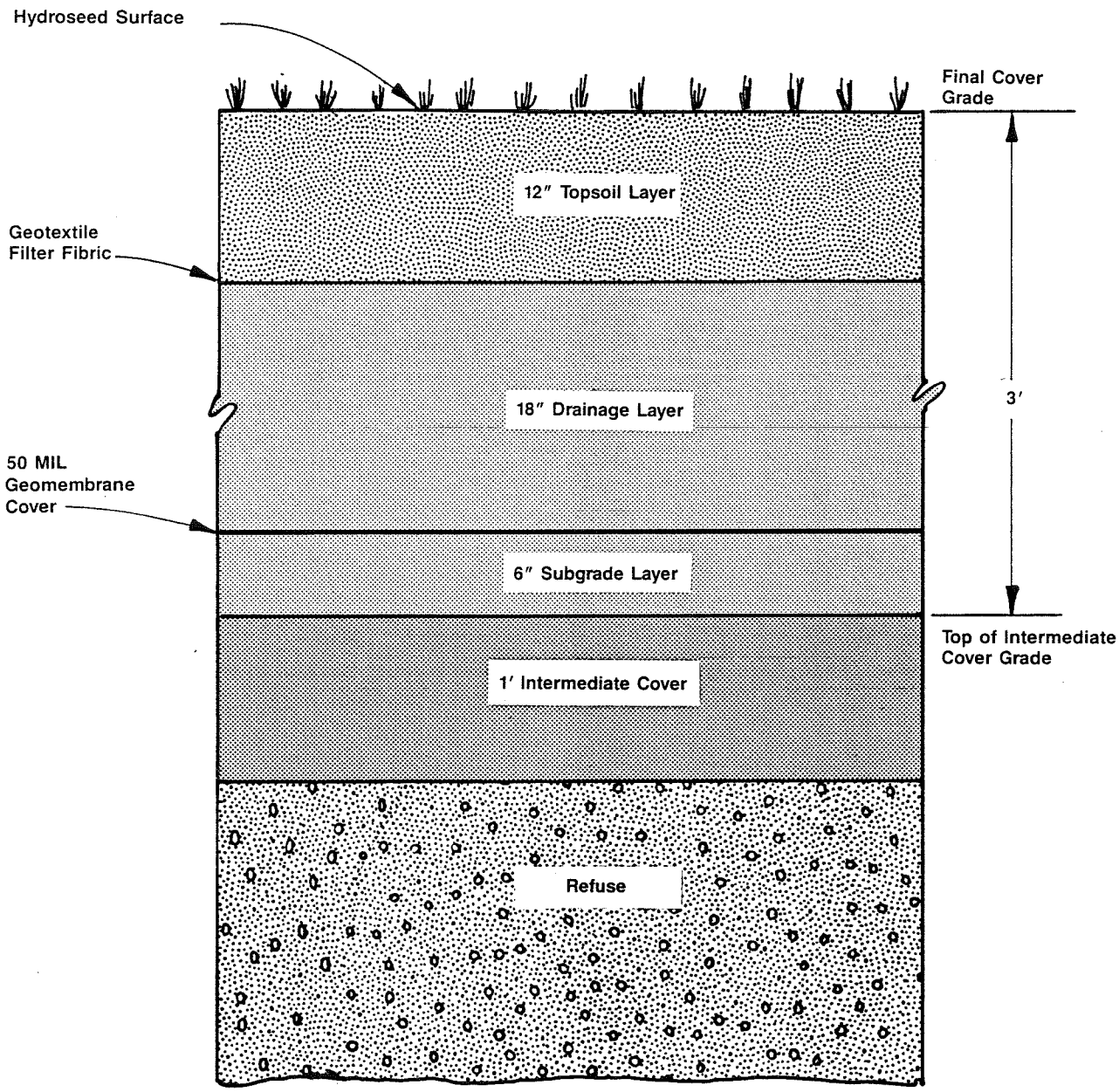


Figure 4.4: Final Cover System

The HELP model performs a water balance to determine the amount of surface runoff, lateral drainage, evapotranspiration, and vertical percolation for the landfill. Input data for the model consists of climatological, soils, and design data.

The HELP model allows input of a leakage fraction for the Flexible Membrane Liner (FML) to account for leaks which may occur due to rips, tears, seam leaks, etc. Physically, the leakage fraction represents the ratio of holes to total liner area. Recommended values for the leakage fraction range from .001% to 1% depending on liner material, bedding material, construction practice and QA/QC plan. A leakage fraction of 0.1% to 0.01% was used for this analysis. This range represents the midpoint of the range recommended by EPA in the model's documentation.

While the landfill is still active it is assumed that approximately one acre is open area. The remainder of the site will be covered with an interim plastic cover assumed to have an efficiency of 70%. The model predicts that about 8 million gallons of leachate would be generated per year during the active life of the landfill without the interim plastic cover. Interim plastic cover reduces this to between two and four million gallons per year depending on the efficiency of the interim plastic. With installation of the final cover system this will be reduced to between 210,000 and 1.7 million gallons depending on the amount of leakage from the installed liner system.

HELP model calculations are included in Appendix 1.

4.4 Surface Water Management

Control of surface water runoff is fundamental to the effective operation of the landfill final cover system. Proper management of runoff has a three fold purpose.

1) Carry runoff from the landfill surface, thus limiting infiltration into placed solid waste.

2) Limit downstream impacts and erosion due to increased quantities of runoff.

3) Control surface water that may run onto the site from surrounding properties.

The surface water management system for the Mason County landfill is shown in Figure 4.5. Control of surface water would be achieved through directing runoff into drainage ditches designed for the maximum flow from the 25 year storm.

Ditches are provided around the landfill perimeter to carry runoff from the landfill surface to the discharge point. All ditches on the landfill surface or around the perimeter of the landfill are underlain by the final cover system. Therefore no infiltration into refuse would occur.

Ditches will also be installed to intercept surface water which would otherwise run on to the landfill surface. These ditches would be located outside the perimeter access road and would be unlined.

The discharge point for all surface water collected from the landfill surface will be in the southeast corner of the landfill. Surface water will be carried via pipe past groundwater monitoring facilities into a settling basin and then discharged. The settling basin will be located in the 300 foot buffer which is currently under acquisition. The settling basin will be unlined and will allow for infiltration of surface water.

Appropriate discharge permits such as the NPDES permit will be sought according to State and Federal requirements.

Erosion of the final cover would be controlled primarily through the development of a vegetative cover over the landfill. This would be achieved by hydroseeding with a mixture of native grasses. Culvert inlets and outlets will be protected with rock to prevent scouring. Routine maintenance and upkeep of the final cover would be accomplished as discussed in the post closure plan (Section 5.0).

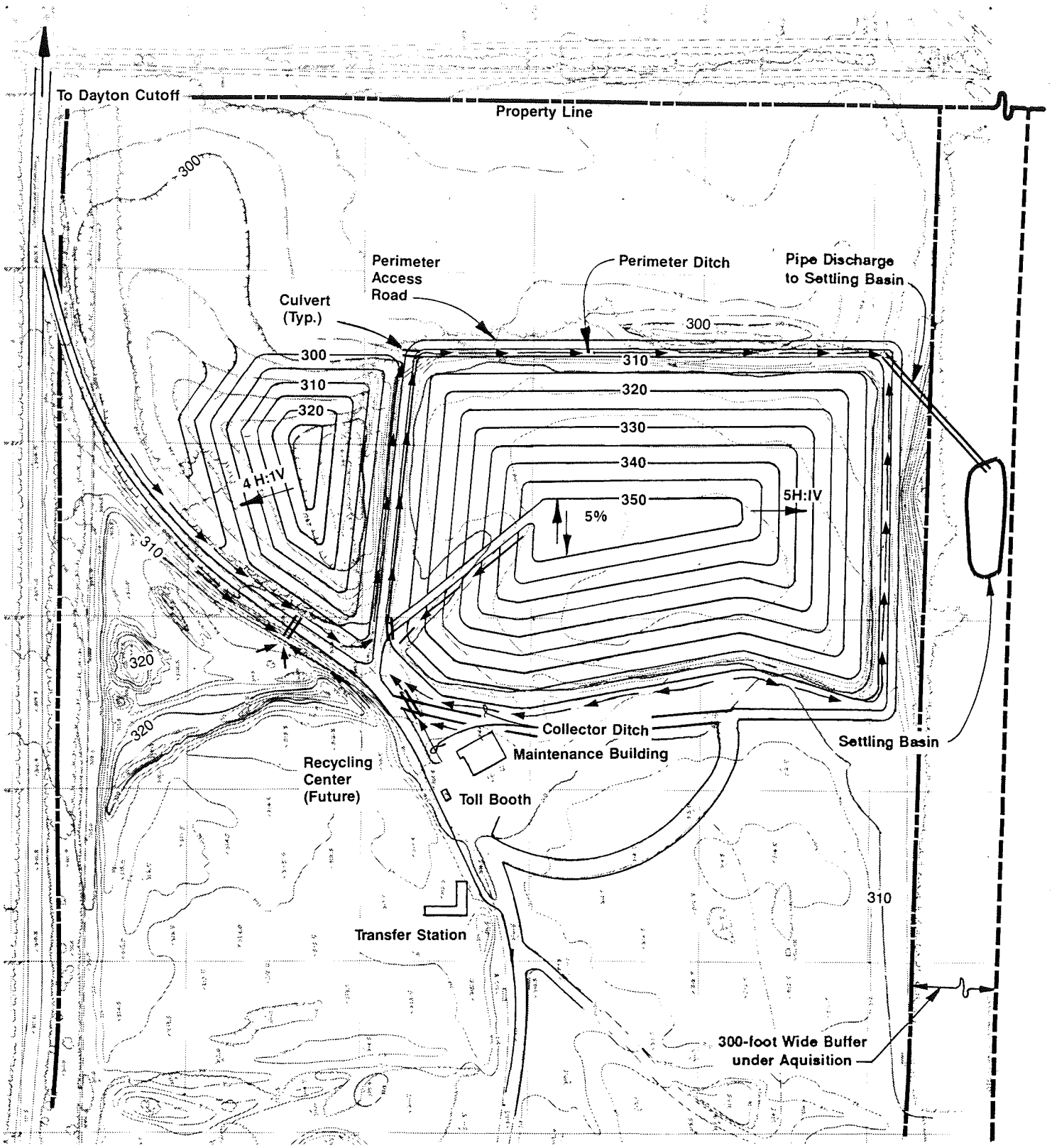
Because of the installation of a drainage layer and settling basin, peak discharge flows should be similar to those that occurred prior to construction of the final cover system. From the discharge point south of the landfill the nearest surface water is the northern seasonal reach of the North Fork of Goldsborough Creek. No impact is anticipated to the creek.

4.5 Landfill Gas Management

As placed refuse decomposes in the landfill, gas is released as a by-product. Prior to closure, this gas vents through the refuse to the atmosphere. With placement of a final cover cap, gas can no longer vent directly to the atmosphere and a path must be provided to allow the gas to escape. A passive gas system will be installed at the Mason County Landfill for this purpose.

The passive gas ventilation system will consist primarily of piping and flares and will be installed in conjunction with the final cover system. Landfill gas will be collected in perforated pipes located within the refuse underneath the final cover. The gas piping will follow the contour of the grading plan to form a continuous loop around the landfill. The collected gas will be piped through the final cover system to flares for burning. The flares will support combustion of the methane and other oxidizable gasses associated with landfill gas.

The piping system will be installed in a filter fabric and drain rock envelope, spacing will be determined based on a gas production and migration model. Flares will be placed on the landfill at high points in the piping. One flare will be placed at the south end of the landfill and one at the north end. Flares will be equipped with a solar powered automatic igniter to ensure that escaping gas is burned. The gas management system is illustrated in Figure 4.6.



0 100 200
Scale in Feet

Figure 4.5: Mason County Landfill Surface Water Management System

Methane is flammable at concentrations from 5 to 15% by volume in air at atmospheric pressure and normal temperature. Because methane is a colorless, odorless and lighter-than-air gas it can readily concentrate to dangerous levels in enclosed areas. Common areas where methane can collect and concentrate include building crawl spaces, utility system manholes, and leachate collection system pump stations.

The Mason County Landfill site is underlain by relatively porous sands and gravel. Because these soils will facilitate venting as well as lateral migration of gas it is uncertain how far gasses may migrate. Six dual-completion gas probes will be installed on the landfill site near property boundaries to monitor for gas migration. The locations of the gas probes are illustrated in Figure 4.6. If gas concentrations in excess of allowed limits are encountered as part of the monitoring plan discussed in Section 3.5, the system will be upgraded by phases to an active system.

Phase I of the upgrade would consist of installation of a blower to be connected to the passive collection system. Phase II could be instituted if necessary and include installation of gas extraction wells in the refuse. The final phase, Phase III could include installation of gas extraction wells around the perimeter of the landfill and could be instituted if the first two phases were ineffective.

Condensate will not be collected from passive gas collection pipes in the landfill located under the landfill final cover. If an active system is installed however, horizontal pipes would be required above the final cover system and condensate would be collected from these pipes.

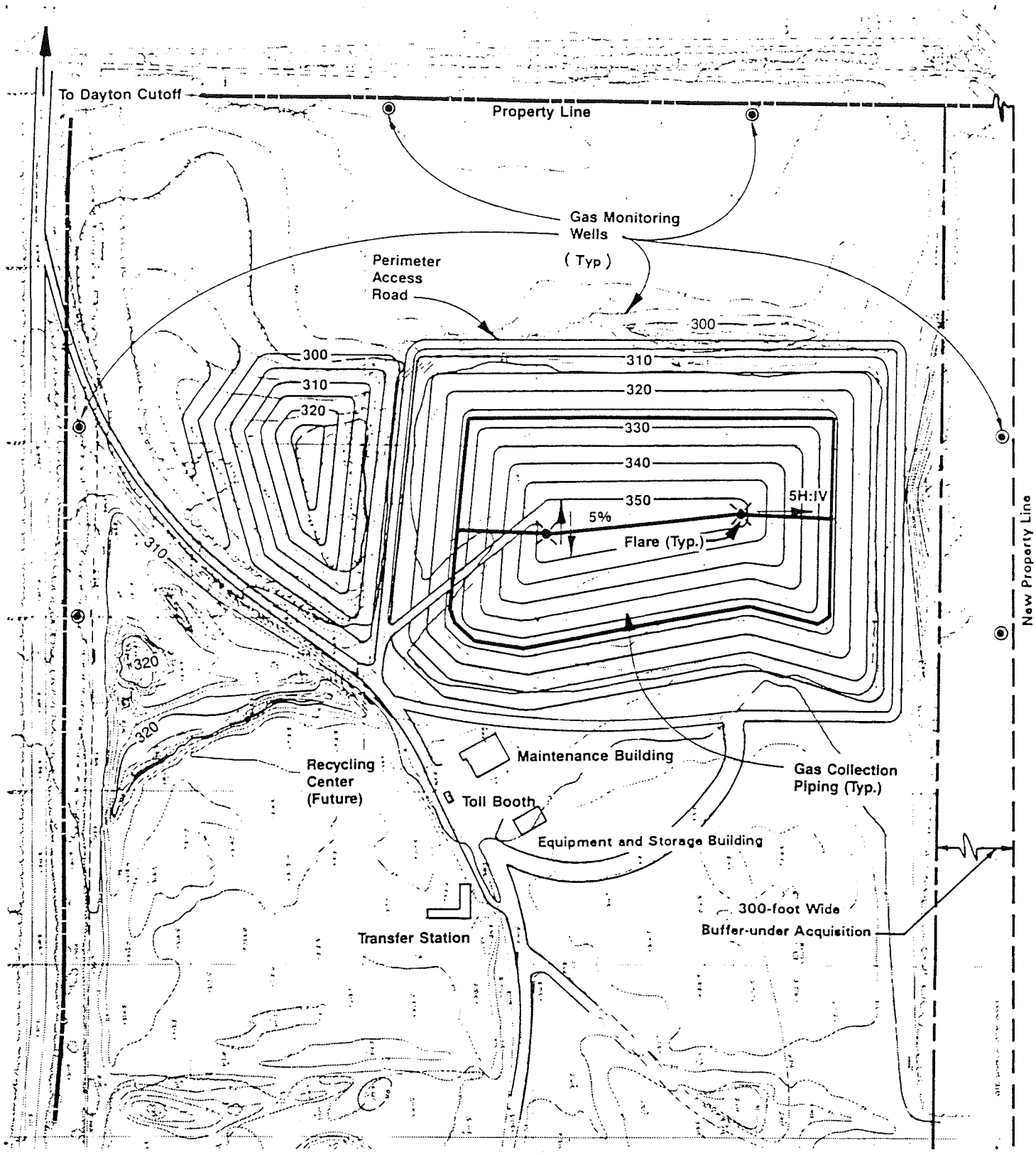
4.6 Landfill Access

Access to the landfill is via a road located to the north. This road passes through the toll booth area and maintenance buildings. Access is restricted via a lockable gate at the entrance. No fence is installed around the perimeter of the property boundary; however, berms have been built along the northern property boundary and trees and brush provide a sufficient barrier throughout the remainder of the site.

A perimeter access road will be provided around the active landfill site. This road will be 15 feet wide and will provide access to the cover system for inspection and maintenance.

A 30-foot wide access road will be provided over the landfill surface for filling the last lifts as shown in Figure 4.1. After final cover placement, this access road will be resurfaced to a width of 15 feet to provide access for final cover and gas management system inspections.

Roads will be constructed of on-site materials. This material is currently used to construct access roads on the landfill. No other road surfacing will be installed.



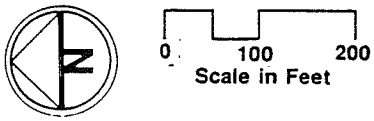


Figure 4.6: Mason County Landfill Gas Management System

5.0 POST CLOSURE ACTIVITIES

5.1 Land Use

Most future land uses for the Mason County Sanitary Landfill will be impractical. As solid wastes decompose they will generate harmful and/or explosive gases. Landfill settlement can damage structures, or facilities placed on the fill area. Any future use would necessitate protection of users and facilities installed as well as the final cover and associated systems.

Surrounding land uses are primarily rural and agricultural. Since the landfill is not in a densely populated area, it is unlikely that the site will be developed in the normal planning period. At some time in the future, open space or park use may be feasible depending on long-term future development needs.

5.2 Deed Clause Changes

WAC 173-304-410 (7) states the following:

> "Maps and a statement of fact concerning the location of the disposal site shall be recorded as part of the deed with the county auditor not later than three months after closure. Records and plans specifying solid waste amounts, location and periods of operation shall be submitted to the local zoning authority or the authority with jurisdiction over land use and be made available for inspection."

These requirements are intended to ensure that potential purchasers or other interested parties have adequate information available about the historical use of the site as a landfill. Within three months of the completion of operations at the Mason County Sanitary Landfill, the required information will be recorded with the Mason County Auditor.

In addition, records and plans specifying solid waste amounts, location and periods of operation shall be submitted to the Mason County Department of General Services, Planning Division, and be made available for inspection.

5.3 Maintenance Activities

Post closure maintenance would continue for approximately 20 years after closure of the landfill depending on the landfill stabilization rate. Individual maintenance items included are as follows:

- Final cover system,
- Surface water management facilities,
- Landfill gas management facilities,

- Access roads, and
- Groundwater, Gas Migration and Surface Water Monitoring Facilities.

A post-closure cost estimate is provided in Section 6.2.

Inspection of the landfill will be performed by the Mason County Department of Public Works according to the schedule listed in Sections 5.3.1 through 5.3.5. Inspection reports will be kept in the Public Works offices and will contain:

- The date and time of inspection
- The printed name and the handwritten signature of the inspector
- A notation of observations made and the date and nature of any repairs or corrective action.

Inspection records will be made available to the Mason County Health Department upon request. The Mason County Department of Public Works will provide the equipment and labor for maintenance of the landfill and related systems as described in the following sections.

5.3.1 Final Cover System

Once the final cover system on the Mason County Sanitary Landfill is installed it will provide the barrier to surface water percolation and reduce leachate production. Proper maintenance of the final cover system is required for the cover to perform its intended function.

The following is a list of potential failures of the cover system which may be expected:

- Top cover erosion from rainfall
- Growth of trees and large brush
- Uneven settlement of the landfill
- Leachate and gas seepage

Inspection of the landfill for any of the potential failures should be performed at least semi-annually. During the first two years after closure, inspection of the cover is recommended on a monthly basis. As the landfill stabilizes, a semi-annual inspection schedule may be adopted. The spring and fall are optimal times to inspect the final cover and repair damage.

Settled areas should be filled and recompacted, as should areas of erosion. Extreme cases of settlement may cause damage to the underlying membrane (FMC). In these cases, the soil layers should be removed, the FMC repaired and the soil layers replaced. In extreme or repeating cases, preventative measures may be required.

Additional erosion prevention measures which could be undertaken include:

- Planting of ground stabilizing vegetation
- Placement of straw or synthetic mats to hold soil and reduce rain impact
- Placement of rip rap in areas with extreme erosion problems

Cases of leachate or gas seeps could also be an indication of a damaged membrane cover. In these cases, the membrane should be repaired as previously described. Additional measures such as gas vents or toe seep systems may be required to prevent reoccurrence.

Growth of trees and large brush can penetrate the cover cap allowing surface water infiltration. Control methods to consider include: extraction, herbicides and mowing and brush cutting. Herbicides should be used with caution. Their impacts on surface waters, desirable vegetation and nearby groundwater should be evaluated.

5.3.2 Surface Water Management System

The surface water management system consists of ditches, culverts and outlets around the site. Maintenance of these facilities will entail semi-annual inspection, cleaning and occasional repairs as necessary to ensure reliable performance.

Required operations could include regrading ditches, cleaning culverts and maintaining outlet structures.

5.3.3 Landfill Gas Management System

Minimal maintenance of a gas management system is required if properly installed. Semi-annual inspection of the riser/flare units is required to determine the extent of damage to the units caused by uneven settling of refuse. Consequently, if imminent damage to the units is apparent they should be adjusted and reanchored as required.

The flare units should be checked more frequently to ensure they are lit and burning properly. Some difficultly may be encountered in keeping the flares continuously lit due to an inadequate gas supply. In these cases, gas may be allowed to vent through the flares without burning. Some odor would be expected; however, there are no residents within 1000 feet of the landfill and odor would not be expected to impact residents further away. In general, if the igniters are working properly, the flares would be lit when gas is present.

Eventually, gas production will cease and it may be possible to remove the vents and seal off the gas system.

Gas migration will be monitored at six gas probes located south and east of the site. Should the probes encounter gas concentrations in excess of the allowed limits the passive system will be upgraded to an active system as discussed in Section 4.5.

5.3.4 Access Roads

The access roads around the perimeter and on the surface of the landfill will receive limited traffic after landfill closure. Maintenance required will depend on usage. The perimeter access roads should be inspected semi-annually and repaired as necessary.

Grading of the surface and adding crushed rock as needed will maintain a good surface. The surface slope is to be maintained at 2 percent to drain to the edge ditches. This will assure that all runoff from the roads is channeled to the ditches.

5.3.5 Groundwater, Gas Migration and Surface Water Monitoring Facilities

Each of the monitoring facilities are scheduled for quarterly monitoring and inspection will be performed in conjunction with the monitoring event by the County or the County's contractor. As appropriate the contractor will notify the County of any needed repairs. The County will also undertake semi-annual inspection of the monitoring facilities during routine inspections.

Of major importance for the monitoring facilities is that the integrity of surface protection be maintained so that no foreign objects are placed in the well or probe. For both groundwater and gas migration wells, the inspector should examine the casing to ensure that the casing is intact, that it is lockable and that the lock works. Wells frequently provide a target for citizens with guns. If this is the case the well's protection may need to be reinforced with a larger, heavier casing.

Surface water monitoring points consists of basins and culverts. Routine maintenance of these facilities would ensure that surface water monitoring points are maintained.

5.4 Miscellaneous Post Closure Procedures

5.4.1 Fire or Explosion Procedure

With construction of a replacement landfill or transfer station on the existing landfill site, personnel will be on-site daily to monitor the landfill for fires or explosions.

Fire district 16 would be notified of fires in landfill structures. However underground landfill fires at the site will be extinguished after excavation by landfill personnel. These fires would be beyond the capabilities of the local fire district.

5.4.2 Recordkeeping and Reporting

No operating records will be required after closure since the existing landfill will not be accepting solid waste. Records of maintenance inspections and actions, and groundwater, surface water and gas monitoring results will be kept by the Mason County Department of Public Works.

An annual report meeting the requirements of WAC 173-304-405(4) shall be prepared and submitted by the Mason County Department of Public Works to the Mason County Health Department and Ecology by March 1 of each year throughout the post closure period. The annual report will include:

- The name and address of the facility.
- Calendar year covered by the report.
- Results of ground water monitoring required in WAC 173-304-490.
- Groundwater flow rate and direction in the uppermost aquifer.
- Results of surface water monitoring and gas monitoring.
- Inspection and reporting of the final cover condition.

6.0 COST ESTIMATE

Upon closure, the Mason County Landfill will be required to meet established environmental standards and regulations. These standards are designed to ensure public health and safety and to protect the natural environment. The preliminary design criteria presented in this document will meet the goals of ensuring public health and safety and protecting the environment.

Separate cost estimates are provided in the following sections for capital costs and for post closure maintenance activities. Both cost estimates are tabulated in 1991 dollars.

6.1 Capital Costs

A capital cost estimate was prepared based on the design criteria presented in this document. Capital costs were separated into the following categories:

- Site Preparation
- Surface Water Management
- Access Roads
- Final Cover System
- Demolition Cover System
- Gas Control System

Capital costs are tabulated in 1991 dollars in Table 6.1 for the Mason County Landfill. The estimate includes a 30% project cost that includes taxes, design, construction services and contingencies.

6.2 Post Closure Costs

Post closure costs represent annual operating and maintenance costs for 20 years after closure of the landfill. Estimated post closure costs were separated into the following categories:

- Inspection
- Maintenance
- Monitoring

Post closure costs for Inspection, Maintenance and Monitoring are included in Table 6.2.

6.3 Financial Assurance

6.3.1 State Requirements

Washington Administrative Code Section 173-304-467 requires financial assurances be established for solid waste landfills accepting waste from the general public.

TABLE 6.2 MASON COUNTY SANITARY LANDFILL-POST CLOSURE COSTS

Description	Price	Unit	Quantity Per Year	Annual Cost
INSPECTION $50/hr. 4 hr/trip				
1994-1995	$200	trip	12	$2,400
1996-2014	$200	trip	2	$400
MAINTENANCE 1994-1995 (160 hrs/yr)				
Equipment Op	$40	hour	160	$6,400
Laborer	$25	hour	160	$4,000
Scraper	$100	hour	60	$6,000
Dozer	$80	hour	100	$8,000
Hydroseeding	$1,200	acre	3	$3,600
				$28,000
1996-2014 (80 hrs/yr)				
Equipment Op	$40	hour	80	$3,200
Laborer	$25	hour	80	$2,000
Scraper	$100	hour	20	$2,000
Dozer	$80	hour	60	$4,800
Hydroseeding	$1,200	acre	1.5	$1,800
				$13,800
Contingency: Replacement of 2 ac. 60 mil textured HDPE liner				$65,000
QUARTERLY MONITORING				
Labor & Expenses, (Includes Sampling, Data Tabulation, Statistical Analysis, Quarterly Report)	$5,000	event	4	$20,000
Laboratory Costs:				
Quarterly	$6,800	event	4	$27,200
Semi-volatiles	$2,550	event	1	$2,550
Total Monitoring				$49,750
TOTAL ANNUAL COST (1991 DOLLARS)				
1994-1995				**$80,150**
1996-2014				**$63,950**
Contingency				**$65,000**

The law requires, in part, that a detailed cost estimate be provided as part of the Closure and Post-Closure plans. The cost estimates must be approved by the Mason County Health Department and Department of Ecology as part of the permitting process. Based on the cost estimates, at least one trust fund must be established to cover the cost of closure and post-closure care.

The closure and post-closure plans must detail when costs will occur and provide a schedule for withdrawing funds from the applicable trust fund at appropriate intervals to cover all costs.

Closure and post-closure funds are generated by transferring a percentage of the facility tip fees to the trust fund at an interval specified in the closure and post-closure plan.

The financial assurance provisions of the law include auditing and review provisions. Trust funds will be audited annually by a CPA licensed in the State of Washington. The results of the audit must be sent to the WDOE by March 31 for the previous calendar year. The closure and post-closure cost estimates will be reviewed annually for any changes, such as inflation, that may affect the cost estimate. The closure cost estimate must be updated if any of the following occur:

- Changes in operating plans or facility design affect the closure plan;
- There is a change in the expected year of closure that affects the closure plan; or
- The jurisdictional health department directs the owner of the landfill to revise the closure plan or closure cost estimate.
- Trust fund withdrawals exceed the projected withdrawal indicated in the closure plan by more than 5%.

The post-closure cost estimate must be updated if any of the following occur:

- Change in the post-closure plan increases or decreases the cost of post-closure care; or
- The jurisdictional health department directs the owner or operator to revise the post-closure plan or post-closure cost estimate.

6.3.2 Landfill Closure Financial Assurances

The estimated cost of closing the Mason County Landfill is included in Table 6.1. All closure tasks are scheduled to be performed in summer/fall 1993, with the exception of tasks associated with closure of the demolition landfill. Closure of the demolition landfill will occur between 1997 and 1999. Some initial landfill closure tasks such as intermediate cover and access roads may be completed before summer 1993. Since these initial tasks will have minimal costs, this document

will assume a single capital expenditure for landfill closure in 1993 of $912,230. A subsequent capital expenditure of $30,650 will be made in 1997/1999 for demolition closure.

Capital costs for closure of the Mason County Landfill are funded through tip fees. The disposal fees approved by Mason County in 1991 provide for accumulation of funds for site closure. Currently there is a trust fund established for closure of the facility. Approximately $450,000 is currently in the fund as of January 1991.

Total closure cost according to Table 6.1 is approximately $943,000. In 1990 approximately 100,000 bulk cubic yards of refuse were brought to the landfill. Projecting this quantity over years 1991 through early 1993, a total of 250,600 cubic yards is expected. This will require a fee per cubic yard of approximately $2 per cubic yard to accumulate the required funds for closure. This estimate is conservative and does not account for interest earned on funds collected through 1993. As the total annual yardage is delivered to the landfill this estimate will be revised and updated.

The amount of money allocated to the closure trust fund will be established such that all landfill closure costs will be provided for by summer 1993.

6.3.3 Landfill Post-Closure Financial Assurance

Following closure of the Mason County Landfill, the site will be maintained and monitored to ensure that the wastes are contained and that no environmental problems occur. The post-closure period is assumed to last 20 years. Twenty years is typically sufficient time to allow a landfill site to stabilize such that there is minimal settlement, no gas generation, and leachate concentrations are reduced to near zero.

The estimated annual cost of this post-closure activity is shown in Table 6.2. This cost estimate will be reviewed annually and updated in accordance with WAC 173-304, as required.

Until closure of the landfill, tip fees will fund landfill closure. Post closure costs will be funded through fees collected in operation of replacement landfill capacity once the existing landfill is closed.

Mason County is a public entity involved in handling the solid waste of Mason County. Whether Mason County constructs a new landfill or contracts for out-of-county landfill capacity, the County intends to be the entity in Mason County with authority over solid waste handling. Mason County has no plans to privatize this solid waste responsibility.

Because of the nature of Mason County's ongoing involvement in solid waste handling in Mason County, the County will collect the annual cost of post-closure maintenance and monitoring each year. The amount collected will be deposited in the closure/post-closure fund for use in the subsequent year. Post-closure funds will begin to be collected in 1993 for use in 1994.

Costs estimated for maintenance, inspection and monitoring of the landfill are included in Table 6.2. Total annual post-closure cost according to Table 6.2 is approximately $80,150 (1994-1995). In 1990 approximately 100,000 bulk cubic yards of refuse were brought to the landfill. Projecting this quantity to year 1993 a total of 109,600 cubic yards is expected. This will require a fee per cubic yard of approximately $0.73 per cubic yard to accumulate the required funds for post-closure in 1994. As total yardage and labor and lab costs change this estimate will be revised and updated.

REFERENCES

Hart Crowser 1986. Geohydrologic Assessment, Mason County Landfill, Shelton, Washington. Prepared for Mason County Department of General Services. December 30, 1986. Seattle, Washington.

Hart Crowser 1989. Groundwater Monitoring Summary Report for 1988, Mason County Landfill, Mason County, Washington. Prepared for Mason County Department of General Services March 24, 1989. Seattle, Washington.

Rongey, Richard J. 1986. Hydrogeologic Study, Shelton Correctional Center, Drainfield Area. Rongey and Associates, Seattle, Washington.

Molenaar, D. and J. B. Nobel. 1970. Water-Supply Bulletin No. 29, Geology and related ground-water occurrence, Southeastern Mason County, Washington, Department of Water Resources. Olympia, Washington.

Economic and Engineering Services, Inc. 1988. City of Shelton Water System Plan. July, 1988. Olympia, Washington.

APPENDIX 1-1

WATER BALANCE CALCULATIONS

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Active Landfill Water Balance
Mason County Landfill
October 18, 1989

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LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3500 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1688 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER

THICKNESS	=	600.00 INCHES
POROSITY	=	0.4800 VOL/VOL
FIELD CAPACITY	=	0.2500 VOL/VOL
WILTING POINT	=	0.1500 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4590 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000099999997 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	75.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	8.00 INCHES
POTENTIAL RUNOFF FRACTION	=	0.100000
UPPER LIMIT VEG. STORAGE	=	2.8000 INCHES
INITIAL VEG. STORAGE	=	0.7521 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR OLYMPIA WASHINGTON

MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	144
END OF GROWING SEASON (JULIAN DATE)	=	269

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
38.60	41.90	43.80	48.70	55.00	60.20
64.40	64.20	59.60	51.60	44.00	40.30

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1984 THROUGH 1988

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	7.90	6.41	6.73	4.56	3.52	1.77
	0.58	0.29	2.54	5.88	9.45	7.77
STD. DEVIATIONS	5.24	1.88	1.32	1.66	1.53	1.22
	0.49	0.22	1.19	4.67	5.62	3.81
RUNOFF						
TOTALS	0.575	0.175	0.064	0.002	0.000	0.000
	0.000	0.000	0.000	0.609	1.379	0.735
STD. DEVIATIONS	1.218	0.331	0.141	0.004	0.000	0.000
	0.000	0.000	0.000	1.350	2.075	1.550
EVAPOTRANSPIRATION						
TOTALS	0.661	1.066	1.835	2.054	2.561	1.413
	0.424	0.222	1.530	0.774	0.687	0.506
STD. DEVIATIONS	0.174	0.110	0.321	0.195	1.151	0.585
	0.285	0.051	0.526	0.451	0.153	0.083
PERCOLATION FROM LAYER 2						
TOTALS	4.2428	4.2877	4.8853	4.5225	4.0428	3.3298
	2.9200	2.4933	2.1664	2.1357	2.5211	3.4058
STD. DEVIATIONS	1.0259	0.7900	1.1000	0.6866	0.5989	0.4457
	0.3703	0.2705	0.2327	0.2446	0.5517	0.7797

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1984 THROUGH 1988

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	57.42	(11.348)	208449.	100.00
RUNOFF	3.539	(2.920)	12848.	6.16
EVAPOTRANSPIRATION	13.734	(2.409)	49853.	23.92
PERCOLATION FROM LAYER 2	40.9534	(5.9268)	148661.	71.32
CHANGE IN WATER STORAGE	-0.802	(8.630)	-2913.	-1.40

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PEAK DAILY VALUES FOR YEARS 1984 THROUGH 1988

	(INCHES)	(CU. FT.)
PRECIPITATION	4.35	15790.5
RUNOFF	0.874	3172.8
PERCOLATION FROM LAYER 2	0.2068	750.8
SNOW WATER	1.78	6469.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3500

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0142

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FINAL WATER STORAGE AT END OF YEAR 1988

LAYER	(INCHES)	(VOL/VOL)
1	3.63	0.3022
2	269.80	0.4497
SNOW WATER	0.00	

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1989 Closure Water Balance
Mason County Landfill
0.1% FML leakage
October 17,1989

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LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.3000 VOL/VOL
FIELD CAPACITY	=	0.2000 VOL/VOL
WILTING POINT	=	0.0700 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2412 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000499999987 CM/SEC

LAYER 2

LATERAL DRAINAGE LAYER

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4000 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3940 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0099999997765 CM/SEC
SLOPE	=	3.00 PERCENT
DRAINAGE LENGTH	=	220.0 FEET

LAYER 3

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3500 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3500 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC
LINER LEAKAGE FRACTION	=	0.00100000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	75.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	24.00 INCHES
UPPER LIMIT VEG. STORAGE	=	9.0000 INCHES
INITIAL VEG. STORAGE	=	8.5896 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR OLYMPIA WASHINGTON

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	144
END OF GROWING SEASON (JULIAN DATE)	=	269

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
38.60	41.90	43.80	48.70	55.00	60.20
64.40	64.20	59.60	51.60	44.00	40.30

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1984 THROUGH 1988

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	7.90	6.41	6.73	4.56	3.52	1.77
	0.58	0.29	2.54	5.88	9.45	7.77
STD. DEVIATIONS	5.24	1.88	1.32	1.66	1.53	1.22
	0.49	0.22	1.19	4.67	5.62	3.81
RUNOFF						
TOTALS	2.715	1.394	0.932	0.396	0.014	0.001
	0.000	0.000	0.019	0.648	2.987	2.386
STD. DEVIATIONS	2.312	1.494	1.339	0.838	0.031	0.002
	0.000	0.000	0.028	1.169	2.877	1.796
EVAPOTRANSPIRATION						
TOTALS	0.660	1.066	1.901	2.111	2.593	2.912
	0.817	0.283	1.599	0.943	0.739	0.497
STD. DEVIATIONS	0.179	0.101	0.257	0.214	1.122	0.865
	0.493	0.183	0.765	0.417	0.164	0.081
LATERAL DRAINAGE FROM LAYER 2						
TOTALS	1.8661	1.7657	1.7519	1.4232	0.9339	0.4346
	0.0076	0.0000	0.0090	0.2676	1.4052	1.9241
STD. DEVIATIONS	0.2111	0.3135	0.4029	0.3160	0.3497	0.2114
	0.0171	0.0000	0.0193	0.2549	0.8134	0.2255
PERCOLATION FROM LAYER 3						
TOTALS	2.5355	2.3720	2.4339	2.1209	1.7663	1.2267
	0.0349	0.0000	0.1775	0.7207	2.0070	2.5729
STD. DEVIATIONS	0.1877	0.2829	0.3442	0.2463	0.2700	0.2479
	0.0781	0.0000	0.2380	0.4451	0.9985	0.2124

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1984 THROUGH 1988

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	57.42	(11.348)	208449.	100.00
RUNOFF	11.492	(6.185)	41715.	20.01
EVAPOTRANSPIRATION	16.119	(2.800)	58513.	28.07
LATERAL DRAINAGE FROM LAYER 2	11.7890	(1.8412)	42794.	20.53
PERCOLATION FROM LAYER 3	17.9683	(2.1335)	65225.	31.29
CHANGE IN WATER STORAGE	0.056	(3.049)	202.	0.10

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PEAK DAILY VALUES FOR YEARS 1984 THROUGH 1988

	(INCHES)	(CU. FT.)
PRECIPITATION	4.35	15790.5
RUNOFF	4.168	15128.1
LATERAL DRAINAGE FROM LAYER 2	0.0743	269.7
PERCOLATION FROM LAYER 3	0.1012	367.2
HEAD ON LAYER 3	24.4	
SNOW WATER	1.78	6469.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3750

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0313

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FINAL WATER STORAGE AT END OF YEAR 1988

LAYER	(INCHES)	(VOL/VOL)
1	1.72	0.2863
2	7.10	0.3944
3	4.20	0.3500
SNOW WATER	0.00	

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Future Closure Water Balance
Mason County Landfill
0.1% FML leakage
October 17, 1989

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LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.3000 VOL/VOL
FIELD CAPACITY	=	0.2000 VOL/VOL
WILTING POINT	=	0.0700 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1548 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000499999987 CM/SEC

LAYER 2

LATERAL DRAINAGE LAYER

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4000 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1906 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0099999997765 CM/SEC
SLOPE	=	20.00 PERCENT
DRAINAGE LENGTH	=	220.0 FEET

LAYER 3

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3500 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3500 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC
LINER LEAKAGE FRACTION	=	0.00100000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	75.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	24.00 INCHES
UPPER LIMIT VEG. STORAGE	=	9.0000 INCHES
INITIAL VEG. STORAGE	=	4.4591 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR OLYMPIA WASHINGTON

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	144
END OF GROWING SEASON (JULIAN DATE)	=	269

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
38.60	41.90	43.80	48.70	55.00	60.20
64.40	64.20	59.60	51.60	44.00	40.30

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1984 THROUGH 1988

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	7.90	6.41	6.73	4.56	3.52	1.77
	0.58	0.29	2.54	5.88	9.45	7.77
STD. DEVIATIONS	5.24	1.88	1.32	1.66	1.53	1.22
	0.49	0.22	1.19	4.67	5.62	3.81
RUNOFF						
TOTALS	0.828	0.251	0.096	0.035	0.014	0.001
	0.000	0.000	0.018	0.419	0.891	0.668
STD. DEVIATIONS	1.167	0.280	0.195	0.078	0.031	0.001
	0.000	0.000	0.027	0.677	1.280	1.185
EVAPOTRANSPIRATION						
TOTALS	0.662	1.068	1.902	2.109	2.592	2.393
	0.668	0.278	1.584	0.941	0.742	0.499
STD. DEVIATIONS	0.181	0.102	0.258	0.214	1.125	0.816
	0.403	0.180	0.760	0.418	0.166	0.082
LATERAL DRAINAGE FROM LAYER 2						
TOTALS	5.2382	4.3155	3.7663	1.8876	0.5897	0.2346
	0.0000	0.0000	0.0379	1.8472	6.1647	5.4371
STD. DEVIATIONS	2.3573	1.5330	1.7762	1.4364	0.6765	0.2825
	0.0000	0.0000	0.0766	2.0252	3.7506	2.6252
PERCOLATION FROM LAYER 3						
TOTALS	1.2715	1.1582	1.1932	0.9573	0.7493	0.3495
	0.0000	0.0000	0.1696	0.6144	1.2211	1.3292
STD. DEVIATIONS	0.2682	0.1813	0.2361	0.2140	0.3212	0.1854
	0.0000	0.0000	0.2171	0.3674	0.5313	0.2189

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1984 THROUGH 1988

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	57.42	(11.348)	208449.	100.00
RUNOFF	3.220	(2.454)	11688.	5.61
EVAPOTRANSPIRATION	15.438	(2.542)	56039.	26.88
LATERAL DRAINAGE FROM LAYER 2	29.5189	(5.7610)	107154.	51.41
PERCOLATION FROM LAYER 3	9.0133	(1.2159)	32718.	15.70
CHANGE IN WATER STORAGE	0.234	(3.043)	851.	0.41

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PEAK DAILY VALUES FOR YEARS 1984 THROUGH 1988

	(INCHES)	(CU. FT.)
PRECIPITATION	4.35	15790.5
RUNOFF	2.691	9768.2
LATERAL DRAINAGE FROM LAYER 2	0.6855	2488.5
PERCOLATION FROM LAYER 3	0.0732	265.8
HEAD ON LAYER 3	14.0	
SNOW WATER	1.78	6469.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3090

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0315

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FINAL WATER STORAGE AT END OF YEAR 1988

LAYER	(INCHES)	(VOL/VOL)
1	1.08	0.1796
2	4.46	0.2476
3	4.20	0.3500
SNOW WATER	0.00	

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1989 Closure Water Balance
Mason County Landfill
0.01% FML leakage
October 17, 1989

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LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.3000 VOL/VOL
FIELD CAPACITY	=	0.2000 VOL/VOL
WILTING POINT	=	0.0700 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2633 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000499999987 CM/SEC

LAYER 2

LATERAL DRAINAGE LAYER

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4000 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3944 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0099999997765 CM/SEC
SLOPE	=	3.00 PERCENT
DRAINAGE LENGTH	=	220.0 FEET

LAYER 3

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3500 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3500 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC
LINER LEAKAGE FRACTION	=	0.00010000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	75.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	24.00 INCHES
UPPER LIMIT VEG. STORAGE	=	9.0000 INCHES
INITIAL VEG. STORAGE	=	8.7085 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR OLYMPIA WASHINGTON

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	144
END OF GROWING SEASON (JULIAN DATE)	=	269

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
38.60	41.90	43.80	48.70	55.00	60.20
64.40	64.20	59.60	51.60	44.00	40.30

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1984 THROUGH 1988

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	7.90	6.41	6.73	4.56	3.52	1.77
	0.58	0.29	2.54	5.88	9.45	7.77
STD. DEVIATIONS	5.24	1.88	1.32	1.66	1.53	1.22
	0.49	0.22	1.19	4.67	5.62	3.81
RUNOFF						
TOTALS	4.876	3.034	2.584	0.864	0.047	0.007
	0.000	0.000	0.020	0.833	4.576	4.190
STD. DEVIATIONS	3.584	1.805	1.688	1.293	0.073	0.015
	0.000	0.000	0.028	1.574	3.904	1.901
EVAPOTRANSPIRATION						
TOTALS	0.655	1.055	1.872	2.111	2.593	3.465
	2.917	0.286	1.619	0.951	0.716	0.492
STD. DEVIATIONS	0.177	0.088	0.239	0.208	1.118	0.470
	0.661	0.190	0.769	0.418	0.143	0.079
LATERAL DRAINAGE FROM LAYER 2						
TOTALS	2.1551	1.9866	2.1329	1.8962	1.7349	1.2610
	0.1431	0.0000	0.0293	0.3695	1.5507	2.1709
STD. DEVIATIONS	0.1450	0.1168	0.0992	0.1022	0.2583	0.2317
	0.0871	0.0000	0.0406	0.3037	0.8778	0.1080
PERCOLATION FROM LAYER 3						
TOTALS	0.2856	0.2641	0.2805	0.2491	0.2393	0.1991
	0.0400	0.0000	0.0260	0.1101	0.2200	0.2879
STD. DEVIATIONS	0.0193	0.0126	0.0126	0.0117	0.0231	0.0172
	0.0153	0.0000	0.0353	0.0648	0.1092	0.0138

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1984 THROUGH 1988

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	57.42	(11.348)	208449.	100.00
RUNOFF	21.030	(8.390)	76340.	36.62
EVAPOTRANSPIRATION	18.733	(2.861)	68001.	32.62
LATERAL DRAINAGE FROM LAYER 2	15.4301	(1.6271)	56011.	26.87
PERCOLATION FROM LAYER 3	2.2017	(0.2382)	7992.	3.83
CHANGE IN WATER STORAGE	0.029	(1.524)	105.	0.05

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PEAK DAILY VALUES FOR YEARS 1984 THROUGH 1988

	(INCHES)	(CU. FT.)
PRECIPITATION	4.35	15790.5
RUNOFF	4.320	15683.3
LATERAL DRAINAGE FROM LAYER 2	0.0746	270.7
PERCOLATION FROM LAYER 3	0.0102	37.0
HEAD ON LAYER 3	24.3	
SNOW WATER	1.78	6469.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3750

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0320

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FINAL WATER STORAGE AT END OF YEAR 1988

LAYER	(INCHES)	(VOL/VOL)
1	1.72	0.2874
2	7.10	0.3944
3	4.20	0.3500
SNOW WATER	0.00	

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Future Closure Water Balance
Mason County Landfill
0.01% FML leakage
October 17, 1989

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LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.3000 VOL/VOL
FIELD CAPACITY	=	0.2000 VOL/VOL
WILTING POINT	=	0.0700 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1548 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000499999987 CM/SEC

LAYER 2

LATERAL DRAINAGE LAYER

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4000 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2046 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0099999997765 CM/SEC
SLOPE	=	20.00 PERCENT
DRAINAGE LENGTH	=	220.0 FEET

LAYER 3

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3500 VOL/VOL
FIELD CAPACITY	=	0.0500 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3500 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC
LINER LEAKAGE FRACTION	=	0.00010000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	75.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	24.00 INCHES
UPPER LIMIT VEG. STORAGE	=	9.0000 INCHES
INITIAL VEG. STORAGE	=	4.7088 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR OLYMPIA WASHINGTON

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	144
END OF GROWING SEASON (JULIAN DATE)	=	269

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
38.60	41.90	43.80	48.70	55.00	60.20
64.40	64.20	59.60	51.60	44.00	40.30

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1984 THROUGH 1988

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	57.42	(11.348)	208449.	100.00
RUNOFF	3.241	(2.472)	11764.	5.64
EVAPOTRANSPIRATION	15.479	(2.521)	56190.	26.96
LATERAL DRAINAGE FROM LAYER 2	37.3648	(6.6033)	135634.	65.07
PERCOLATION FROM LAYER 3	1.1065	(0.1171)	4017.	1.93
CHANGE IN WATER STORAGE	0.232	(3.143)	844.	0.40

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PEAK DAILY VALUES FOR YEARS 1984 THROUGH 1988

	(INCHES)	(CU. FT.)
PRECIPITATION	4.35	15790.5
RUNOFF	2.691	9768.2
LATERAL DRAINAGE FROM LAYER 2	0.7263	2636.6
PERCOLATION FROM LAYER 3	0.0076	27.4
HEAD ON LAYER 3	14.7	
SNOW WATER	1.78	6469.9

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3196

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0315

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FINAL WATER STORAGE AT END OF YEAR 1988

LAYER	(INCHES)	(VOL/VOL)
1	1.08	0.1796
2	4.70	0.2611
3	4.20	0.3500
SNOW WATER	0.00	

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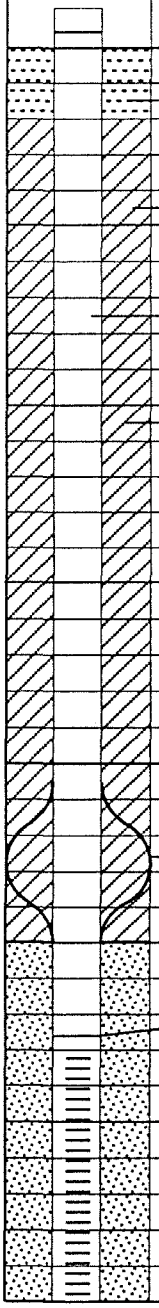
APPENDIX 2-1

WELL LOGS

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY-ING. RAND T3W			WELL NO. MW-6	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB				
JOINT TYPE	FLUSHED THREAD	LEGAL DESCRIPTION: NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W				SHEET 1	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 16, 1991			OF 2	
SLOT SIZE	0.020 - INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	GRANULAR BENTONITE - 6 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			09:30	16:30
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	31	31:45			
FILTER	10-20 COLORADO SILICA SAND - 7 BAGS	TIME	ATD	13:25			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE		1-15-91			
GROUT		MEASURING POINT	CASING	PVC			



WELL DETAILS	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 311.21 (SOUNDING PORT) LOG DESCRIPTION
8 INCH DIAMETER STEEL PROTECTIVE CASING			DARK BROWN GRAVELLY (30%)
CONCRETE SURFACE SEAL		OL	SAND WITH SOME ORGANICS
		GW	MOIST, LOOSE, POORLY SORTED
6" DIAMETER BORING	5		
			BROWN SANDY (40%)
			GRAVEL, MOIST, LOOSE
2" SCHEDULE 40 PVC BLANK			SUB ANGULAR TO SUB ROUNDED
			POORLY SORTED
	10		
BENTONITE CHIPS			BROWN SANDY (40%)
			GRAVEL, MOIST, LOOSE
			SUB ANGULAR TO SUB ROUNDED
			POORLY SORTED
	15		
			BROWN SANDY (30%)
			GRAVEL, SUB ROUND TO ROUND
		GW	SLIGHTLY MOIST, LOOSE
			POORLY GRADED
	20		
			BROWN SANDY (10%)
			GRAVEL, SUB ROUND TO ROUND
STAINLESS STEEL			POORLY SORTED, SLIGHTLY
CENTRALIZER			MOIST, LOOSE
	25		
			BROWN SANDY (10%)
			GRAVEL, SUB ROUND TO ROUND
FLUSH THREAD JOINT			POORLY SORTED, SLIGHTLY
			MOIST, LOOSE
	30		
10-20 COLORADO SAND			BROWN GRAVELLY (15%)
			COARSE SAND, SLIGHTY
2" SCHEDULE 40 PVC SCREEN		SW	MOIST, LOOSE, POORLY
(0.020 IN. SLOT)			SORTED

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY-ING. RAND T3W			WELL NO. MW-6	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB				
JOINT TYPE	FLUSHED THREAD	LEGAL DESCRIPTION:	NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W			SHEET 2	
SCREEN TYPE	HORIZONTAL SPOT	DATE	JANUARY 15, 1991			OF 2	
SLOT SIZE	0.020	BY	JOE HICKER			START	FINISH
SEAL TYPE	GRANULAR BENTONITE - 8 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			09:30	16:30
INSTALL. METHOD	DOWN HOLE	WATER LEVEL (FT)	31	31.45			
FILTER	10-20 COLORADO SILICA SAND - 8 BAGS	TIME	ATD	13:25			
INSTALL	POUR, CONSTANT SOUND	DATE		1-15-91			
GROUT		MEASURING POINT	CASING	PVC			

WELL DETAILS (Not to Scale)	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 311.21 (SOUNDING PORT) LOG DESCRIPTION
		GW	BROWN SANDY (20%)
			GRAVEL, LOOSE, WET,
10-20 COLORADO SAND			SUB ROUNDED TO ROUNDED
2" SCH. 40 PVC SCREEN			
(0.020 IN. SLOT)	40		GRAY-BROWN, PEBBLY SANDY (25%)
			GRAVEL, CLEAN, LOOSE, WET
			SUB ROUND TO ROUND,
STAINLESS STEEL			POORLY SORTED
CENTRALIZER			
	45		GRAY-BROWN, PEBBLY SANDY (25%)
			GRAVEL, CLEAN, LOOSE, WET
			SUB ROUND TO ROUND,
			POORLY SORTED
		GW	
	50		GRAY-BROWN, PEBBLY SANDY (25%)GRAVEL,
			CLEAN, LOOSE, WETSUB ROUND TO ROUND,
2 IN. FLUSH THREAD END CAP			POORLY SORTED
			END OF BORING @ 53 FEET

Well Installation Log

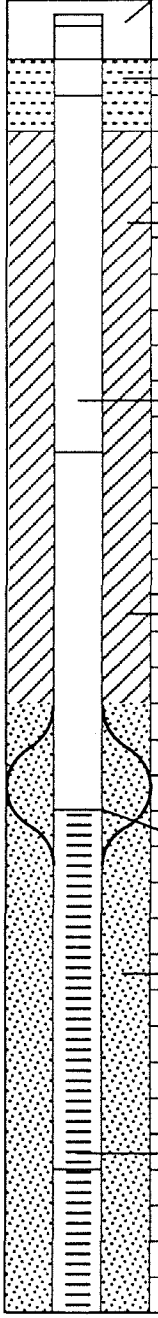
Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40
LENGTH	50 FEET
JOINT TYPE	FLUSH THREAD
SCREEN TYPE	HORIZONTAL SLOT PVC
SLOT SIZE	0.020 - INCH
SEAL TYPE	GRANULAR BENTONITE (5 BAGS)
INSTALL. METHOD	POUR (CONTINUOUS SOUNDING)
FILTER PACK	10-20 COLORADO SILICA SAND, 6 BAGS
INSTALL	POUR (CONSTANT SOUNDING)

DRILLING METHOD	AIR ROTARY		
SAMPLING METHOD	GRAB		
LEGAL DESCRIPTION: NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W			
DATE	JANUARY 15, 1991		
BY	JOE HICKER		
DRILLING CONTR.	SOIL SAMPLING SERVICE		
WATER LEVEL (FT)	30	26.35	
TIME	ATD	12:40	
DATE		1-16-91	
MEASURING POINT	CASING	PVC	

WELL NO. MW-7		
SHEET 1 OF 2		
START	FINISH	
08:00	13:00	
1-16-91	1-16-91	

WELL DETAILS



WELL ELEVATION: 303.95 (SOUNDING PORT)

DEPTH IN FEET	USGS GROUP SYMBOL	LOG DESCRIPTION
	GW	GRAY-BROWN SANDY (30%)
		GRAVEL, ANGULAR TO SUB ANGULAR
		MOIST TO WET, LOOSE
	GW	
5	GM	GRAY-BROWN SILTY (5%)
		SANDY (30%) GRAVEL WITH
		SOME REFUSE (10%) I.E. PLASTIC, WOOD, PAPER
		MOIST, LOOSE
10		
		GRAY-BROWN SANDY (15%)
		GRAVEL, SUB ROUNDED TO
	GW	ROUNDED, POORLY SORTED,
		LOOSE, SLIGHTLY MOIST
15		
		GRAY-BROWN GRAVELLY (15%)
		COARSE SAND WITHN TRACE
		SILT (<2%) POOR TO MODERATELY SORTED
	SW	SLIGHTLY MOIST, LOOSE
20		
		GRAY-BROWN GRAVELLY (15%)
		COARSE SAND WITH TRACE
		SILT (<2%) POOR TO MODERATELY SORTED
		SLIGHTLY MOIST, LOOSE
25		
		BROWN-GRAY SANDY (20%)
		GRAVELLY,MSUB ROUND TO ROUND
	GW	POORLY SORTED,
		LOOSE, SLIGHTLY MOIST
30		
		BROWN-GRAY SANDY (20%)
		GRAVEL, SUB ROUND TO ROUND, POORLY SORTED,
		WET LOOSE
	GW	

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

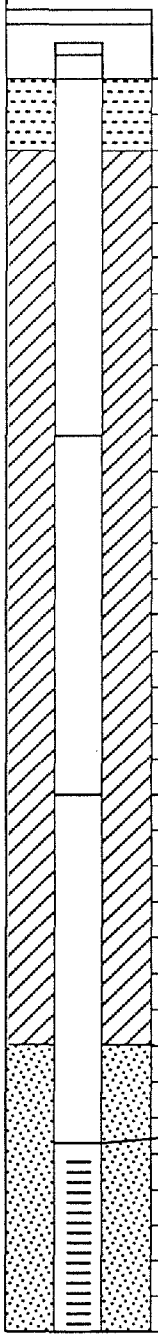
CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY			WELL NO. MW-7	
LENGTH	50 FEET	SAMPLING METHOD	GRAB				
JOINT TYPE	FLUSH THREAD	LEGAL DESCRIPTION: NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W				SHEET 2	
SCREEN TYPE	HORIZONTAL SLOT PVC	DATE	JANUARY 15, 1991			OF 2	
SLOT SIZE	0.020 - INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	GRANULAR BENTONITE (5 BAGS)	DRILLING CONTR.	SOIL SAMPLING SERVICE			08:00	13:00
INSTALL. METHOD	POUR (CONTINUOUS SOUNDING)	WATER LEVEL (FT)	30	26.35			
FILTER PACK	10-20 COLORADO SILICA SAND, 6 BAGS	TIME	ATD	12:40			
INSTALL	POUR (CONSTANT SOUNDING)	DATE		1-16-91		1-16-91	1-16-91
		MEASURING POINT	CASING	PVC			

WELL DETAILS (Not to Scale)	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 303.95 (SOUNDING PORT) LOG DESCRIPTION
		gw	BROWN-GRAY SANDY (15%)
			GRAVEL, SUB ROUND TO ROUND
			POORLY SORTED, WET,
			LOOSE
	40		
	45		
FLUSH THREAD END CAP			BROWN-GRAY GRAVELLY (25%)
COLLAPSED		sw	COARSE SAND, POORLY SORTED
MATERIAL			WET, LOOSE
			END OF BORING @ 48 FEET
	50		

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY			WELL NO. MW-8	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB/PUSH TUBE				
JOINT TYPE	FLUSH THREAD	LEGAL DESCRIPTION, NE 1/4, NE 1/4, SEC. 4, T. 20 N, R. 4 W				SHEET 1	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 18, 1991			OF 4	
SLOT SIZE	0.020-INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	BENTONITE CHIPS - 35 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			1-18-91	1-21-91
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	30'	29.1'			
FILTER	10-20 COLORADO SILICA SAND - 12 BAGS	TIME	ATD, 11:30	09:50			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE	1-18-91	1-25-91			
GROUT		MEASURING POINT	CASING	PVC			



WELL DETAILS	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.23 (SOUMDING PORT) LOG DESCRIPTION
8 - INCH DIAMETER STEEL PROTECTIVE CASING			
		OL	DARK BROWN GRAVELLY (25%)
CONCRETE SURFACE SEAL			SAND WITH SOME SILT (10%)
			ABUNDANT ORGANIC MATERIAL
			LOOSE, MOIST, SLIGHTLY COHESIVE
	5		
10" DIAMETER BORING		GW	BROWN SANDY (30%)
			GRAVEL, SUB ROUND TO ROUND
			POORLY SORTED, LOOSE
			SLIGHTLY MOIST
	10		
2" SCH. 40 PVC BLANK			
	15		
BENTONITE CHIPS SEAL		GW	YELLOW-BROWN SANDY (30%)
			GRAVEL, SUB ROUND TO ROUND
			POORLY SORTED, SLIGHTLY MOIST
			LOOSE
	20		
	25		
		GW	LIGHT BROWN SANDY (35%)
			GRAVEL, SUB ROUND TO ROUND
			POORLY SORTED, SLIGHTY
			MOIST TO DRY, LOOSE
FLUSH TREAD JOINT	30		
(5 PLACES)			
10-20 COLORADO SAND			

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY			WELL NO. MW-8	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB/PUSH TUBE				
JOINT TYPE	FLUSH THREAD	LEGAL DESCRIPTION, NE 1/4, NE 1/4, SEC. 4, T. 20 N, R. 4 W				SHEET 2	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 18, 1991			OF 4	
SLOT SIZE	0.020-INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	BENTONITE CHIPS - 35 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			1-18-91	1-21-91
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	30'	29.1'			
FILTER	10-20 COLORADO SILICA SAND - 12 BAGS	TIME	ATD,11:30	09:50			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE	1-18-91	1-25-91			
GROUT		MEASURING POINT	CASING	PVC			

WELL DETAILS	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.23 (SOUNDING PORT) LOG DESCRIPTION
		SW	GRAY-BROWN GRAVELLY (30%)
			COARSE SAND WITH TRACE SILT (52%)
			POORLY SORTED, WET, LOOSE
	40		
2" PVC SCREEN			
(0.020) SLOT			
	45	SW	DARK BROWN-GRAY GRAVELLY (15%)
			COARSE SAND, POORLY SORTED,
			WET, LOOSE
	50		
FLUSH THREAD END CAP	55	SW	DARK BROWN-GRAY GRAVELLY (15%)
			COARSE SAND, POORLY SORTED,
			WET, LOOSE
	60		
BENTONITE CHIPS			BROWN-GRAY GRAVELLY (30%)
(SOME COLLAPSED			COARSE SAND, POORLY SORTED,
GRAVEL MATERIAL)		SW	WET, LOOSE
	65		(INCREASING % SAND)

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY			WELL NO. MW-8	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB/PUSH TUBE				
JOINT TYPE	FLUSH THREAD	LEGAL DESCRIPTION, NE 1/4, NE 1/4, SEC. 4, T. 20 N, R. 4 W				SHEET 3	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 18, 1991			OF 4	
SLOT SIZE	0.020-INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	BENTONITE CHIPS - 35 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			1-18-91	1-21-91
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL	30'	29.1'			
FILTER	10-20 COLORADO SILICA SAND - 12 BAGS	TIME	ATD,11:30	09:50			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE	1-18-91	1-25-91			
GROUT		MEASURING	CASING	PVC			

WELL DETAILS (Not to Scale)	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.23 (SOUNDING PORT) LOG DESCRIPTION
		SW	BROWN-GRAY MEDIUM TO
			COARSE SAND WITH SOME
			GRAVEL (5%) POORLY SORTED,
			LOOSE, WET
	75		
		SP SM	GRAY-BROWN FINE SAND
			WITH SOME SILT (5%) SOFT,
			MODERATLY SORTED, WET
			(INCREASING FINES)
	80		
	85		
		SM	GRAY-BROWN SILTY (25%)
			VERY FINE SAND, MODERATELY
4 FOOT BENTONITE			SORTED, LOW TO MODERATELY
PLUG IN ANNULAR			COHESIVE, SOFT, WET
SPACE BETWEEN CASINGS	90		
REDUCED TO 6"			
CASING DIAMETER			
FOR REMAINDER			
OF BORING			
	95		
		ML	BROWN-GRAY CLAYEY (<5%)
6 IN. DIAMETER			SILT WITH SOME FINE SAND (25%)
BORING			MODERATLY SORTED, WET,
			SOFT, INCREASING DENSITY
	100		

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY			WELL NO.	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB/PUSH TUBE			MW-8	
JOINT TYPE	FLUSH THREAD	LEGAL DESCRIPTION, NE 1/4, NE 1/4, SEC. 4, T. 20 N, R. 4 W				SHEET 4	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 18, 1991			OF 4	
SLOT SIZE	0.020-INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	BENTONITE CHIPS - 35 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			1-18-91	1-21-91
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	30'	29.1'			
FILTER	10-20 COLORADO SILICA SAND - 12 BAGS	TIME	ATD,11:30	09:50			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE	1-18-91	1-25-91			
GROUT		MEASURING POINT	CASING	PVC			

WELL DETAILS	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.23 (SOUNDING PORT) LOG DESCRIPTION
		ML	BROWN-GRAY CLAYEY
ABANDONED WITH			SILT WITH SOME FINE SAND (15%)
BENTONITE CHIPS			WET, MODERATELY COHESIVE,
			SLIGHTLY PLASTIC, SOFT
	110		
6 IN. BORING			
	115		
24 IN. LENGTH SPLIT SPOON			
SAMPLE			
			END OF BORING @ 117 FEET
	120		

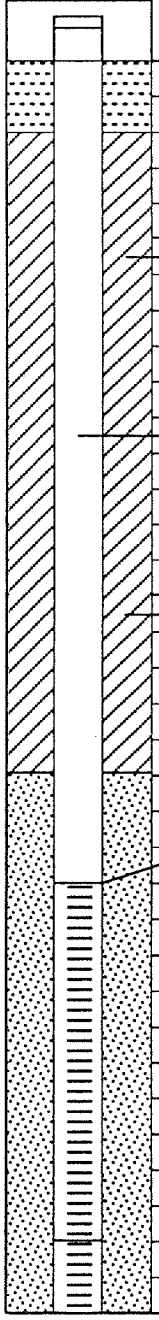
Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK
JOINT TYPE	FLUSH THREAD
SCREEN TYPE	HORIZONTAL SLOT
SLOT SIZE	0.020 - INCH
SEAL TYPE	GRANULAR BENTONITE - 5 BAGS
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING
FILTER	10-20 COLORADO SILICA SAND - 6 BAGS
INSTALL	POUR, CONTINUOUS SOUNDING
GROUT	

DRILLING METHOD	AIR ROTARY		
SAMPLING METHOD	GRAB		
LEGAL DESCRIPTION: NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W			
DATE	JANUARY 17, 1991		
BY	JOE HICKER		
DRILLING CONTR.	SOIL SAMPLING SERVICE		
WATER LEVEL (FT)	28	29:37	
TIME	ATD	08:30	
DATE		1-17-91	
MEASURING POINT	CASING	PVC	

WELL NO. MW-9		
SHEET 1 OF 2		
START	FINISH	
13:30	09:00	
1-16-91	1-17-91	



WELL ELEVATION: 306.43 (SOUNDING PORT)

DEPTH IN FEET	USGS GROUP SYMBOL	LOG DESCRIPTION
		LIGHT BROWN GRAVELLY (30%)
	SW	SAND (FILL)
5	SW	DARK BROWN GRAVELLY (20%)
		COARSE SAND, POORLY
		SORTED, SLIGHTLY MOIST
		LOOSE
10		
15		BROWN SANDY (15%)
	GW	GRAVEL, SUB ROUND TO
		ROUND, POORLY SORTED
		SLIGHTLY MOIST, LOOSE
20		
25		BROWN SANDY (30%)
		GRAVEL, SUB ROUND TO
		ROUND, SLIGHTLY MOIST
		TO MOIST, POORLY SORTED
		LOOSE
30		
		BROWN SANDY (30%)
	GW	GRAVEL, SUB ROUND TO
		ROUND, WET, POORLY SORTED
		LOOSE

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK
JOINT TYPE	FLUSH THREAD
SCREEN TYPE	HORIZONTAL SLOT
SLOT SIZE	0.020 - INCH
SEAL TYPE	GRANULAR BENTONITE - 5 BAGS
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING
FILTER	10-20 COLORADO SILICA SAND - 6 BAGS
INSTALL	POUR, CONTINUOUS SOUNDING
GROUT	

DRILLING METHOD	AIR ROTARY		
SAMPLING METHOD	GRAB		
LEGAL DESCRIPTION:	NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W		
DATE	JANUARY 16, 1991		
BY	JOE HICKER		
DRILLING CONTR.	SOIL SAMPLING SERVICE		
WATER LEVEL (FT)	28	29:37	
TIME	ATD	08:30	
DATE		1-17-91	
MEASURING POINT	CASING	PVC	

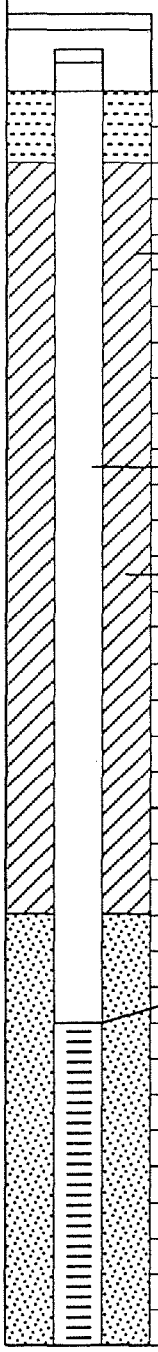
WELL NO.	MW-9	
SHEET	2	
OF	2	
START	FINISH	
13:30	09:00	
1-16-91	1-17-91	

WELL DETAILS (Not to Scale)	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.43 (SOUNDING PORT) LOG DESCRIPTION
			BROWN GRAVELLY (25%)
10-20 COLD SAND		SW	COARSE SAND, POORLY SORTED,
			LOOSE, WET
	40		
2" PVC SCREEN			GRAY-BROWN GRAVELLY (30%)
			SAND, POORLY SORTED,
			LOOSE, WET
	45	SW	
FLUSH THREAD END CAP			END OF BORING @ 48 FEET
	50		

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY-ING. RAND T3W			WELL NO. MW-10	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB				
JOINT TYPE	FLUSHED THREAD	LEGAL DESCRIPTION: NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W				SHEET 1	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 17, 1991			OF 2	
SLOT SIZE	0.020 - INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	GRANULAR BENTONITE - 6 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			09:30	14:30
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	31	29:07			
FILTER	10-20 COLORADO SILICA SAND - 7 BAGS	TIME	ATD	14:20			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE		1-17-91		1-17-91	1-17-91
GROUT		MEASURING POINT	CASING	PVC			



WELL DETAILS	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.74 (SOUNDING PORT) LOG DESCRIPTION
8 INCH DIAMETER STEEL PROTECTIVE CASING		OL	DARK BROWN GRAVELLY (20%)
CONCRETE SURFACE SEAL			SILTY SAND WITH ABUNDANT
			ORGANIC MATERIAL, VERY
			MOIST, SOFT (TOPSOIL)
6 IN. DIAMETER BORING			
	5	GW	BROWN SANDY (30%)
			GRAVEL, SUB ANGULAR TO
			ROUND, POORLY SORTED
			VERY MOIST, LOOSE
	10		
2 IN. DIAMETER SCHEDULE			YELLOW-BROWN SANDY (30%)
40 PVC BLANK			GRAVEL, SUB ROUND TO ROUND,
			POORLY SORTED LOOSE
BENTONITE CHIP PLUG		GW	SLIGHTLY MOIST TO MOIST
(ENVIROPLUG, MEDIUM)			
	15		BROWN SANDY (30%)
			GRAVEL, SUB ROUND TO ROUND,
			SLIGHTLY MOIST, LOOSE
	20		BROWN GRAVELLY (25%)
		SW	COARSE SAND WITH TRACE
			SILT (<2%)
			POORLY SORTED,
		SW	LOOSE, SLIGHTLY MOIST
	25		
FLUSH THREAD JOINT			
			BROWN GRAVELLY (5%)
			COARSE SAND WITH TRACE
			SILT (<2%) POORLY
	30		SORTED, LOOSE, SLIGHTLY
10-20 COLORADO SAND			MOIST
			DARK GRAY, CLEAN,
		GW	SANDY (20%) GRAVEL,
			POORLY SORTED, LOOSE,
			WET

Well Installation Log

Job Number 11-1682-07 (4) Client MASON COUNTY Location MASON COUNTY LANDFILL

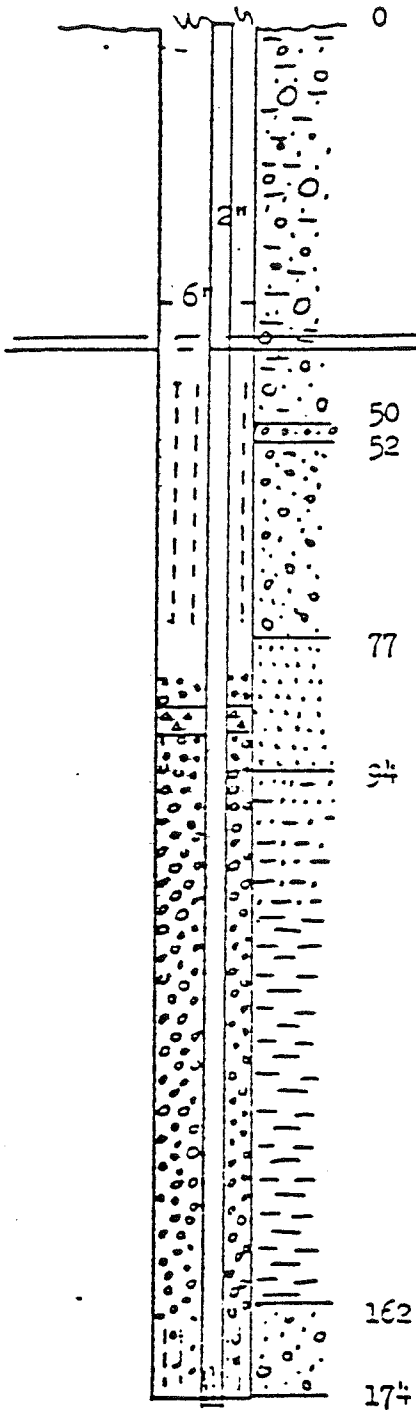
CASING TYPE	2" PVC SCHEDULE 40	DRILLING METHOD	AIR ROTARY-ING. RAND T3W			WELL NO. MW-10	
LENGTH	25 FOOT SCREEN, 27.5 FOOT BLANK	SAMPLING METHOD	GRAB				
JOINT TYPE	FLUSHED THREAD	LEGAL DESCRIPTION:	NE 1/4, NE 1/4, SEC 4, T 20 N, R 4 W			SHEET 2	
SCREEN TYPE	HORIZONTAL SLOT	DATE	JANUARY 17, 1991			OF 2	
SLOT SIZE	0.020 - INCH	BY	JOE HICKER			START	FINISH
SEAL TYPE	GRANULAR BENTONITE - 6 BAGS	DRILLING CONTR.	SOIL SAMPLING SERVICE			09:30	14:30
INSTALL. METHOD	POUR, CONTINUOUS SOUNDING	WATER LEVEL (FT)	31	29:07			
FILTER	10-20 COLORADO SILICA SAND - 7 BAGS	TIME	ATD	14:20			
INSTALL	POUR, CONTINUOUS SOUNDING	DATE		1-17-91		1-17-91	1-17-91
GROUT		MEASURING POINT	CASING	PVC			

WELL DETAILS (Not to Scale)	DEPTH IN FEET	USGS GROUP SYMBOL	WELL ELEVATION: 306.74 (SOUNDING PORT) LOG DESCRIPTION
			DARK GRAY CLEAN COARSE
10-20 COLORADO SAND		GW	SANDY (20%) GRAVEL,
			SUB ROUND TO ROUND,
			POORLY SORTED, WET, LOOSE
	40		
			DARK GRAY GRAVELLY (30%)
2 IN. SCHEDULE 40 PVC SCREEN			COARSE SAND, POORLY
			SORTED, WET, LOOSE
		SW	
	45		
			DARK GRAY GRAVELLY (30%)
			COARSE SAND, POORLY
			SORTED, WET, LOOSE
	50		
FLUSH THREAD END CAP			END OF BORING @ 51.0 FEET

Elev. top casing, 306.05
Elev. top pipe couplings 306.90
Elev. avg. ground 306.7

Driller's Log (with geologist's notations)

TEST HOLE NO. 1



Rock and gravel (Graded pebble cobble and boulder gravel, silty sand matrix with some clay, moderately permeable; dry and and taking water)

Static level, upper zone 39.80', elev. 267.1'

Static level, deep zone 41.00', elev. 265.90'

Sand and gravel (Well sorted coarse sand, clean, permeable)

Water sand and gravel(Sandy pebble gravel with small cobbles, loose, clean, highly permeable)

Brown sand and clay (Well sorted fine to medium sand, loose, clean, moderately to highly permeable)

Gray clay and fine sand(Fine sandy silt with trace of clay to 114'; 114' - 162' soft silty clay)

Water sand and gravel(Sandy pebble gravel with streaks of coarse sand, clean, highly permeable)

Mills Knife perforated, 165' - 175', 45' - 75', 4 per round, one round per foot. Set 2" galvanized piezometer to 175', torch perf. 175' - 170'; gravel pack 175' - 90'; cement packer 90' - 85', pea gravel 86' - 82'

Ground-Water Investigations

MASON COUNTY

SOLID WASTE LANDFILL SITE

DATE	SCALE
[illegible]	1" = [illegible]

RICHARD J. RONGEY
CONSULTING GEOLOGIST

J-1828
F-12

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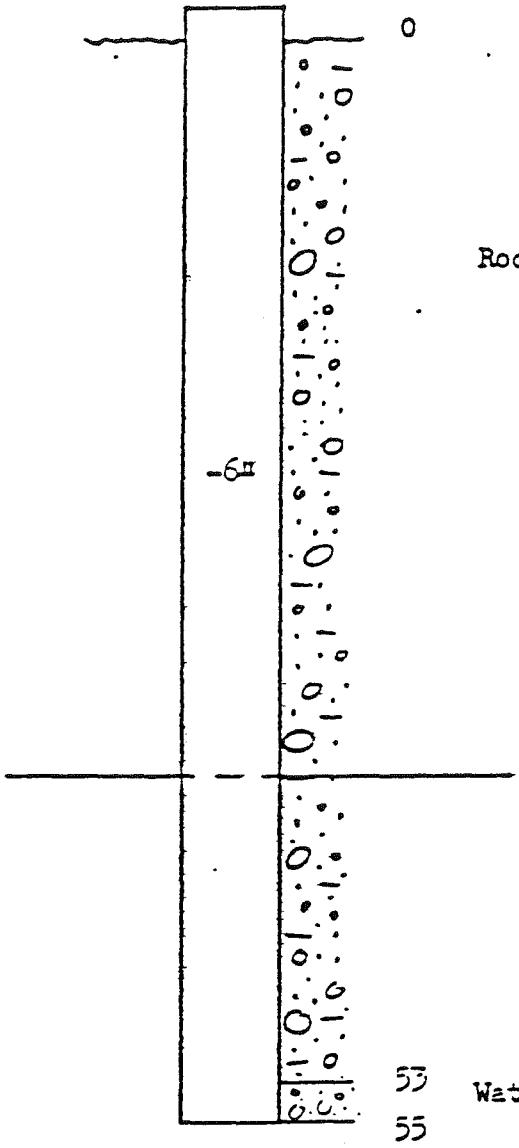
Elev. top casing, 303.97
Elev. avg. ground, 302.7

TEST HOLE NO. 2



Driller's Log (with geologist's notations)

Rock and gravel (graded pebble, cobble and boulder gravel with considerable silt, moderately permeable; dry and taking water)

Static water level, 37.57' below top casing, Elev.266.40

Water sand and gravel (clean pebble and small cobble gravel loose, highly permeable)

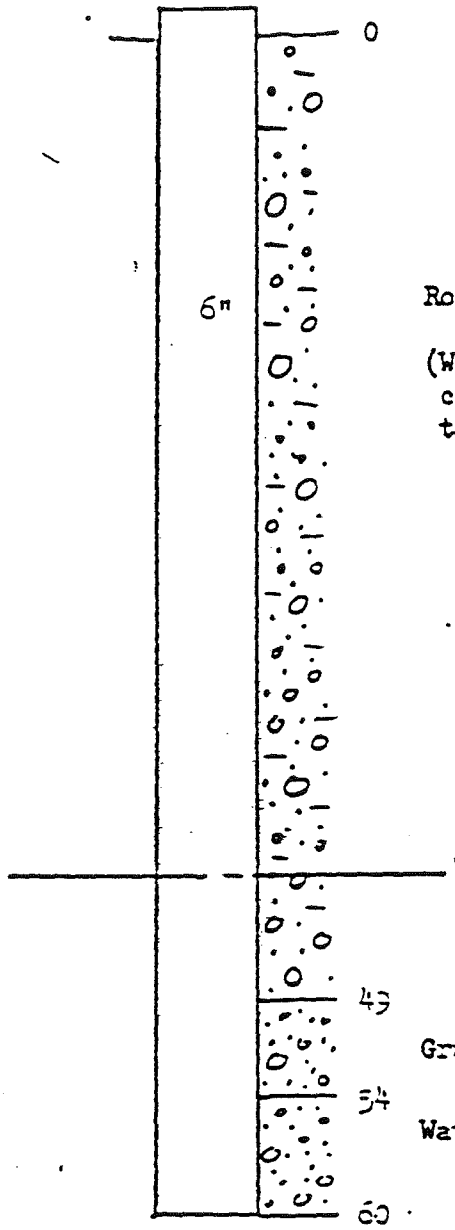
Completed open bottom with no perforations.
Bail tested for 30 minutes at 15 gpm with no drawdown.

Ground-Water Investigations MASON COUNTY SOLID WASTE LANDFILL SITE	
DATE 6/20/73	SCALE 1" = 10'
RICHARD J. RONGEY CONSULTING GEOLOGIST	J-1828 F-13

top casing, 310.80
avg. ground, 308.9

TEST HOLE NO. 3

Driller's Log (with geologist's notations)



Rock and gravel

(Well graded pebble cobble and boulder gravel with considerable silt, moderately permeable; dry and taking water.)

Static water level, 44.27' below top casing, Elev. 266.53'

Gravel with some sand (As above with less silt, saturated)

Water sand and gravel (clean pebble and small cobble gravel loose, highly permeable)

Completed open bottom with no perforations.
Bail tested for 15 minutes, no drawdown @ 15 gpm.

Ground-Water Investigations

MASON COUNTY

SOLID WASTE LANDFILL SITE

DATE 5/20/75	SCALE 1" = 10'

RICHARD J. RONGEY
CONSULTING GEOLOGIST

J-1828
F-14

Boring Log and Construction Data for Well MW-1

Geologic Log

Depth In Feet

Ground Surface Elevation in Feet 285

0

Dense to very dense, damp to wet, tan to brown, very sandy GRAVEL.

10

20

30

40

50

60

Dense, wet, tan, silty, fine to medium SAND.

70

Hard to very dense to dense, wet, gray, sandy SILT to very silty fine SAND.

80

Bottom of Boring 80.0 Feet.
Completed 10/17/86.

90

100

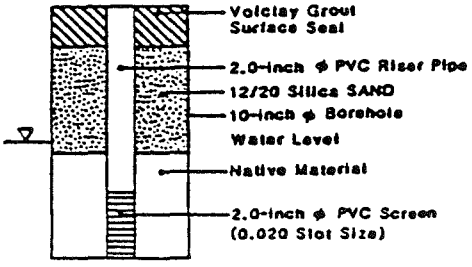
Sample	N
S-1	37
S-2	44
S-3	39
S-4	22/11"
S-5	50/5"
S-6	43
S-7	35
S-8	50
S-9	50/4"
S-10	58
S-11	45
S-12	42
S-13	40
S-14	49
S-15	P
S-16	81
S-17	P
S-18	25

Well Design

Top Casing Elevation in Feet N/A
Casing Stickup in Feet N/A

ATD

NOTE:
Abandoned MW-1 on 10/20/86.
Cut off stickup below grand surface.
Pressure grouted well with voiclay grout and packed ¼ inch bentonite pellets in top section of PVC casing.
Top of casing sealed with pop-riveted PVC slip cap.



3-inch I.D. Shelby Tube Sample

2-inch O.D. Split Spoon Sample

* No Sample Recovery

N Standard Penetration Resistance, Blows per foot

P Tube Pushed Hydraulically, Not Driven

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-2

Boring Log and Construction Data for Well MW-1A & MW-1

Geologic Log

Depth In Feet

Ground Surface Elevation in Feet 285

Sample

0

No samples taken.

MW-1A driller refusal at 25.0 feet.
MW1-B located 18 feet west of MW-1.

10

20

30

40

Bottom of Boring 40.0 Feet.
Completed 10/29/86.

50

60

70

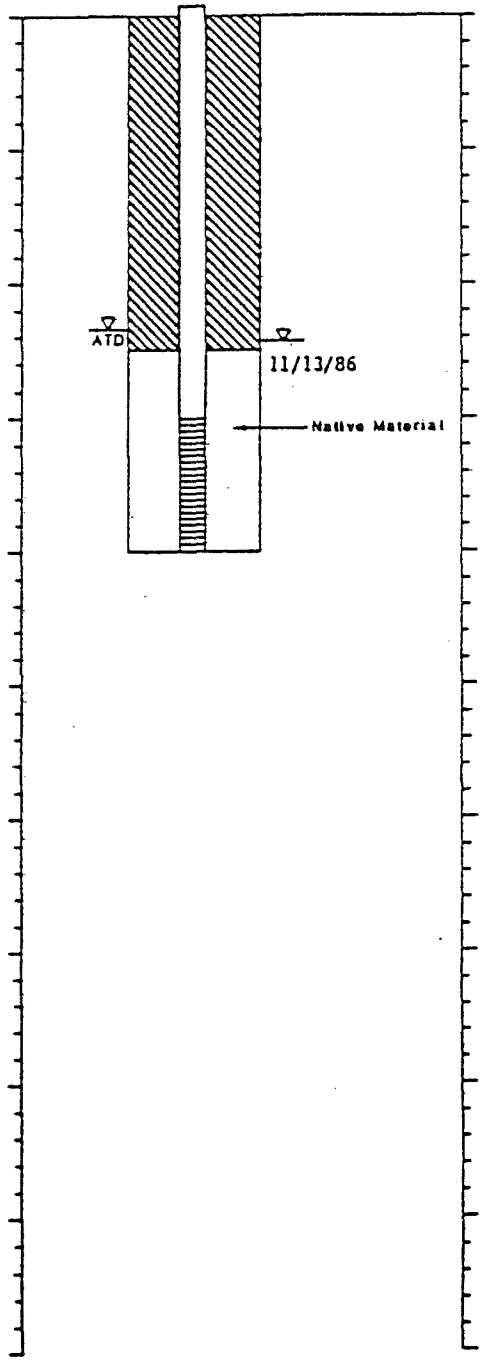
80

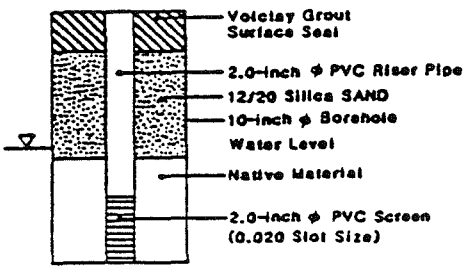
90

100

Well Design

Top Casing Elevation in Feet 286.87
Casing Stickup in Feet 1.5





□	3-inch I.D. Shelby Tube Sample
⊠	2-inch O.D. Split Spoon Sample
±	No Sample Recovery
N	Standard Penetration Resistance, Blows per foot
P	Tube Pushed Hydraulically, Not Driven
GS	Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-3

Boring Log and Construction Data for Well MW-2, 2A & 2B

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 306

0 — Medium dense to very dense, damp, very sandy GRAVEL.

10

Very dense, damp, tan, slightly silty, sandy GRAVEL (Till-like)

20

30

40 — (TILL-like)

Very dense to dense, wet, tan, sandy GRAVEL.

50

60 — Bottom of Boring 60.0 Feet.
Completed 10/23/86.

Note: MW-2 driller refusal at 18.5 feet. MW-2A located 5 feet west of MW-2. MW-2A driller refusal at 28.5 feet. MW-2B located 3 feet west of MW-2A.

70

80

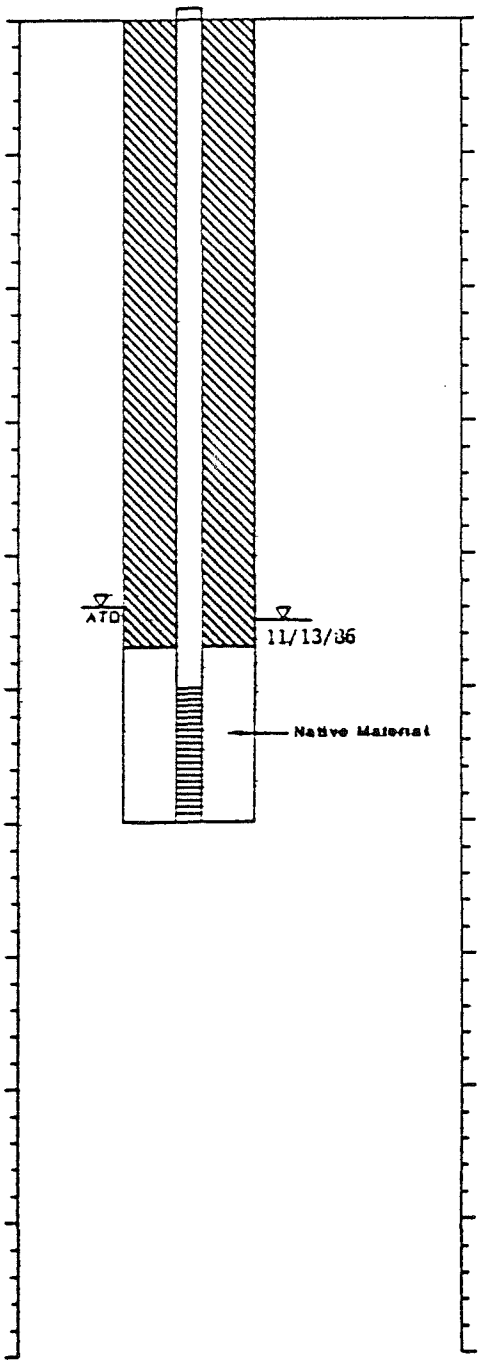
90

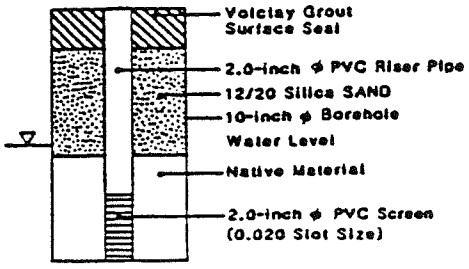
100

Sample	N
S-1	22
S-2	83
S-3	29
S-4	50/6
S-5	85
S-6	53
S-7	59
S-8	50/3"
S-9	51
S-10	30
S-11	22
S-12	34

Well Design

Top Casing Elevation in Feet 307.06
Casing Stickup in Feet 1.4





- 3-inch I.D. Shelby Tube Sample
- 2-inch O.D. Split Spoon Sample
- * No Sample Recovery
- N Standard Penetration Resistance, Blows per foot
- P Tube Pushed Hydraulically, Not Driven
- GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-4

Boring Log and Construction Data for Well MW-3 & 3A

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 306

0 — Dense to very dense, damp, tan, slighty silt, very sandy GRAVEL (TILL-like).

10 — Medium dense, moist, tan, very sandy GRAVEL

20 — Very dense to dense, moist to damp, tan, slightly silty to silty, very sandy GRAVEL (TILL-like).

30 — Bottom of Boring 26.5 Feet.
Completed 10/24/86.

Note: MW-3 driller refusal at 26.5 feet. MW-3A located 5 feet west of MW-3. MW-3A driller refusal at 21.5 feet.

40

50

60

70

80

90

100

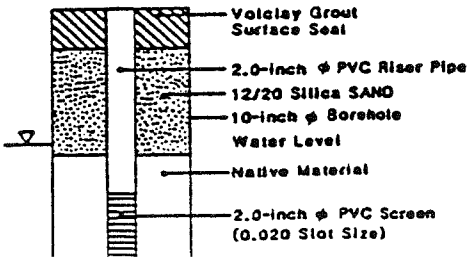
Sample	N
S-1	46
S-2	50/4"
S-3	20
S-4	52
S-5	39

Well Design

Top Casing Elevation in Feet

Casing Stickup in Feet

No well installation.



3-inch I.D. Shelby Tube Sample

2-inch O.D. Split Spoon Sample

* No Sample Recovery

N Standard Penetration Resistance, Blows per foot

P Tube Pushed Hydraulically, Not Driven

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-5

Boring Log and Construction Data for Well MW-3B

Geologic Log

Depth In Feet

Ground Surface Elevation in Feet 304.5

0 — Very dense, damp, tan, very sandy GRAVEL.

10

20 — Very dense, damp, tan, slightly silty, very sandy GRAVEL (TILL-like).

30 — Very dense, damp to wet, tan to gray, very sandy GRAVEL.

40

50

60 — Bottom of Boring 60.5 Feet. Completed 11/4/86.

70

80

90

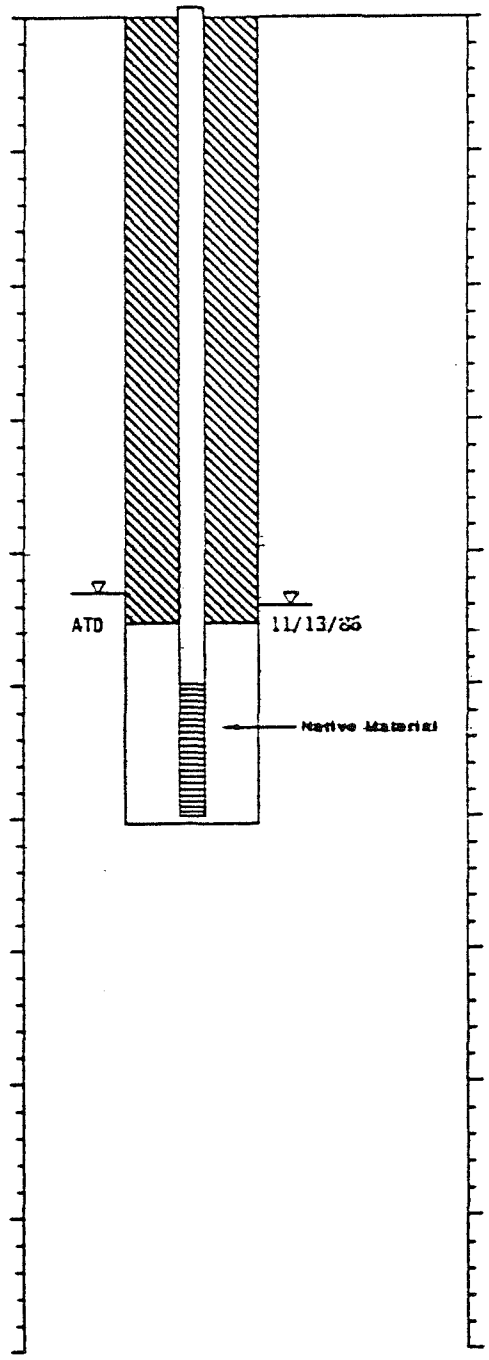
100

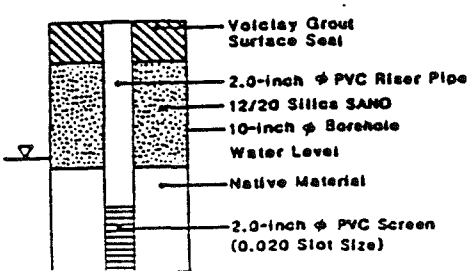
Sample	N
S-1	50/4"
S-2	50/5"
S-3	50/5"
S-4	50/5"
S-5	50/6"
S-6	50/6"
S-7	50/6"
S-8	65/6"
S-9	66
S-10	65/6"
S-11	65/5"
S-12	65/4"

Well Design

Top Casing Elevation in Feet 306.33

Casing Stickup in Feet 1.8





- 2.5-inch O.D. Split Spoon Sample
- 2-inch O.D. Split Spoon Sample
- ★ No Sample Recovery
- N Standard Penetration Resistance, Blows per foot
- P Tube Pushed Hydraulically, Not Driven
- GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-6

Boring Log and Construction Data for Well MW-4

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 310.5

0 — Medium dense, damp, reddish brown, slightly silty, very gravelly, fine to medium SAND.

Very dense, damp to wet, brown to tan to gray, very sandy GRAVEL.

10
20
30
40
50
60
70
80
100

Bottom of Boring 65.0 Feet.
Completed 11/5/86.

Sample	N
S-1	20
S-2	87
S-3	50/6"
S-4	50/3"
S-5	50/6"
S-6	50/5"
S-7	50/2"
S-8	50/5"
S-9	50/6"
S-10	50/4"
S-11	50/2"
S-12	50/6"
S-13	50/4"

Well Design

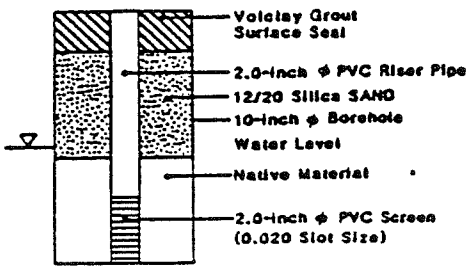
Top Casing Elevation in Feet 311.97
Casing Stickup in Feet 1.5

Concrete

ATD

11/13/86

Native Material



3-inch I.D. Shelby Tube Sample

2-inch O.D. Split Spoon Sample

* No Sample Recovery

N Standard Penetration Resistance, Blows per foot

P Tube Pushed Hydraulically, Not Driven

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

J-1828 November 1986

HART-CROWSER & associates, inc.

Figure A-7

Original and First Copy — Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) OWNER: Name Ronald G. Singer Address 515½ Park St. Shelton, Wash.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 2 T. 20 N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 60 ft. Depth of completed well 60 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 60 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Flint Walling
Type: submersible H.P. ⅓

(8) WATER LEVELS: Land-surface elevation above mean sea level .... 300 ft.
Static level 46 ft. below top of well Date 9/4/81
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 20 gal./min. with 10 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Shot clay	0	10'
Hard pan	10	15'
Gravel & clay	15	50'
Cemented gravel	50	58'
Gravel & water	58	60'

RECEIVED
JAN 15 1982
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 9/4, 19 Completed 9/4/81, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St Shelton, Wash.

[Signed] Vern L. Bedell
(Well Driller)

License No. 0032 Date 9/8/81, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Permit No. ....

(1) OWNER: Name Thelma Thomas Address 3416 93rd St. Olympia Wa.

(2) LOCATION OF WELL: County Mason — NE ¼ NW ¼ Sec. 2 T 20 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 89 ft. Depth of completed well 87 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to -89 ft.
Threaded ☐ ..." Diam. from ... ft. to ... ft.
Welded ☐ ..." Diam. from ... ft. to ... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ...
SIZE of perforations ... in. by ... in.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ...
Type ... Model No. ...
Diam. ... Slot size ... from ... ft. to ... ft.
Diam. ... Slot size ... from ... ft. to ... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ...
Gravel placed from ... ft. to ... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ... Depth of strata ...
Method of sealing strata off ...

(7) PUMP: Manufacturer's Name Flint & Walling
Type: Sub. H.P. 3/4

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.
Static level 69 ft. below top of well Date ...
Artesian pressure ... lbs. per square inch Date ...
Artesian water is controlled by ... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ...
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ...
Bailer test 20 gal./min. with 4 ft. drawdown after 2 hrs.
Artesian flow ... g.p.m. Date ...
Temperature of water ... Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL		FROM	TO
Sand & Gravel	Br.	0	10
Hard pan	"	10	22
Compact Sand & Gravel	"	22	35
Sand & Gravel (loose)	"	35	38
Compact Sand & Gravel	"	38	70
Sand & Gravel	Grey	70	77
Compact Sand & Gravel	"	77	85
Sand & Gravel	"	85	89

RECEIVED
FEB 11 1981
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 1/20, 1981. Completed 2/3, 1981

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Skookum Well Drilling (Person, firm, or corporation) (Type or print)

Address SE 2810 Arcadia Rd Shelton Wa.

[Signed] George H. Witcraft (Well Driller)

License No. 0665 Date 2/6, 1981

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Original and First Copy — Water Right Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No

Permit No

(1) OWNER: Name Mrs. Dorothy Mac Rae Address 12340 Hwy 101, Shelton, Wash.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 2 T. 20 N., R. 4W W.M

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☑ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.

Drilled 109 ft. Depth of completed well 109 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 109 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☐ No ☑

Manufacturer's Name

Type Model No.

Diam. Slot size from ft. to ft.

Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:

Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? Yes ☐ No ☑

Type of water? Depth of strata

Method of sealing strata off

(7) PUMP: Manufacturer's Name Flint & Walling

Type: submersible H.P. ½

(8) WATER LEVELS: Land-surface elevation above mean sea level 250 ft.

Static level 42 ft. below top of well Date 11/13/83

Artesian pressure lbs. per square inch Date

Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☑ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test

Bailer test 100 gal./min. with 30 ft. drawdown after 1 hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Gravel & clay	0	15
Gravel Sand & clay	15	65
Gravel & water	65	80
Gravel & clay	80	100
Gravel & water	100	109'

RECEIVED JAN 4 1984 DEPARTMENT OF ECOLOGY SOUTHWEST REGIONAL OFFICE

Work started 11/11, 19 Completed 11/13/83, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Vern L. Bedell (Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St. Shelton, Wash.

[Signed] Vern L. Bedell (Well Driller)

License No. 0032 Date 11/25/83, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name Port of Shelton Address P.O. Box 517 Shelton, Wa. 98584

(2) LOCATION OF WELL: County mason — S.W.¼ S.E.¼ Sec. 2 T. 20 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10 inches.
Drilled 140 ft. Depth of completed well 139 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 10" Diam. from 0 ft. to 139 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No.
Diam. 10" Slot size from 123 ft. to 139 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 54 ft. below top of well Date 1-6-88
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Driller
Yield: gal./min. with ft. drawdown after hrs.
" (See ATTACHED) " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Brn. Sand & Gravel	0	7
" " "	7	19
" " "	19	102
Brn. Silt, Sand, Some gravel	102	109
Water, Sand & Gravel	109	139
Brn. Cemented Sand & Grav	139	140

RECEIVED '88 JAN 26 A11:20 S.W. REGIONAL OFFICE

Work started 12-10, 1987 Completed 1-7, 1988

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Burt Well Drilling, Inc. (Person, firm, or corporation) (Type or print)

Address 19782 N.E. Lincoln Rd. Paulsbo, Wa. 98370

[Signed] George A. Burt (Well Driller)

License No. 0048 Date 1-25, 1988

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

WELL PRODUCTION TEST

Date: JAN 7, 1988 Hydrogeologist: _____ Owner: PORT OF SHELTON

Location: _____ Production Test: _____

Static Water Level: 54' Production Well: _____

Measuring Point: _____ Observation Well: _____

Pump Company: BURT WELL DRILLING Pump Type: _____

Remarks: _____

Date	Time Hrs. Min. Sec.	Elapsed Time (min.)	Drawdown (feet)	Pumping Rate (gpm)	Remarks
1/6/88	10:15		86'	285	
	10:17		86' 1/2"	285	
	10:20		86' 1"	285	
	10:22		86' 2"	285	
	10:24		86' 3"	285	
	10:26		86' 4"	285	
	10:28		86' 5"	285	
	10:30		86' 6"	285	
	10:32		86' 5"	285	
	10:34		86' 3 1/2"	285	
	10:36		86' 2 1/2"	285	
	10:45		86' 4"	285	
	11:00		86' 9"	285	
	11:15		86' 8"	285	
	11:30		86' 9 1/2"	285	
	11:45		86' 10 1/2"	285	
	12:00		86' 11 1/2"	285	
	12:15		87'	285	
	12:30		87'	285	
	1:30		86' 7"	285	
	2:30		86' 6"	285	
	3:30		86' 7"	285	
	4:30		86' 9"	285	
	5:30		87' 1"	285	

WELL PRODUCTION TEST

Date: JAN 7, 1988 Hydrogeologist: _____ Owner: PORT OF SHELTON

Location: _____ Production Test: _____

Static Water Level: 54' Production Well: _____

Measuring Point: _____ Observation Well: _____

Pump Company: BURT WELL DRILLING Pump Type: _____

Remarks: _____

Date	Time Hrs. Min. Sec.	Elapsed Time (min.)	Drawdown (feet)	Pumping Rate (gpm)	Remarks
1/6/88	6:30		86'10"	285	
	7:30		87'2½"	285	
	8:30		87'3½	285	
	9:30		87'2"	285	
	11:30		87'4"	285	
	1:30		87'2½"	285	
	3:30		87'½"	285	
	5:30		87'	285	
	7:30		86'11"	285	
	9:30		87'4"	285	
	10:15		87'	285	
	RECOVERY S		RECOVERY		
	1-MIN		54'6"		
	2-MIN		54'4"		
	3-MIN		54'3"		
	4-MIN		54'2½"		
	5-MIN		54'2"		
	6-MIN		54'1½"		
	7-MIN		54'1½"		
	10-MIN		54'1"		
	15-MIN		54'		

Second Copy — Owner's Copy
Third Copy — Driller's Copy

STATE OF WASHINGTON

Permit No. 62-00771

(1) OWNER: Name Don R McDougall Address 4814 Edna Olympia, Wash 98501

(2) LOCATION OF WELL: County Mason — SE ¼ SE ¼ Sec. 2 T. 20 N., R. 4 W W.M.

Bearing and distance from section or subdivision corner 300 feet west & 100 feet north from SE corner of Sec 2

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☒ Community Fire

(4) TYPE OF WORK: Owner's number of well (if more than one)....

New well ☐ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 81' 6" ft. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 81' 6" ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☐ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐
Type of perforator used Mills
SIZE of perforations ⅛ in. by ¾" in.
70 perforations from 70 ft. to 80 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 15 ft.
Material used in seal Drill Mud & Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Cal Pump
Type: Submersible H.P. 3

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 40 ft. below top of well Date Nov. 10, 56
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test Nov 8, 1956
Bailer test 50 gal./min. with 30 ft. drawdown after 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Red Clay + Gravel Lenses	0	47
Gravel + Water	47 -	81' 6"

Work started Nov 5, 1956 Completed Nov 10, 1956

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Drilling Co (Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson

[Signed] Lawrence Bedell (Well Driller)

License No. 223-02-4876 Date March 14, 1974

0031

OK with 4-8-74

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 661791

Water Right Permit No.

(1) OWNER: Name William Blocher Address Q 1583 Dayton Airport Rd

(2) LOCATION OF WELL: County MASON NE ¼ SE ¼ Sec 3 T. 20 N. R. 4 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address)

(3) PROPOSED USE: ☒ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 93 feet. Depth of completed well 93 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 0 ft. to 93 ft.
Welded ☐ Liner installed ☐ Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level
Static level 13 ft. below top of well Date 6-12-90
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.) NONE

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airlift 100+ gal./min. with steam set at 80' ft. for 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Top Soil	0	2
Brn Sand &	2	10
" " " Clay	10	30
" " " "	30	38
Sandy Sandy Clay Brn	38	92
Blue Clay	92	93
& Sand (WATER)	93	93

Work started 6-12 1990 completed 6-12 1990

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Patterson/Russell Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address PO Box 423 Shelton WA
(Signed) Bill Russell (WELL DRILLER) License No. 0444
Contractor's Registration No. Date 6-12 1990

(USE ADDITIONAL SHEETS IF NECESSARY)

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No.
Water Right Permit No.

(1) OWNER: Name HART CROWSER INC Address 1910 FAIRVIEW AVE E SEATTLE, WA 98102-

(2) LOCATION OF WELL: County MASON - NE 1/4 SE 1/4 Sec 4 T 20N, ~~R4W~~ WM
(2a) STREET ADDRESS OF WELL (or nearest address) MASON CTY. LANDFILL NESE sec 4 T20N R4W

(3) PROPOSED USE: OTHER USE

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: AIR ROTARY

(5) DIMENSIONS: Diameter of well 2 inches
Drilled 60 ft. Depth of completed well 58 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 2 " Dia. from 0 ft. to 30 ft.
THREADED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: NO
Type of perforator used ~~MANUFACTURE~~
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: YES
Manufacturer's Name
Type PVC Model No.
Diam. 2 slot size 20 from 48 ft. to 58 ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 35 ft.
Material used in seal BENTONITE CLAY
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off PRESSURE GROUT

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 43 ft. below top of well Date 12/06/87
Artesian Pressure lbs. per square inch Date / /
Artesian water controlled by

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
SILTY SAND AND GRAVEL	0	9
LOOSE SAND AND GRAVEL	9	28
LOOSE GRAVEL AND CLAY	28	37
LOOSE GRAVEL	37	43
LOOSE SAND GRAVEL AND WATER	43	60

Work started 12/06/87 Completed 12/06/87

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test 0 gal/min. 0 ft. drawdown after 0 hrs.
Air test 0 gal/min. w/ stem set at 0 ft. for 0 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME RICHARDSON WELL DRILLING
(Person, firm, or corporation) (Type or print)

ADDRESS P O BOX 44427

[SIGNED] [signature], License No. 1424

Contractor's Registration No. RICHAW*3210B Date 10/07/88

8 G1

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. A-6260

Date 10-16, 1962

Record by well driller

Source driller's record

Location: State of WASHINGTON

County Mason

Area

Map

SW ¼ NE ¼ sec 8 T. 20 N., R. 4 E. W.

Diagram of Section

Drilling Co. Redell Drilling Co.

Address 1583 East Dickinson, Shelton, Washington

Method of Drilling 2E Grossman Date , 19

Owner ~~Mount Vernon Sand and Gravel~~ Co.

Address First & Fir St., Mt. Vernon, Washington

Land surface, datum 280 ft. above below

Correlation	Material	Thickness (feet)	Depth (feet)
	Peat or top soil	2	2
	Gravel	28	30
	Blue clay	15	45
	Red clay, gravel, water	5	50
	Gravel and water	10	60
PUMP TEST:			
	Dim: 8" x 60'		
	DD: 45 ft.		
	Yield: 180 gpm		
Flowing Well:			
	Measured discharge: 70 gpm (March 9, 1962)		
	Shut-in pressure: 6 lbs (March 9, 1962)		
	Water controlled by valve		
	(and)		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up (over) Sheet of sheets

Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No. G2-27170

(1) OWNER: Name Latvian Village Water Supply System Address

(2) LOCATION OF WELL: County Mason - Approx. 100' N. of the SE Corner of Sec. 8 T. 20 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 0 96 ft. Depth of completed well 96 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8" Diam. from 0 ft. to 96 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name JOHNSON
Type STAINLESS Model No.
Diam. 8 Slot size 25 from 86 ft. to 96 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 22 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☒ No ☐ If yes, by whom? Roy McGill
Yield: 90 gal./min. with 58.5 ft. drawdown after 4 hrs.
" 9:00 - 40 - 30" | 9:30 - 45.2 - 38 | 10:00 - 54" - 65 gal. "
" 9:45 - 43.5" 35 | 9:45 - 49.4 - 66 | 10:30 - 59.2 - 90 gal. "
10:45 - 58.5 - 90 gal.

Recovery data (time taken as zero when pump turned off) (Water level measured from well top to water level) stuck 2 1/2 hrs

Time	Water Level	Time	Water Level	Time	Water Level
1:15	58.5				
1:24	40.1	9 min. 15 sec.			

Date of test Sept. 17. 1987
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Brown clay Sand + Gravel	0	24
Same	24	28
Brown Hard Clay	28	37
Blue Clay	37	46
Brown Hard Clay Little water	46	61
Gray sand + Gravel	61	72
Gray Bound Gravel Some water	72	85
Gray Sand + Gravel	85	89
Same	89	96
Bottomed out Brown Clay Bound Gravel		

Work started Sept. 1 19 87 Completed 21 19 87

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Roy McGill Well Drilling (Person, firm, or corporation) (Type or print)

Address 7837 Martin Way #23

[Signed] Roy McGill (Well Driller)

License No. 0336 Date SEP 21, 1987

(USE ADDITIONAL SHEETS IF NECESSARY)

DY 050-1-20

The Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No
Permit No

(1) OWNER: Name Rick Coleman Address E. 201 Bourgault Shelton, Wash.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 8 T. 20 N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 61 ft. Depth of completed well 61 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 0 ft. to 61 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☑ No ☐
Manufacturer's Name Johnson SS
Type Model No.
Diam. Slot size 120 from 0 ft. to 6 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 200 ft.
Static level 3 ft. below top of well Date 9/20/83
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☑ No ☐ If yes, by whom? Bedell
Yield: 50 gal./min. with 40 ft. drawdown after 4 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 9/20/83
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Gravel	0	15
Hard pan	15	28
Red clay & gravel	28	54
Gravel & water	54	61

Work started 9/20/83, 19 Completed 9/20/83, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St. Shelton, Wash.

[Signed] Vern L. Bedell
(Well Driller)

License No. 0032 Date 10/5/83, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) OWNER: Name West Coast Latvian Educational Center Address W. 3381 Dayton Matlock Rd, Shelton, Wn.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 8 T. 20 N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) .....
New well ☑ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 90 ft. Depth of completed well 90 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 0 ft. to 90 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level 280 ft.
Static level 5 ft. below top of well Date 2/2/83
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? Bedell
Yield: 100 gal./min. with 80 ft. drawdown after 4 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 100 gal./min. with 80 ft. drawdown after 1 hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Shot clay	0	14'
Hard pan	14	26'
Gravel & clay	26	83'
Gravel & water	83	90'

RECEIVED
MAR 08 1983
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 2/1, 19.... Completed 2/2/83, 19....

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co. (Person, firm, or corporation) (Type or print)
Address 1583 E. Dickinson St. Shelton, Wash.
[Signed] Vern L. Bedell (Well Driller)
License No. 0032 Date 2/15/83, 19....

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No

Permit No.

(1) OWNER: Name Washington Correction Center Address Shelton, Wa. 98584

(2) LOCATION OF WELL: County Mason — ¼ ¼ ¼ Sec. 9 T. 21 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20 inches.

Drilled 56 ft. Depth of completed well 56 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20" Diam. from 0 ft. to 24 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☒ No ☐

Manufacturer's Name Johnson

Type Model No.

Diam. 20" Slot size 100 from 27'4" ft. to 42'11" ft.

Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:

Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 30 ft.

Material used in seal Cement

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? Depth of strata

Method of sealing strata off

(7) PUMP: Manufacturer's Name

Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.

Static level 34'11" ft. below top of well Date 3/-3/84

Artesian pressure lbs. per square inch Date

Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☒ No ☐ If yes, by whom? Driller

Yield: gal./min. with ft. drawdown after hrs.

" See Attached Test Pump Report "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test

Bailer test gal./min. with ft. drawdown after hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? Yes ☒ No ☐

(Sample taken by Whitacre Engineers, Inc.)

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Gravel, Large; Boulders, Small		
Sand, Coarse, Loose	[illegible]	21
Clay Gravel, Yellow, Dense; Sand Coarse	22	25
Gravel, Large; Sand, Coarse (CB)	27	45
Gravel & Sand, Clay Binder (CB)	45	47
Clay, Yellow; Some Gravel, Sandy	47	51
Clay, Yellow, Sandy	51	56

RECEIVED
MAR 28 1984
Department of Ecology
Central Office

Work started 2/6, 1984 Completed 3/21, 1984

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Williams Well Drilling, Inc.
(Person, firm, or corporation) (Type or print)

Address 957 Jackson Hwy. So., Toledo, Wa. 98591

[Signed] Steve Williams
(Well Driller)

License No. 0536 Date March 21, 1984

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Copy with
's Copy
Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

me Washington Correction Center Address Shelton, Wa. 98584

OF WELL: County Mason — SE ¼ NW ¼ Sec. 9 T. 20 N., R. 4W W.M.

from section or subdivision corner

USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☒

WORK: Owner's number of well (if more than one)....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

S: Diameter of well 6 inches.
ft. Depth of completed well 40'6" ft.

TION DETAILS:

ailed: 6 " Diam. from +20" ft. to 38 ft.
" Diam. from ft. to ft.
" Diam. from ft. to ft.

Yes ☒ No ☐
erforator used Millsknife
erforations ¼ in. by 1¼ in.
perforations from 28 ft. to 33 ft.
perforations from ft. to ft.
perforations from ft. to ft.

☐ No ☒
urer's Name
Model No.
Slot size from ft. to ft.
Slot size from ft. to ft.

ked: Yes ☐ No ☒ Size of gravel:
aced from ft. to ft.

Yes ☒ No ☐ To what depth? 18 ft.
used in seal Cement
strata contain unusable water? Yes ☐ No ☒
water? Depth of strata
: sealing strata off

ufacturer's Name
H.P.

EVELS: Land-surface elevation above mean sea level.... ft.
21'2" ft. below top of well Date 3-13-84
lbs. per square inch Date
water is controlled by (Cap, valve, etc.)

TS: Drawdown is amount water level is lowered below static level
e? Yes ☐ No ☒ If yes, by whom?
min. with ft. drawdown after hrs.
" " "
" " "

e taken as zero when pump turned off) (water level well top to water level)

Level	Time	Water Level	Time	Water Level

gal./min. with ft. drawdown after hrs.
g.p.m. Date
er Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Gravel and clay, yellow	0	12
Gravel, clay binder	12	13
Gravel and clay	13	28
Gravel, waterbearing	28	33
Clay, some gravel	33	36
Gravel and clay	36	38

Work started 3-13- 19 84 Completed 3-13- 19 84

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Williams Well Drilling, Inc.
(Person, firm, or corporation) (Type or print)

Address 6517 Olympic Hwy., Aberdeen, Wa. 98520

[Signed] Buck Williams
(Well Driller)

License No. 0526 Date 4-3 19 84

(USE ADDITIONAL SHEETS IF NECESSARY)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) OWNER: Name Washington Correction Center Address Shelton, Wa. 98584

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. T. N., R. W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) .....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled 56 ft. Depth of completed well 56 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from 0 ft. to 24 ft.
Threaded ☐ 12" Diam. from 24 ft. to 27 1/4" ft.
Welded ☒ 12" Diam. from 42 ft. to 52 1/4" ft.

Perforations: Yes ☐ No ☒
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type ..... Model No. .....
Diam. 12" Slot size 100 from 27 1/4" ft. to 42 1/4" ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 30 ft.
Material used in seal Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.
Static level 4 ft. below top of well Date 1-2-84
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Driller
Yield: gal./min. with ft. drawdown after hrs.
" See Attached Test Pump Report "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☒ No ☐
(Sample taken by Whitacre Engineers, Inc.)

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Gravel, Large; Boulders, Small		
Sand, Coarse, Loose	[illegible]	2[illegible]
Clay, Gravel, Yellow, Loose; Hard		
Coarse	3[illegible]	37
Gravel, Loose; Sand, Coarse (Wet)	37	45
Gravel & Sand, Very Fine (Wet)	45	4[illegible]
Clay, Yellow; Sand, Gravel, Tough	4[illegible]	51
Clay, Yellow, Tough	51	56

RECEIVED
MAR 28 1984
Department of Ecology
Central Office

Work started 2/6, 19 84 Completed [illegible], 19 [illegible]

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Williams Well Drilling, Inc.
(Person, firm, or corporation) (Type or print)

Address 957 Jackson Hwy. No., Toledo, Wa. 98591

[Signed] Steve Williams
(Well Driller)

License No. 0536 Date March 21, 1984

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

#1

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION

WELL SCHEDULE No. 20/4W-9F1

Date 9-30, 1963

Record by JBM

Source Dept Gen Adm & obs of cuttings

Location: State of WASHINGTON

County

Area

Map

¼ ¼ sec. T. N., R. E. W.

DIAGRAM OF SECTION

Details

Owner Wash. Corrections Center (His No.)

Address

Driller Gaudio Address

Topography prairie

Land-surface datum 287 ft. above below surveyed

Type: Dug Drilled Driven Bored Jetted

Depth: Rept. 402 feet
Meas. filled to 209 feet

Date Nov 27, 1961

Casing: Diam. 12 to in. ft. Type Screen at 209

Depth 209 ft. Finish

Chief aquifer Depth ft. Thick ft.

Water level: Rept. Meas. 39.7 ft. Feb, 1963, above below

& see over which is ft. above below datum

Pump: Type Capacity Size gal. min.

Driven by horsepower

Yield: Flow gal. min. Pump gal. min. Meas. Rept. Est.

Drawdown ft. after hours pumping gal. min.

Adequacy, permanence excessive dd, slow recovery

Use: Dom. Stock. PS. RR. Ind. Irr. Obs. Abandoned

Quality: Sample No. , 19 Temp. °F.

Taste, color, hardness, sanitation, etc.

Other data: Log Water levels Draft Pump test Analyses

Turn up

SP-13529

#4 deep

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG (#2 well) No. 20/4W.9E2

Date 10-29, 1963

Record by JBL

Source R & R report

Location: State of WASHINGTON

County

Area

Map

¼ ¼ sec. T. N., R. E. W.

Diagram of Section

Drilling Co.

Address

Method of Drilling Date, 19

Owner Wash. Corrections Center

Address

Land surface, datum 276 ft. above below

File number 20/4W-9E2

Correlation	Material	Thickness (feet)	Depth (feet)
	G	3	3
	HP	16	19
	G & S, wtr (see 9E3)	16	35
	S, coarse, clean	9	44
	C, brown silty	19	63
	Silt, brown	15	78
	C, blue	18	96
	G, some water	5	101
	G & C some water	23	124
	Silt, brown	16	140
	G, wtr	2	142
	Silt, brown	8	150
	C & G, blue	10	160
	G, wtr	2	162
	C, & G	2	164
	G & S	13	177

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up C, blue

Sheet 1 of 17 sheets

#4 deep
(#2 well)

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION

WELL SCHEDULE #2 (pro/using well) No. 20/4W-9E2

Date 10-29 1963

Record by Pine

Source Robinson & Roberts report

Location: State of WASHINGTON

County

Area

Map

¼ ¼ sec. T. N. R. E. W.

DIAGRAM OF SECTION

Details

Owner Wash. Correctional Ctr (His No.)

Address Shelton

Driller Gondie & Fox R & R Address

Topography prairie

Land-surface datum 276 ft. above below surveyed E.L. 1963

Type: Dug Drilled Driven Depth: Rept. 178 feet

Bored Jetted Meas. ↑ correct feet

Date May 8, 1962

Casing: Diam. 12 to in. ft. Type

Depth 162 ft. Finish 12" x 13" 100 slot screen

Chief aquifer 164-177 Depth ft. Thick ft.

Water level: Rept. 31.0 ft. 6-18, 1962, above below T.C.
Meas.

which is ft. above below datum

Pump: Type ~~Test~~ T Capacity Size gal. min.

Driven by 25 horsepower

Yield: Flow gal. min. Pump gal. min. Meas. Rept. Est.

Drawdown 103 ft. after 8 hours pumping 178 gal. min.

Adequacy, permanence Full recovery ↑ correct

Use: Dom. Stock. PS RR. Ind. Irr. Obs. Test

Quality: Sample No. , 19 Temp. °F.

Taste, color, hardness, sanitation, etc.

Other data: Log Water levels Draft Pump test Analyses

Turn up

GA-15525

#3

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

WELL LOG No. 20/4W-9E1

Date 10-28, 1963

Record by Jim

Source Robinson & Roberts report

Location: State of WASHINGTON

County Mason

Area

Map

____ ¼ ____ ¼ sec. ____ T. ____ N., R. ____ E. W.

Diagram of Section

Drilling Co. Geodio

Address

Method of Drilling ____ Date ____, 19____

Owner Wash. Corrections Center

Address

Land surface, datum 267 ft above below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	G	6	6
	HP (till)	12	18
	S & C	25	43
	C, blue	18	61
	G, wtr	2	63
	C & G	8	71
	G	1	72
	HP	6	78
	G	2	80
	C & G	33	113
	G wtr	2	115
	HP	37	152
	C blue & G	5	157
	S & G dirty, wtr	21	178
	C blue	6+	184

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up

Sheet ____ of ____ sheets

186 Mb 187

Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No .....

(1) OWNER: Name Don Lykes Address Carmen Rd. N. Shelton, Wash. 98584

(2) LOCATION OF WELL: County Mason N.E. N.E. S.E. ¼ ¼ Sec. 16 T. 20N N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 88' ft. Depth of completed well 88' ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0' ft. to 88 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Flint Walling
Type: Submersible H.P. 1

(8) WATER LEVELS: Land-surface elevation above mean sea level 150 ft.
Static level 46 ft. below top of well Date 8/13/77
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 40 gal./min. with 10 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Shot Clay	0'	16'
Hardpan	16'	58'
Cemented Gravel	58'	85'
Gravel & Water	85'	88'

Work started 8/2, 1977 Completed 8/13, 1977

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St. Shelton, Wash.

[Signed] Vern J. Bedell
(Well Driller)

License No. 0032 Date 8/30, 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name Walter Kratcha Address W800A Golden Pheasant Rd. Shelton, Wa.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 16 T. 20 N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 94.5 ft. Depth of completed well 94.5 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 94.5 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 250 ft.
Static level 40 ft. below top of well Date 1/3/85
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 30 gal./min. with 40 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Shot clay	0	9
Hard pan	9	45
Cemented gravel	45	90
Gravel & water	90	94.5'

Work started 1/2/85, 19 Completed 1/3/85, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co. (Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St. Shelton, Wa.

[Signed] Vern L. Bedell (Well Driller)

License No. 0032 Date 1/6/85, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

3

For Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No

Permit No

(1) OWNER: Name David Chappell Address W. 6020 Shelton Matlock Rd. Shelton, Wa.

(2) LOCATION OF WELL: County Mason — ¼ ¼ Sec. 16 T. 20 N., R. 4W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 76 ft. Depth of completed well 76 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 76 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 200 ft.
Static level 44 ft. below top of well Date 12/12/85
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 25 gal./min. with 20 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Shot clay	0	18
Clay	18	70
Gravel & water	70	76'

'86 JAN 16 P 1:20

Work started, 19 Completed, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 1583 E. Dickinson St. Shelton, Wa.

[Signed] Vern L. Bedell
(Well Driller)

License No. 0032 Date 12/17/85, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

~~Application~~ No. 13146

Permit No. .....

(1) OWNER: Name Dan Wells. Address W8321 Shelton Matlock Rd. Shelton Wash.

(2) LOCATION OF WELL: County Mason SE ¼ NE ¼ Sec 15 T 20 N., R. 4 W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) .....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 40 ft. Depth of completed well 40 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to -40 ft
Threaded ☐ ..." Diam. from ... ft. to ... ft
Welded ☒ ..." Diam. from ... ft. to ... ft.

Perforations: Yes ☐ No ☒
Type of perforator used .....
SIZE of perforations ... in. by ... in.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft
... perforations from ... ft. to ... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ... Slot size ... from ... ft. to ... ft.
Diam. ... Slot size ... from ... ft. to ... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ... ft. to ... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ... Depth of strata ...
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name —
Type: — H.P. —

(8) WATER LEVELS: Land-surface elevation above mean sea level .... 230 ? ft.
Static level 8 ft. below top of well Date 3-18-88
Artesian pressure ... lbs. per square inch Date ...
Artesian water is controlled by ... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ...
Yield: ... gal./min. with ... ft. drawdown after ... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 20 gal./min. with 10 ft. drawdown after 2 hrs.
Artesian flow ... g.p.m. Date ...
Temperature of water ... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Top Soil	0	3
Sand & gravel	3	10
Hard pan	10	23
Sand & gravel	23	30
gravel - water	30	40

Work started 3-15, 19 88 Completed 3-18, 19 88

RECEIVED
'88 MAR 25 AM 10:57
SW REGIONAL OFFICE

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Skookum Well Drilling (Person, firm, or corporation) (Type or print)

Address SE 2810 Arcadia Rd Shelton Wa.

[Signed] George H. Witcraft (Well Driller)

License No. 0665 Date 3-24, 19 88

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No
Permit No

(1) OWNER: Name Vi Stickley Address Rt. 5, Box 730, Shelton

(2) LOCATION OF WELL: County Mason — NW ¼ NW ¼ Sec. 17 T. 20 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 81 ft. Depth of completed well 81 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 81 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 16 ft. below top of well Date 3-3-76
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 12 gal./min. with 50 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Clay, yellow; gravel, large	0	20
Clay, yellow; gravel, small	20	28
Clay, blue, sandy	28	39
Sand, yellow, fine, sticky	39	61
Clay, blue, sandy	61	66
Clay, blue, thick, sticky	66	73
Sand, gravel, large, water-bearing	73	81

Work started 2-25, 1976 Completed 3-3, 1976

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Williams Well Drilling (Person, firm, or corporation) (Type or print)

Address 6517 Olympic Hwy. Aberdeen

[Signed] Steve Williams (Well Driller)

License No. 0536 Date 3-10, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

CY 050-1-20

3

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 03 1657

Water Right Permit No. _____

(1) OWNER: Name Steve Jansen Address W 181 Little Egypt Rd. 98584

(2) LOCATION OF WELL: County Mason NE ¼ NW ¼ Sec 17 T. 20 N., R. 4 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) Same

(3) PROPOSED USE: [X] Domestic [ ] Irrigation [ ] DeWater [ ] Industrial [ ] Test Well [ ] Municipal [ ] Other

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned [ ] New well [X] Deepened [ ] Reconditioned [ ]

Method: Dug [ ] Cable [X] Rotary [ ] Bored [ ] Driven [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.

Drilled 61 feet. Depth of completed well 61 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to 61 ft.

Welded [ ] _____ Diam. from _____ ft. to _____ ft.

Liner installed [ ] _____ Diam. from _____ ft. to _____ ft.

Threaded [ ] _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes [ ] No [X]

Type of perforator used _____

SIZE of perforations _____ in. by _____ in.

_____ perforations from _____ ft. to _____ ft.

_____ perforations from _____ ft. to _____ ft.

_____ perforations from _____ ft. to _____ ft.

Screens: Yes [ ] No [X]

Manufacturer's Name _____

Type _____ Model No. _____

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel _____

Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes [X] No [ ] To what depth? 17 ft.

Material used in seal Bentonite

Did any strata contain unusable water? Yes [ ] No [X]

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.

Static level 4 ft. below top of well Date _____

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (Cap, valve, etc.))

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes [ ] No [X] If yes, by whom? _____

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____

Bailer test 25 gal./min. with 8 ft. drawdown after 1½ hrs.

Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? Yes [ ] No [X]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
0 Brown clay & gravel	0	17
Sand & gravel	17	36
Cemented	–	–
Gray clay	36	57
Gravel & water	57	61

Work started 9-5, 19. Completed 9-7, 1989

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Arcadia Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 170 SE Walker Pk Rd Shelton

(Signed) Bill Nash (WELL DRILLER) License No. 1455

Contractor's Registration No. ARCADD*141K1 Date 9-9, 1989

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 3

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name Daisy Fitland Address W 7431 Shelton Matlock, Shelton Wa.

(2) LOCATION OF WELL: County MASON — NW ¼ NW ¼ Sec. 17 T 20 N. R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.

Drilled 75 ft. Depth of completed well 75 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to 75 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☐ No ☒

Manufacturer's Name

Type Model No.

Diam Slot size from ft. to ft.

Diam Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel

Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.

Material used in seal BENTONITE

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? Depth of strata

Method of sealing strata off

(7) PUMP: Manufacturer's Name GOULDS

Type: GOULDS H.P. 3/4

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.

Static level 11 ft. below top of well Date 1-21-88

Artesian pressure lbs. per square inch Date

Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☒ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test

Bailer test 25 gal./min. with 10 ft. drawdown after 2 hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation*

MATERIAL	FROM	TO
LOOSE TOPSOIL & GRAVEL	0	20
FINE BROWN SAND	20	35
SANDY BROWN CLAY	35	65
FINE BROWN SAND	65	69
GRAY CLAY	69	70
SILTY BLACK SAND	70	73
COARSE SAND & PEE GRAVEL	73	74
SAND, PEE GRAVEL, LARGE GRAVEL	74	75

RECEIVED 88 JAN 28 AM 11:41 DEPARTMENT OF ECOLOGY SW REGIONAL OFFICE

Work started 1-11- 19 88 Completed 1-21 19 88

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME SKOOKUM WELL DRILLING (Person, firm, or corporation) (Type or print)

Address 2810 ARCADIA RD

[Signed] Robert Lee (Well Driller)

License No. 1502 Date 1-25, 19 88

(USE ADDITIONAL SHEETS IF NECESSARY)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name PAM ROBINSON Address 6261 MALLOCK Rd Shelton WA

(2) LOCATION OF WELL: County MASON — SW ¼ NE ¼ Sec. 17 T. 20 N. R. 4 W W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 71 ft. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: " Diam. from ft. to ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☒ 6 " Diam. from 0 ft. to 71 ft.

Perforations: Yes ☐ No ☒

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☐ No ☒

Manufacturer's Name

Type Model No.

Diam. Slot size from ft. to ft.

Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:

Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? Depth of strata

Method of sealing strata off

(7) PUMP: Manufacturer's Name Red Jacket

Type: Sub HP ½

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.

Static level 14 ft. below top of well Date 8-31-87

Artesian pressure lbs. per square inch Date

Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☐ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test

Bailer test 25 gal./min. with @ 51 ft. drawdown after 2 hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation*

MATERIAL	FROM	TO
Top Soil	0	1
Clay Br	1	10
" "	10	20
Cem Br	20	40
" "	40	60
" "	60	68
Br Sand (water)	68	71

Work started 8-31- 1987 Completed 8-31- 1987

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Patterson Drilling / Russell Drilling (Person, firm, or corporation) (Type or print)

Address P.O. Box 433 Shelton WA

[Signed] Bill Russell (Well Driller)

License No. 0444 Date 8-31- 1987

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [illegible]

Water Right Permit No. ____

(1) OWNER: Name Elmer Sytsma Address Shelton-Matlock Rd.

(2) LOCATION OF WELL: County Mason NW ¼ SE ¼ Sec 17 T. 20 N., R. 4 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) Same

(3) PROPOSED USE: [X] Domestic [X] Irrigation [ ] DeWater Industrial [ ] Test Well [ ] Municipal [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one) ____

Abandoned [ ] New well [X] Deepened [ ] Reconditioned [ ]
Method: Dug [ ] Cable [X] Rotary [ ] Bored [ ] Driven [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled ____ feet. Depth of completed well ____ ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to 32 ft.
Welded [X] ____ Diam. from ____ ft. to ____ ft.
Liner installed [ ]
Threaded [ ] ____ Diam. from ____ ft. to ____ ft.

Perforations: Yes [ ] No [X]
Type of perforator used ____
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes [X] No [ ]
Manufacturer's Name ____
Type ____ Model No. ____
Diam. 5" Slot size 40 from 28 ft. to 33 ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel ____
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

(7) PUMP: Manufacturer's Name ____
Type: ____ H.P. ____

(8) WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level 16 ft. below top of well Date 6-2-89
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ____
Bailer test 12 gal./min. with 0' ft. drawdown after 2 hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
SANDY LOAM - ORGANICS	0'	3'
BROWN CLAY	3'	13'
BROWN HARDPAN	13'	28'
GRAVELLY SAND	28'	33'
BROWN HARDPAN	33'	

Work started 6-1, 19 89 completed 6-2, 19 89

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Arcadia Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 120 SE. Walker Pk Rd.
(Signed) Jack Watkins (WELL DRILLER) License No. 1465
Contractor's Registration No. ARCADD*147KL Date 6-2-89, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 3

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No.
Permit No.

(1) OWNER: Name MARK PENTONY Address E 10552 MASON LAKE DR. GRAPEVIEW

(2) LOCATION OF WELL: County MASON — NW ¼ SE ¼ Sec. 17 T. 20 N., R. 4 W.W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 70 ft. Depth of completed well 70 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to -70 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 15 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Myers
Type: Sub H.P. 1

8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 34 ft. below top of well Date 9-26-85
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 40 gal./min. with 10 ft. drawdown after 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Dirt. Sand Gravel Brown	0	5
Hardpan Grey	5	35
Sand Grey	35	38
Hardpan "	38	54
Compact sand & Gravel "	54	62
Sand & Gravel water	62	68
Gravel water	68	70

U.S. 85 OCT 16 A10:15

Work started 9-20, 1985 Completed 9-26, 1985

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME SKOOKUM Well Drilling (Person, firm, or corporation) (Type or print)

Address SE 2810 Arcadia Rd. Shelton

[Signed] George H. Witcraft (Well Driller)

License No. 0665 Date 9-27, 1985

(USE ADDITIONAL SHEETS IF NECESSARY)

E 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No 37666

Water Right Permit No. _____

(1) OWNER: Name JACK Davidson Address _____

(2) LOCATION OF WELL: County Mason SE ¼ SW ¼ Sec 16 T 20 N., R 4 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: [X] Domestic [ ] Irrigation [ ] DeWater Industrial [ ] Test Well [ ] Municipal [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned [ ] New well [X] Deepened [ ] Reconditioned [ ]
Method: Dug [ ] Cable [ ] Rotary [X] Bored [ ] Driven [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well _____ inches.
Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from +1 ft. to 72 ft.
Welded [ ] _____" Diam. from _____ ft. to _____ ft.
Liner installed [ ]
Threaded [ ] _____" Diam. from _____ ft. to _____ ft.

Perforations: Yes [ ] No [X]
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes [ ] No [X]
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes [X] No [ ] To what depth? 26 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level _____ ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.))

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest 16 gal./min. with stem set at 77 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
BROWN ROCKY CLAY	0'	3'
BOULDERS W/CLAY	3'	10'
BROWN HARDPAN	10'	35'
BROWN SANDY CLAY	35'	47'
SANDY GRAVEL	47'	60'
BROWN HARDPAN	60'	70'
SANDY GRAVEL	70'	80'

Work started _____, 19. Completed 11-27, 1982

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Arcadia Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address _____

(Signed) Jack Nathan (WELL DRILLER) License No. 1465

Contractor's Registration No. _____ Date _____, 19____

(USE ADDITIONAL SHEETS IF NECESSARY)

APPPENDIX 2-2

WATER RIGHTS

RECEIVED APR 5 1991

Example Printout* of a Primary Report from the Water Rights Information System (WRIS)

RECORDED WATER RIGHTS OF THE DEPARTMENT OF ECOLOGY REGION 2 PAGE 00 REPORT DATE 02/28/89

CONTROL #	SEC #	OLD APPL	OLD PERM	OLD CERT	DATE OF PRIORITY	S C A T C M	CNTY	PERMIT DATE	NAME	SOURCE OF APPROPRIATION	TRIBUTARY OF

#OF PTS	R P	LOC. OF POD/POW	(CHG C#)	PURPOSE OF USE	USE TYPE	INST QI	C R S M U U	ANNUAL QA	C R S M U U	IRR C S PRO- ACC M U VISOS	TIME OF USE	R R R I A C

WATER RESOURCE INVENTORY AREA- 10

TOWNSHIP - 18 RANGE - 10 E

S2*06508C	22	06508	06179	04701	09/12/962		PIER	03/25/963	FIRGROVE MUTUAL		ROCK CR			CHEHALIS R
1 NW4NW4					DOMESTIC MULTIPLE	C	0.5	C 3	50.0	3			S$	
					STOCKWATER	C	0.5	C 3	50.0	3			S$	
					IRRIGATION	C	0.5	C 3	50.0	3		20	S$	04011001

CONTROL # — Number used to identify water rights in WRIS. The letters S, G, and R, at the beginning of the number, denote surface, ground, and reservoir water rights. The second character of the control number denotes the Region in which the water right was issued. Our example is from Region 2, SWRO. The letter at the end of the number denotes the stage of perfection (A=Application, P=Permit, and C=Certificate are used most frequently) of the water right.

SEC # — Denotes section, within a township and range, that the point, or points, of diversion or withdrawal are located. In our example, the township is 18N, the range is 10E, and the section number is 22.

OLD APPL, OLD PERM, OLD CERT — These represent Application, Permit and Certificate numbers that were assigned by Ecology prior to the development of the current system (which tracks information by CONTROL #).

DATE OF PRIORITY — Date of filing of a water right application with the Department of Ecology. The year is designated by three digits. In our example, 962 represents 1962.

S C A / T C M — Internal tracking parameters, designating water right status, change of certificate, and adjudication class number. Most frequently used status codes are (Q) relinquishment, (C) cancelled permit, and (R) rejected application.

CNTY — A four letter code which indicates the county in which the point of diversion or withdrawal is located (PIER = PIERCE Co.).

PERMIT DATE — Date permit was issued. The year is designated by 3 digits. In our example, 963 represents 1963.

NAME — The name of the applicant, permittee, certificant depending on the stage and type of record, is entered in this field last name first followed by initials or first name. In our example, the NAME is FIRGROVE MUTUAL.

SOURCE OF APPROPRIATION — The name, if known, of the surface water source, or type of source if unnamed, for surface water records. For ground water records, the source is indicated as being a well, or sump. In our example, the SOURCE OF APPROPRIATION is ROCK CREEK.

TRIBUTARY — For surface water records, this field refers to the name, if known, of the stream or other surface water body to which the source flows, if any. In our example, the source is a TRIBUTARY OF the CHEHALIS RIVER.

Example Printout of a Primary Report from the Water Rights Information System (WRIS)


```
                    RECORDED WATER RIGHTS OF THE DEPARTMENT OF ECOLOGY  REGION  2        PAGE   00      REPORT DATE   02/28/89

CONTROL #   SEC     OLD      OLD      OLD      DATE OF  S C A  CNTY  PERMIT   NAME              SOURCE OF APPROPRIATION  TRIBUTARY OF
            #       APPL     PERM     CERT     PRIORITY T C M        DATE

#OF R [LOC. OF POD/POW]   (CHG C#)  [PURPOSE OF USE]   [USE TYPE]  [INST QI]  [C R S M U U]  [ANNUAL QA]  [C R S M U U]  [IRR ACC]  [C S M U]  [PRO-VISOS]  [TIME OF USE]  [R R R I A C]
PTS P

WATER RESOURCE INVENTORY AREA-  10

TOWNSHIP - 18    RANGE -  10 E

S2*06508C    22    06508    06179    04701    09/12/962        PIER 03/25/963 FIRGROVE MUTUAL    ROCK CR                    CHEHALIS R
 1  [NW4NW4]                         [DOMESTIC MULTIPLE]   [C]   [0.5  C][3]   [50.0][3]                  [S$]
                                     [STOCKWATER]          [C]   [0.5  C][3]   [50.0][3]                  [S$]
                                     [IRRIGATION]          [C]   [0.5  C][3]   [50.0][3]   [20]           [S$]   [04011001]
```

LOC. OF POD/POW — This field is used to describe land subdivisions that completely encompass the location of the point(s) of diversion or withdrawal. In our example, the land subdivision is the NW¼ of the NW¼ of section 22.

PURPOSE OF USE — The authorized or proposed uses of water under each water right are indicated in this field. There can be multiple purposes of use for a given water right. In our example, we site three different uses.

USE TYPE — This field indicates whether the diversion of water for each use has a (C) consumptive, (P) partially consumptive or (N) non-consuptive effect on the source of supply.

INST QI — Instantaneous Quantity: For surface water rights, the authorized instantaneous rate of diversion is stated in cubic feet per second (C) for each purpose of use. For ground water rights, the authorized instantaneous rate of withdrawal is stated in gallons per minute (G) for each purpose of use. These quantities are not necessarily additive. In our example, the QI = 0.5 CFS.

C R S M U U — Internal tracking parameters which indicate if a water quantity is in Common (C), Re-use (R), or Supplemental (S) to other purposes of use.

ANNUAL QA — For both surface water and ground water rights, the authorized total annual diversion is stated in acre-feet per year for each purpose of use. For reservoir storage rights, the authorized annual storage volume is stated in acre-feet per year. In our example, QA = 50.

IRR ACC — Where irrigation is specified as a purpose of use, the maximum irrigated land area authorized is indicated in acres. In our example, the maximum number of irrigated acres is 20.

PRO-VISOS — Certain standard informative statements, restrictions or provisions are often included on state issued permits and certificates. These are tracked by letter codes in this field (R for access port, S for screening, $ for general information, etc.).

TIME OF USE — An entry in this field denotes the period of time during a year when water may be diverted or withdrawn for a specific purpose of use. A blank field indicates continuous use. In our example, 04011001 denotes April 1st to October 1st (IS denotes during irrigation season).

R R R I A C — Internal tracking parameters used for split records which indicate the number of repeat QI's (RI), repeat QA's (RA), and repeat irrigated acres (RC), associated with this water right. These fields are blank in our example.

ONTROL # / OF R / TS P	SEC #	OLD APPL	OLD PERM	OLD CERT	DATE OF PRIORITY	S C A T C M	CNTY	PERMIT DATE	NAME	SOURCE OF APPROPRIATION	TRIBUTARY OF
LOC. OF POD/POW (CHG C#)	PURPOSE OF USE	USE TYPE	INST QI	C R S M U U	ANNUAL QA	C R S M U U	IRR AC	C S PRO- M U VISOS	TIME OF USE	R R R I A C	
ATER RESOURCE INVENTORY AREA- 14											
OWNSHIP - 20 RANGE - 04 W											
2 E2 SW4 SW4				DOMESTIC MULTIPLE		C	300.0	G 2	38.0	RM	
				REC & BEAUTIFICATION		C	300.0	G 2	30.0	RM	
2-22511C 01				05/29/974		MASO	10/31/975	STARR LAURENCE D	WELL		
1 L4 BL3 CORR PL ISL LK SHORE				DOMESTIC SINGLE		C	25.0	G 2	1.0	RN	
				IRRIGATION		C	25.0	G 2	2.0	1.0 RN	05011001
2-24937C 01				05/02/978		MASO	12/20/978	HUMPHREY FRED	WELL		
1 SE4SW4				DOMESTIC MULTIPLE		C	82.0	G	31.5	RK	
2*20829A 01 20829				03/22/968	R	MASO	/ /	SNIVELY EDNA RAE	UNN SPR		
1 NE4SW4SW4,& NW4SE4SW4				REC & BEAUTIFICATION		F	C		39.0		
2*02717C 01 02717			01367	00375 09/23/929		MASO	11/13/929	MULLER L	ISLAND LK		SWAMP CR
1 GL1				DOMESTIC SINGLE		C	.04	C 2			
				IRRIGATION		C	.04	C 2		6.0	IG
2*02721A 01 02721				09/26/929	R	MASO	/ /	SHELTON CITY OF	JOHNS CR		HAMMERSLEY CR
1 SE4NE4				DOMESTIC MUNICIPAL		C	10.0	C			
2*12192C 01 12192			08921	07140 03/25/953	E	MASO	05/25/953	FERRIS F E	ISLAND LK		SWAMP CR
1 GL1				DOMESTIC SINGLE		C	.01	C		S	
				IRRIGATION		C	.01	C		1.0 S	IS
2*16620C 01 16620			12344	08714 04/04/961		MASO	06/20/961	BURNETT J A ET UX	JOHNS CR		OAKLAND BAY
1 SW4 NE4				STOCK WATERING		C	.01	C		SDL	
				IRRIGATION		C	.2	C	40.0	20.0 SDL	IG
2*19187C 01 19187			14018	09510 08/06/965		MASO	11/01/965	HATCH E O	ISLAND LK		SWAMP CR
1 L-9 & 10 BL-3 IS LK SHRLAND				IRRIGATION		C	.01	C	1.0	.5 S	04151001
2-22510C 01				05/29/974		MASO	01/31/975	STARR LAURENCE D	ISLAND LK		SWAMP CR
1 L4 BL3 CORR PL ISL LK SHORE				IRRIGATION		C	.06	C	2.0	1.0 SZ	05011001
2-20099C 02				04/11/972		MASO	11/16/973	MCDOUGALL DON R	WELL		
1 SE4 SE4				DOMESTIC MULTIPLE		C	45.0	G 2	16.8	RH	
				FIRE PROTECTION		C	45.0	G 2		RH	
2-27813A 02				07/24/990		MASO	/ /	H ROY FARRINGTON	WELL		
1 W2NW4				DOMESTIC MULTIPLE		C	50.0	G			
2*06260C 08 06260			05947	04365 04/18/962		MASO	09/17/962	GROSSMAN R E	WELL		
1 SW4NE4				COMMERCIAL/INDUSTRIAL		C	150.0	G	96.0	A	
2-27170A 08				07/31/987		MASO	/ /	LATVIAN HOMEOWN	WELL		
1 SE4SE4SE4				DOMESTIC MULTIPLE		C	150.0	G			
2-27346C 08				05/27/988		MASO	02/13/989	COLEMAN D & R	WELL		
1 SE4NE4				DOMESTIC MULTIPLE		C	50.0	G	4.5	R	
2*01155A 08 01155				07/24/924	R	MASO	/ /	JOHNSON EPHRAIM	UNN SPR		GOLDSBOROUGH CR
1 SE4SW4				DOMESTIC SINGLE		C	1.0	C 2			
				IRRIGATION		C	1.0	C 2			IS
2*07347C 08 07347			04755	07019 07/29/946		MASO	11/26/946	HALL R F	UNN SPR		GOLDSBO CR N FK
1 NW4 SW4				DOMESTIC SINGLE		C	.01	C		S	
				IRRIGATION		C	.14	C	30.0	15.0 S	IS
2*07397P 08 07397			05354	08/22/946	C	MASO	11/18/947	GROSSMANN R E	UNN STR		GOLDSBOROUGH CR
1 SW4NE4				DOMESTIC SINGLE		C	.01	C		SM	
				FISH PROPAGATION		N	.05	C		SM	
				IRRIGATION		C	.09	C		10.0 SM	04151001
2*11478P 08 11478			08553	06/24/952	C	MASO	01/07/953	SWEARINGEN ROBERT	UNN SPRS		GOLDSBOROUGH CR
1 W2W2NW4SW4				DOMESTIC SINGLE		C	.01	C 2		MS	
				STOCK WATERING		C	.01	C 2		MS	
				IRRIGATION		C	.02	C		2.0 MS	04151001
2*16964C 08 16964			12554	08415 10/13/961		MASO	01/10/962	COLE R M / C P	UNN STR		GOLDSBO CR N FK
1 W2NE4SW4				DOMESTIC SINGLE		C	.01	C		SD	
2*06107C 09 06107			05764	04789 11/16/961		MASO	02/06/962	WA ST D O I	WELL		
1 SW4NW4				DOMESTIC GENERAL		C	140.0	G	224.0	AE	
G2*06143P 09 06143			05864	01/02/962	C	MASO	06/28/962	SIMPSON CO	WELL		

CONTROL # / #OF PTS	SEC # / P	OLD APPL / LOC. OF POD/POW	OLD PERM / (CHG C#)	OLD CERT / PURPOSE OF USE	DATE OF PRIORITY	S C A T C M	CNTY / USE TYPE	PERMIT DATE / INST QI	NAME	ANNUAL QA	C R S M U U	SOURCE OF APPROPRIATION	IRR AC	C S M U	PRO-VISOS	TRIBUTARY OF / TIME OF USE	R R I A C
WATER RESOURCE INVENTORY AREA- 14																	
TOWNSHIP - 20 RANGE - 04 W																	
1		W2 W2 NW4		COMMERCIAL/INDUSTRIAL			C	250.0 G		400.0					A		
G2*07086C	09	07086	06937	05376	04/02/964		MASO	03/12/965	WA ST D O I			WELLS					
2		SW4NW4 / NW4SW4		DOMESTIC MULTIPLE			C	563.0 G		224.0		G			AHTM		
				DOMESTIC MULTIPLE			C	563.0 G		44.0					AHTM		
G2*08789C	12	08789	08123	06234	06/13/967		MASO	09/22/967	RUSSELL W J			WELL					
1		L31 PARKWOOD		DOMESTIC MULTIPLE			C	250.0 G		27.0					NAHT		
G2*08952C	12	08952	08527	06529	09/12/967		MASO	06/10/968	RUSSELL D L			WELL					
1		L4 WOODLAND MANOR		DOMESTIC MULTIPLE			C	60.0 G		38.0					RH		
G2*12214A	12	12214			10/13/971	R	MASO	/ /	HIMLIE REALTY INC			WELL					
1		NE4		DOMESTIC MULTIPLE			C	100.0 G									
G2-20336C	12				06/30/972		MASO	12/28/973	MIKLETHUN DARRELL			WELL					
1		NW4NE4		DOMESTIC MULTIPLE			C	55.0 G		10.75					THR		
G2-20819C	12				03/07/973		MASO	11/30/973	HIMLIE REALTY INC			WELL					
1		NE4NW4		DOMESTIC MULTIPLE			C	100.0 G		15.7					HNT		
G2-23319C	12				10/31/974		MASO	11/19/976	HIMLIE REALTY INC			WELL					
1		NE4NW4		DOMESTIC MULTIPLE			C	50.0 G		15.7					RT		
G2-27635A	12				10/30/989		MASO	/ /	KNUDSEN TIMBER CO			WELL					
1		NE4NW4		DOMESTIC MULTIPLE			C	25.0 G									
R2*23595A	17				01/03/972	R	MASO	/ /	UDDENBERG A KEITH			UNN STR					
1		SE4		REC & BEAUTIFICATION			F	C		76.0							
S2*11029C	17	11029	08657	06025	02/06/952		MASO	02/09/953	LUHM J A			GOLDSBO CR N FK				OAKLAND BAY	
99		SW4 NW4		IRRIGATION			C	.18 C					18.0		SDL	IS	
S2*11842C	17	11842	08686	06474	11/17/952		MASO	02/20/953	BEZLEY H A			UNN STR				GOLDSBO CR N FK	
1		NW4NW4		IRRIGATION			C	.2 C					20.0		SDL	IS	
S2-23542P	17				06/26/974	C	MASO	/ /	KLAUS W HOEPFNER			UNN SPR				GOLDSBOROUGH CR	
1		SE4 NW4		IRRIGATION			C	.01 C		1.0			.5			05011001	
S2*02108C	18	02108	01088	00255	07/08/927		MASO	04/20/928	PENINSULAR RY			UNN STR				GOLDSBO CR N FK	
1		NW4NE4		RAILWAY			C	.25 C									
S2*03357C	18	03357	01855	01463	04/17/931		MASO	03/07/932	BUECHEL A			UNN STR					
1		SE4 NE4		DOMESTIC SINGLE			C	.1 C 2									
				IRRIGATION			C	.1 C 2					5.0			IS	
S2*03388C	18	03388	01851	00979	05/12/931		MASO	03/04/932	FOLMSBEE C E			UNN STR					
1		NW4NE4		DOMESTIC SINGLE			C	.07 C 3									
				POWER			N	.07 C 3									
				IRRIGATION			C	.07 C 3					6.0			IS	
S2*03463C	18	03463	01852	00778	07/30/931		MASO	03/04/932	FOLMSBEE C E			UNN SPRS					
2		NW4NE4		DOMESTIC SINGLE			C	.1 C 2									
				IRRIGATION			C	.1 C 2					5.0			IS	
S2*08860P	18	08860	06403		06/23/949	C	MASO	04/14/950	GOLDY D R & D A			BILLIBEAUX CR				GOLDSBOROUGH CR	
1		E2W2NE4SW4		DOMESTIC SINGLE			C	.01 C							MSLD		
				IRRIGATION			C	.06 C					7.0		MSLD	04151001	
S2*08927C	18	08927	06429	04899	07/22/949		MASO	05/03/950	WILLIAMS W			BILLIBEAUX CR *				GOLDSBO CR N FK	
1		NE4 SW4		DOMESTIC SINGLE			C	.07 C 2							LSD		
				IRRIGATION			C	.07 C 2					7.0		LSD	IS	
S2*13512CAL	19	13512A	10150A	06775A	07/01/955		MASO	12/30/955	BUNNELL J O			GOLDSBOROUGH CR				OAKLAND BAY	
1		NE4SE4		IRRIGATION			C	.4 C		80.0			40.0		SMD	04151001 2 2 2	
S2*14270P	19	14270	10994		03/27/957	C	MASO	05/26/958	BUNNELL J O			GOLDSBOROUGH CR				OAKLAND BAY	
1		NE4SE4		FISH PROPAGATION			N	1.0 C							MSLD		
S2*19884C	19	19884	14641	10490	09/19/966		MASO	03/21/967	KIDD H W ET UX			UNN STR				GOLDSBO CR S FK	
99		GL2		DOMESTIC SINGLE			C	.01 C		1.0					S		
				REC & BEAUTIFICATION			N	.03 C							S		
				STOCK WATERING			C	.01 C		.5					S		
				IRRIGATION			C	.1 C		20.0			10.0		S	IS	

APPENDIX 2-3

LABORATORY SOIL TEST DATA

RECEIVED MAR 1 5 1991

RZA

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Environmental Consultants

1400 140th Avenue N.E.
Bellevue, Washington 98005-4594
(206) 746-8020/FAX (206) 746-6364

12 March 1991 W-7387

Parametrix, Inc.
13020 Norhtup Way
Bellevue, Washington 98005

Attention: Mr. Joe Hicker

Subject: Geotechnical Laboratory Testing Results
Mason County Landfill: PMX 11-1682-07
Shelton, Washington

Gentlemen:

This letter summarizes the permeability testing performed, as requested by you, on samples from the above referenced site.

A series of laboratory tests were performed on three 2.5 inch diameter tubes collected during the drilling of monitoring well MW-10. The samples were tested for moisture content (ASTM:D-2216), particle size analysis (ASTM:D-422), and for hydraulic conductivity using a flexible wall permeameter (based on ASTM:D-1804 draft #6). Percent saturation was also determined using an assumed specific gravity of 2.70. Specific gravity was not measured due to its insignificant effect on the calculation of percent saturation. The results of our testing are shown on the table below:

Sample	Natural Moisture Content	In-place Dry Density (PCF)	Percent Saturation	Hydraulic Conductivity (cm/sec)
MW-10	26%	101	100	8.6×10^{-7}

A plot of the grain size analysis is attached. We hope that these test results and this letter serve your current needs. If you require further information, please do not hesitate to contact us.

Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

Thomas P. Marshall
Senior Technician

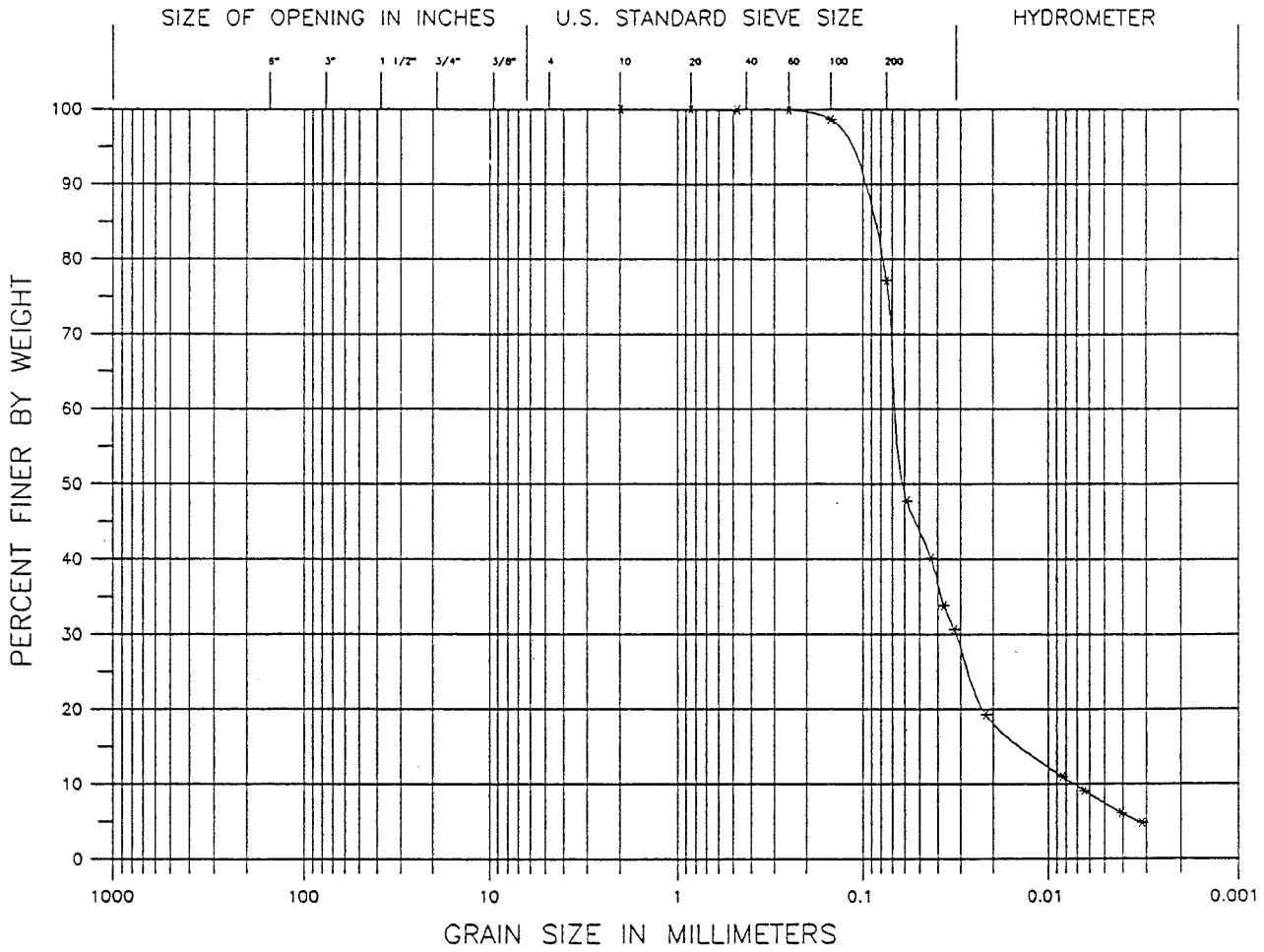
James S. Dransfield, P.E.
Associate

Enclosures: Grain Size Distribution Chart

cc: Lorna Mauren
Parametrix

TPM:grh1

GRAIN SIZE DISTRIBUTION



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	GRAVEL		SAND			FINE GRAINED	

PMX 11-1682-07 MW-10 "A" 27% Moisture 77% Passing 200

Project: Mason County Landfill
Work Order: W - 7387
Date: 1/29/91

RITTENHOUSE - ZEMAN & ASSOCIATES INC.
Geotechnical & Environmental Consultants
1400 140th Ave NE
Bellevue, Washington 98005

RZA

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Environmental Consultants

1400 140th Avenue N.E.
Bellevue, Washington 98005-4594
(206) 746-8020/FAX (206) 746-6364

18 December 1989 W-6485

Parametrix, Inc.
PO Box 460
Sumner, Washington 98390

DEC 19

Attention: Mr. Pat Allen

Subject: Laboratory Test Results
Mason County Landfill
Mason County, Washington

Gentlemen:

We are writing this letter to present the final results of our testing on a sample of "granulithic" type soil submitted to us, for consideration in the final cover system drainage layer on the above referenced project. This information has mostly been transmitted to you via facsimile. The friction testing was not completed as a result of the preliminary results of permeability testing. Based on our testing, we would suggest interface friction angles between soil\PVC and soil\textured HDPE to be about 18 and 35 degrees, respectively. The results of grain size analyses, Proctor testing and permeability are attached.

We trust this letter serves your current needs. If you have any questions or we can provide future testing on alternative borrow sources, please call.

Respectfully submitted,

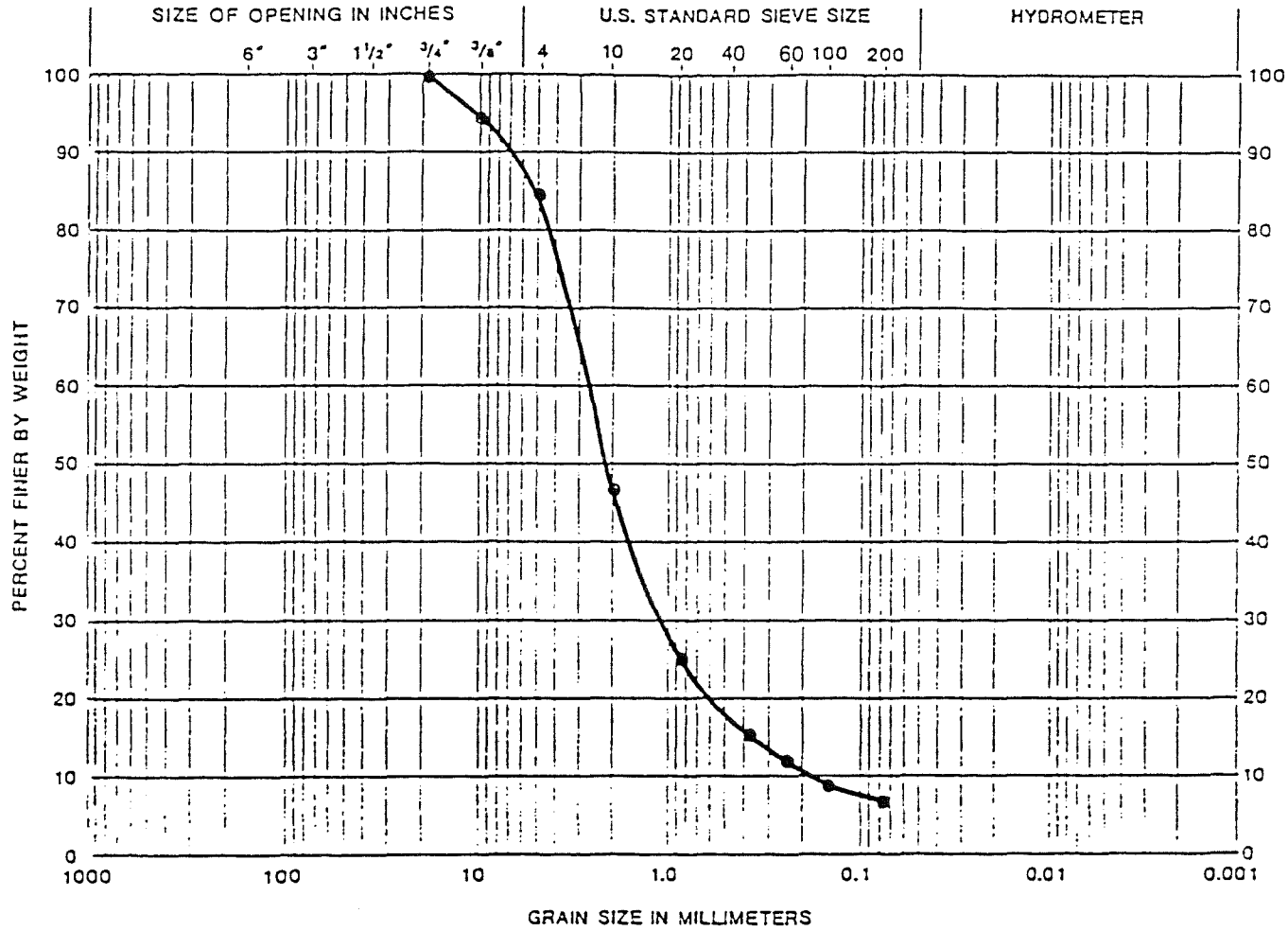
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

James S. Dransfield, P.E.
Associate

JAMES S. DRANSFIELD
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

Enclosures: Grain Size Distribution (1 sheet)
Compaction Curve (1 sheet)

GRAIN SIZE DISTRIBUTION



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	GRAVEL		SAND			FINE GRAINED	

	Boring	Sample	Depth	% Moisture	% Passing 200
———	FINE TO COARSE SAND WITH SOME GRAVEL & SILT			6.4	7.7
- - - - -					
— — — —					

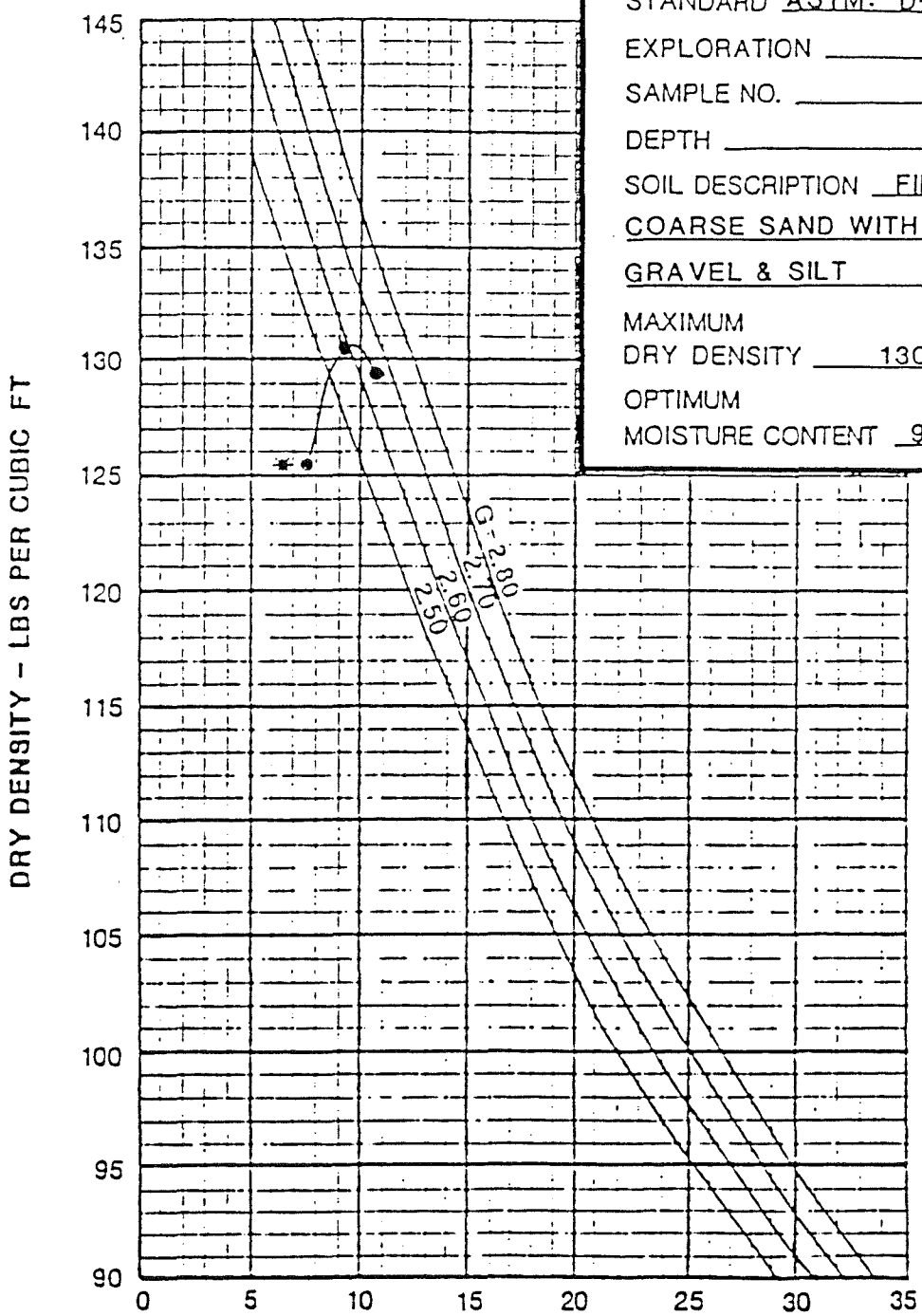
MASON COUNTY LANDFILL

DEC 1989 W-6485

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical Consultants
1400 140th N.E.
Bellevue, Washington 98007

COMPACTION CURVE

COMPACTION TEST
STANDARD ASTM: D-698
EXPLORATION
SAMPLE NO.
DEPTH
SOIL DESCRIPTION FINE TO COARSE SAND WITH SOME GRAVEL & SILT
MAXIMUM DRY DENSITY 130.5 PCF
OPTIMUM MOISTURE CONTENT 9.5%



MOISTURE CONTENT - %

✱ PERMEABILITY POINT AT 17.79 MOISTURE (NATURAL MOISTURE CONTENT) 6.4×10^{-5} CM/SEC

MASON COUNTY LANDFILL

W.O. W-6485
By GW
Date DEC 1989

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical Consultants
1400 140th Avenue N.E.
Bellevue, Washington 98005

RZA

APPENDIX 2-4a

TABULATED CHEMICAL DATA

(Pre-November, 1989)

MASON COUNTY LANDFILL

MONITORING WELL: MW-1B

SAMPLE DATE:			11/13/86	1/13/88	4/18/88	8/1/88	10/21/88
PARAMETERS:	UNITS	MCL					
pH	units		-	5.7	5.3	6.1	5.8
Total Coliform	mpn/100ml		>1600	<2	>1600	-	30
Specific Conductivity	umhos/cm	**700	150	120	236	180	167
COD	mg/l		<10	<10	<10	<10	<10
TOC	mg/l		2.8	10	5.7	1.8	3
Total Organic Halogen (as Cl)	mg/l		-	0.02	<0.02	0.03	<0.02
Chloride	mg/l	**250	6	7	13	5	6
Fluoride	mg/l	*4	-	<0.2	<0.2	-	<0.2
Sulfate	mg/l	**250	4	11	19	4	4
Nitrate (as N)	mg/l	*10.0	<0.2	<0.2	0.8	0.8	0.6
Nitrite (as N)	mg/l		<0.005	-	0.13	0.13	-
Ammonia (as N)	mg/l		0.06	-	<0.05	<0.05	-
Arsenic	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	-	0.15	<0.02	<0.02	<0.02
Cadmium	mg/l	*0.01	-	<0.002	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Iron	mg/l	**0.3	1	0.03	0.07	0.02	0.06
Lead	mg/l	*0.05	-	<0.01	-	-	<0.01
Manganese	mg/l	**0.05	1.3	1.3	2.1	1.4	1.2
Mercury	mg/l	*0.002	-	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	*0.01	-	<0.005	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	-	<0.002	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	0.019	0.3	0.004	0.02	0.039

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: MW-2B

SAMPLE DATE:			11/13/86
PARAMETERS:	UNITS	MCL	
pH	units		-
Total Coliform	mpn/100ml		1600
Specific Conductivity	umhos/cm	**700	100
COD	mg/l		<10
TOC	mg/l		3.6
Total Organic Halogen (as Cl)	mg/l		-
Chloride	mg/l	**250	3
Fluoride	mg/l	*4	-
Sulfate	mg/l	**250	2
Nitrate (as N)	mg/l	*10.0	0.8
Nitrite (as N)	mg/l		<0.005
Ammonia (as N)	mg/l		<0.05
Arsenic	mg/l	*0.05	-
Barium	mg/l	*1.0	-
Cadmium	mg/l	*0.01	-
Chromium	mg/l	*0.05	-
Iron	mg/l	**0.3	<0.01
Lead	mg/l	*0.05	-
Manganese	mg/l	**0.05	0.024
Mercury	mg/l	*0.002	-
Selenium	mg/l	*0.01	-
Silver	mg/l	*0.05	-
Zinc	mg/l	**5.0	0.007

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: MW-3B

SAMPLE DATE:			11/13/86	1/13/88	4/18/88	8/1/88	10/21/88
PARAMETERS:	UNITS	MCL					
pH	units		-	6.3	5.9	6.4	6.2
Total Coliform	mpn/100ml		>1600	30	<2	-	2
Specific Conductivity	umhos/cm	**700	400	170	386	430	520
COD	mg/l		15	<10	<10	<10	<10
TOC	mg/l		8.9	9.8	3.8	5	20
Total Organic Halogen (as Cl)	mg/l		-	<0.02	0.04	0.04	0.04
Chloride	mg/l	**250	13	6	18	14	13
Fluoride	mg/l	*4	-	<0.2	<0.2	<0.2	<0.2
Sulfate	mg/l	**250	5	6	7	11	8
Nitrate (as N)	mg/l	*10.0	<0.2	4.2	0.3	0.5	0.5
Nitrite (as N)	mg/l		<0.005	-	<0.005	0.006	0.5
Ammonia (as N)	mg/l		<0.05	-	<0.05	0.038	-
Arsenic	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	-	0.16	<0.02	<0.02	<0.02
Cadmium	mg/l	*0.01	-	<0.002	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Iron	mg/l	**0.3	1.1	0.01	0.02	0.2	0.34
Lead	mg/l	*0.05	-	<0.01	-	-	<0.01
Manganese	mg/l	**0.05	1.8	2.5	3	3.7	2.7
Mercury	mg/l	*0.002	-	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	*0.01	-	<0.005	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	-	<0.002	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	0.02	0.087	0.008	0.024	0.04

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: MW-4

SAMPLE DATE:			11/13/86	1/13/88	4/18/88	8/1/88	10/21/88
PARAMETERS:	UNITS	MCL					
pH	units		-	6.4	6	6.4	6.1
Total Coliform	mpn/100ml		900	17	<2	-	4
Specific Conductivity	umhos/cm	**700	87	61	86	120	72
COD	mg/l		28	<10	<10	<10	<10
TOC	mg/l		3	16	<1.0	-	6.1
Total Organic Halogen (as Cl)	mg/l		-	0.04	<0.02	0.02	<0.02
Chloride	mg/l	**250	2	2	2	2	3
Fluoride	mg/l	*4	-	<0.2	<0.2	<0.2	<0.2
Sulfate	mg/l	**250	3	1	1	1	1
Nitrate (as N)	mg/l	*10.0	6.2	<0.2	0.4	0.2	<0.2
Nitrite (as N)	mg/l		<0.005	-	<0.005	0.005	-
Ammonia (as N)	mg/l		<0.05	-	<0.05	<0.015	-
Arsenic	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	-	0.1	<0.02	<0.02	<0.02
Cadmium	mg/l	*0.01	-	<0.002	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	-	<0.005	<0.005	<0.005	<0.005
Iron	mg/l	**0.3	1.15	0.33	<0.01	<0.01	<0.01
Lead	mg/l	*0.05	-	<0.01	-	-	<0.01
Manganese	mg/l	**0.05	0.013	0.077	<0.002	0.014	0.005
Mercury	mg/l	*0.002	-	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	*0.01	-	<0.005	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	-	<0.002	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	0.057	0.034	0.006	0.013	0.011

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: MW-5B

SAMPLE DATE:			1/13/88	4/18/88	8/1/88	10/21/88
PARAMETERS:	UNITS	MCL				
pH	units		6.4	5.7	6.2	6.4
Total Coliform	mpn/100ml		240	<2	-	<2
Specific Conductivity	umhos/cm	**700	120	163	200	610
COD	mg/l		<10	<10	<10	<10
TOC	mg/l		6	<1.0	4.3	18
Total Organic Halogen (as Cl)	mg/l		<0.02	<0.02	<0.02	0.04
Chloride	mg/l	**250	3	4	3	4
Fluoride	mg/l	*4	<0.2	<0.2	0.3	<0.2
Sulfate	mg/l	**250	1	2	1	2
Nitrate (as N)	mg/l	*10.0	<0.2	<0.2	0.3	0.3
Nitrite (as N)	mg/l		-	<0.005	<0.005	-
Ammonia (as N)	mg/l		-	<0.05	<0.015	-
Arsenic	mg/l	*0.05	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	0.12	<0.02	<0.02	<0.02
Cadmium	mg/l	*0.01	<0.002	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	<0.005	<0.005	<0.005	<0.005
Iron	mg/l	**0.3	0.01	<0.01	0.02	<0.01
Lead	mg/l	*0.05	<0.01	-	-	<0.01
Manganese	mg/l	**0.05	0.027	0.024	0.008	0.008
Mercury	mg/l	*0.002	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	*0.01	<0.005	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	<0.002	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	0.08	0.003	0.041	0.021

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: Waldberger

SAMPLE DATE:			7/29/86	1/13/88	4/18/88	8/4/88	10/21/88
PARAMETERS:	UNITS	MCL					
pH	units		6.2	6.3	6.1	6.3	6.2
Total Coliform	mpn/100ml		-	<2	2	-	<2
Specific Conductivity	umhos/cm	**700	286	210	198	290	400
COD	mg/l		15	<10	<10	<10	<10
TOC	mg/l		-	8.7	2.1	3.4	3.4
Total Organic Halogen (as Cl)	mg/l		-	0.02	<0.02	0.05	0.02
Chloride	mg/l	**250	15	7	5	9	12
Fluoride	mg/l	*4	-	<0.2	0.3	<0.2	<0.2
Sulfate	mg/l	**250	1.8	2	2	2	3
Nitrate (as N)	mg/l	*10.0	<0.01	<0.2	0.4	0.3	0.2
Nitrite (as N)	mg/l		-	-	<0.005	<0.005	-
Ammonia (as N)	mg/l		0.01	-	<0.05	<0.015	-
Arsenic	mg/l	*0.05	0.002	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	-	<0.02	<0.02	<0.02	<0.02
Cadmium	mg/l	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	<0.001	<0.005	<0.005	<0.005	<0.005
Iron	mg/l	**0.3	2.52	0.02	0.23	0.31	1.4
Lead	mg/l	*0.05	<0.005	<0.01	-	-	<0.01
Manganese	mg/l	**0.05	0.019	0.021	0.009	0.004	0.025
Mercury	mg/l	*0.002	-	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	*0.01	0.003	<0.005	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	-	<0.002	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	0.009	0.13	0.15	0.088	0.18

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-1S

SAMPLE DATE:			8/22/75	11/18/75	1/26/77	8/17/77	12/21/77	2/9/79	3/11/80	2/3/82	1/10/84
PARAMETERS:	UNITS	MCL									
pH	units		-	6.5	6.6	6.2	6.2	6.2	6.2	6.5	6.3
Total Coliform	mpn/100ml		-	-	-	-	-	-	-	-	-
Specific Conductivity	umhos/cm	**700	70	340	170	190	212	167	100	102	86
COD	mg/l		4	120	20	12	16	15	-	4	4
TOC	mg/l		-	-	-	-	-	-	-	-	-
Total Organic Halogen (as Cl)	mg/l		-	-	-	-	-	-	-	-	-
Chloride	mg/l	**250	2	2.6	4	6	9	9	5	8.4	5
Fluoride	mg/l	*4	-	-	-	-	-	-	-	-	-
Sulfate	mg/l	**250	-	-	-	-	-	-	-	13	-
Nitrate (as N)	mg/l	*10.0	0.04	0.05	0.01	0.04	0.06	1.7	0.76	0.66	0.56
Nitrite (as N)	mg/l		<0.1	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	0.02	-
Ammonia (as N)	mg/l		-	-	0.02	0.04	<0.02	0.14	<0.01	<0.01	0.02
Turbidity	NTU	**1	20	15	115	83	40	5	22	4	4
Total Hardness	mg/l		14	59	27	33	80	84	52	42	38
Arsenic	mg/l	*0.05	-	-	-	-	-	-	-	-	-
Barium	mg/l	*1.0	-	-	-	-	-	-	-	-	-
Cadmium	mg/l	*0.01	-	-	-	-	-	<0.01	<0.01	<0.001	<0.01
Chromium	mg/l	*0.05	-	-	-	-	-	<0.02	<0.01	<0.005	<0.01
Copper	mg/l	**1.0	-	-	-	-	-	0.15	0.02	<0.001	<0.01
Iron	mg/l	**0.3	0.1	12	30	26	10.2	0.74	4.4	5	6.7
Lead	mg/l	*0.05	-	-	-	-	-	<0.05	<0.1	0.002	<0.05
Manganese	mg/l	**0.05	-	-	-	-	-	0.1	-	0.03	0.02
Mercury	mg/l	*0.002	-	-	-	-	-	-	-	-	-
Nickel	mg/l		-	-	-	-	-		<0.05	<0.005	<0.05
Selenium	mg/l	*0.01	-	-	-	-	-	-	0	-	-
Silver	mg/l	*0.05	-	-	-	-	-	-	-	-	-
Zinc	mg/l	**5.0	-	-	-	0	-	0.88	0.1	0.21	0.26

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-1S

SAMPLE DATE:			6/18/85	12/4/85	11/13/86
PARAMETERS:	UNITS	MCL			
pH	units		6.2	6	5.7
Total Coliform	mpn/100ml		-	-	<2.
Specific Conductivity	umhos/cm	**700	84	66	110
COD	mg/l		8	0.3	<10
TOC	mg/l		-	-	2.4
Total Organic Halogen (as Cl)	mg/l		-	-	-
Chloride	mg/l	**250	2.8	2.5	3
Fluoride	mg/l	*4	-	-	-
Sulfate	mg/l	**250	2.2	3	1
Nitrate (as N)	mg/l	*10.0	0.83	1.9	1.2
Nitrite (as N)	mg/l		0.01	0.005	<0.005
Ammonia (as N)	mg/l		0.02	0.5	<0.05
Turbidity	NTU	**1	-	-	-
Total Hardness	mg/l		-	43	-
Arsenic	mg/l	*0.05	<0.001	<0.001	-
Barium	mg/l	*1.0	-	-	-
Cadmium	mg/l	*0.01	0.002	<0.01	-
Chromium	mg/l	*0.05	<0.001	<0.01	-
Copper	mg/l	**1.0	<0.001	-	-
Iron	mg/l	**0.3	2.12	5.15	0.29
Lead	mg/l	*0.05	<0.001	-	-
Manganese	mg/l	**0.05	-	0.06	0.01
Mercury	mg/l	*0.002	-	-	-
Nickel	mg/l		0.03	<0.01	-
Selenium	mg/l	*0.01	0.002	<0.01	-
Silver	mg/l	*0.05	-	-	-
Zinc	mg/l	**5.0	0.067	0.17	0.045

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-1D

SAMPLE DATE:			8/22/75	8/26/75	11/18/75	1/26/77	8/17/77	12/21/77	3/11/80	2/3/82	1/10/84
PARAMETERS:	UNITS	MCL									
pH	units		-	8.1	7.8	8.1	8	8	8.1	8.2	7.8
Total Coliform	mpn/100ml		-	-	-	-	-	-	-	-	-
Specific Conductivity	umhos/cm	**700	88	100	120	100	97	102	92	87	92
COD	mg/l		<4	4	4	12	12	4	-	4	4
TOC	mg/l		-	-	-	-	-	-	-	-	-
Total Organic Halogen (as Cl)	mg/l		-	-	-	-	-	-	-	-	-
Chloride	mg/l	**250	2	2	3	2	<1.0	2	1	2.3	2.8
Fluoride	mg/l	*4	-	-	-	-	-	-	-	-	-
Sulfate	mg/l	**250	-	-	-	-	-	-	-	11	-
Nitrate (as N)	mg/l	*10.0	0.02	0.06	0.02	0.04	0.23	0.03	0.05	0.06	0.04
Nitrite (as N)	mg/l		-	-	-	<0.02	<0.02	<0.02	<0.01	<0.01	-
Ammonia (as N)	mg/l		-	-	-	0.02	<0.02	<0.02	<0.01	<0.01	<0.01
Turbidity	NTU	**1	1	10	13	1	2	5	2	29	4
Total Hardness	mg/l		19	-	19	21	23	44	43	42	46
Arsenic	mg/l	*0.05	-	-	-	-	-	-	-	-	-
Barium	mg/l	*1.0	-	-	-	-	-	-	-	-	-
Cadmium	mg/l	*0.01	-	-	-	-	-	-	<0.01	<0.001	<0.01
Chromium	mg/l	*0.05	-	-	-	-	-	-	<0.01	<0.005	<0.01
Copper	mg/l	**1.0	-	-	-	-	-	-	0.11	0.009	<0.01
Iron	mg/l	**0.3	<0.05	0.1	1	0.12	0.27	0.6	0.13	0.18	0.32
Lead	mg/l	*0.05	-	-	-	-	-	-	<0.1	<0.05	<0.05
Manganese	mg/l	**0.05	-	-	-	-	-	-	-	<0.01	<0.02
Mercury	mg/l	*0.002	-	-	-	-	-	-	-	-	-
Nickel	mg/l		-	-	-	-	-	-	<0.05	<0.05	<0.05
Selenium	mg/l	*0.01	-	-	-	-	-	-	-	-	-
Silver	mg/l	*0.05	-	-	-	-	-	-	-	-	-
Zinc	mg/l	**5.0	-	-	-	-	-	-	0.11	0.15	0.2

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-1D

SAMPLE DATE:			6/18/85
PARAMETERS:	UNITS	MCL	
pH	units		7.6
Total Coliform	mpn/100ml		-
Specific Conductivity	umhos/cm	**700	81
COD	mg/l		8
TOC	mg/l		-
Total Organic Halogen (as Cl)	mg/l		-
Chloride	mg/l	**250	1.7
Fluoride	mg/l	*4	-
Sulfate	mg/l	**250	1.5
Nitrate (as N)	mg/l	*10.0	0.08
Nitrite (as N)	mg/l		0.01
Ammonia (as N)	mg/l		0.67
Turbidity	NTU	**1	-
Total Hardness	mg/l		-
Arsenic	mg/l	*0.05	0.011
Barium	mg/l	*1.0	-
Cadmium	mg/l	*0.01	0.003
Chromium	mg/l	*0.05	0.015
Copper	mg/l	**1.0	<0.001
Iron	mg/l	**0.3	0.15
Lead	mg/l	*0.05	0.014
Manganese	mg/l	**0.05	-
Mercury	mg/l	*0.002	-
Nickel	mg/l		<0.001
Selenium	mg/l	*0.01	0.002
Silver	mg/l	*0.05	-
Zinc	mg/l	**5.0	0.201

NOTE:
" - " = Not Tested
" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)
" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-2

SAMPLE DATE:			1/26/77	8/17/77	12/21/77	6/18/85	12/4/85	11/13/86	1/13/88	4/18/88	8/1/88
PARAMETERS:	UNITS	MCL									
pH	units		8	6.5	6.4	6.5	6.3	-	7.7	6	6.2
Total Coliform	mpn/100ml		-	-	-	-	-	<2	100	170	-
Specific Conductivity	umhos/cm	**700	113	540	145	45	251	360	100	108	590
COD	mg/l		12	12	12	8	4.7	<10	<10	16	<10
TOC	mg/l		-	-	-	-	-	10	1.6	5	6.7
Total Organic Halogen (as Cl)	mg/l		-	-	-	-	-	-	<0.02	<0.02	0.06
Chloride	mg/l	**250	2	1	4	6	8	17	7	6	17
Fluoride	mg/l	*4	-	-	-	-	-	-	1.4	0.6	<0.2
Sulfate	mg/l	**250	-	-	-	3.1	9.6	1	<1.0	<1.0	2
Nitrate (as N)	mg/l	*10.0	0.03	1.23	0.27	0.01	0.4	<0.2	<0.2	<0.2	<0.2
Nitrite (as N)	mg/l		<0.02	<2.02	<0.02	<0.01	0.004	<0.005	-	<0.005	<0.005
Ammonia (as N)	mg/l		0.03	<0.02	<0.02	0.4	<0.02	<0.05	-	<0.05	0.045
Total Hardness	mg/l		24	14	66	-	105	-	-	-	-
Turbidity	NTU	**1	2	<1	2	-	-	-	-	-	-
Arsenic	mg/l	*0.05	-	-	-	<0.001	<0.01	-	<0.005	<0.005	<0.005
Barium	mg/l	*1.0	-	-	-	-	-	-	0.11	<0.02	<0.02
Cadmium	mg/l	*0.01	-	-	-	0.002	<0.01	-	<0.002	<0.002	<0.002
Chromium	mg/l	*0.05	-	-	-	<0.001	0.04	-	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	-	-	-	0.003	-	-	-	-	-
Iron	mg/l	**0.3	0.69	0.05	0.05	2.03	0.655	0.9	0.02	0.01	2.3
Lead	mg/l	*0.05	-	-	-	<0.001	0.2	-	<0.01	-	-
Manganese	mg/l	**0.05	-	-	-	-	1.01	0.78	0.053	0.11	2.3
Mercury	mg/l	*0.002	-	-	-	-	-	-	<0.001	<0.001	<0.001
Nickel	mg/l		-	-	-	0.004	<0.1	-	-	-	-
Selenium	mg/l	*0.01	-	-	-	0.001	<0.01	-	<0.005	<0.005	<0.005
Silver	mg/l	*0.05	-	-	-	-	-	-	<0.002	<0.002	<0.002
Zinc	mg/l	**5.0	-	-	-	0.049	0.13	0.27	0.006	<0.002	0.069

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-2

SAMPLE DATE:			10/21/88
PARAMETERS:	UNITS	MCL	
pH	units		6.1
Total Coliform	mpn/100ml		110
Specific Conductivity	umhos/cm	**700	462
COD	mg/l		<10
TOC	mg/l		6
Total Organic Halogen (as Cl)	mg/l		-
Chloride	mg/l	**250	17
Fluoride	mg/l	*4	<0.2
Sulfate	mg/l	**250	2
Nitrate (as N)	mg/l	*10.0	<0.2
Nitrite (as N)	mg/l		-
Ammonia (as N)	mg/l		-
Total Hardness	mg/l		-
Turbidity	NTU	**1	-
Arsenic	mg/l	*0.05	<0.005
Barium	mg/l	*1.0	<0.02
Cadmium	mg/l	*0.01	<0.002
Chromium	mg/l	*0.05	<0.005
Copper	mg/l	**1.0	-
Iron	mg/l	**0.3	2.7
Lead	mg/l	*0.05	<0.01
Manganese	mg/l	**0.05	1.4
Mercury	mg/l	*0.002	<0.001
Nickel	mg/l		-
Selenium	mg/l	*0.01	<0.005
Silver	mg/l	*0.05	<0.002
Zinc	mg/l	**5.0	0.12

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: TH-3

SAMPLE DATE:			6/18/85
PARAMETERS:	UNITS	MCL	
pH	units		6.9
Total Coliform	mpn/100ml		-
Specific Conductivity	umhos/cm	**700	45
COD	mg/l		8
TOC	mg/l		-
Total Organic Halogen (as Cl)	mg/l		-
Chloride	mg/l	**250	1.6
Fluoride	mg/l	*4	-
Sulfate	mg/l	**250	0.8
Nitrate (as N)	mg/l	*10.0	0.04
Nitrite (as N)	mg/l		<0.01
Ammonia (as N)	mg/l		0.13
Turbidity	NTU	**1	-
Total Hardness	mg/l		-
Arsenic	mg/l	*0.05	0.001
Barium	mg/l	*1.0	-
Cadmium	mg/l	*0.01	0.0004
Chromium	mg/l	*0.05	0.012
Copper	mg/l	**1.0	<0.001
Iron	mg/l	**0.3	0.5
Lead	mg/l	*0.05	<0.001
Manganese	mg/l	**0.05	-
Mercury	mg/l	*0.002	-
Nickel	mg/l		0.001
Selenium	mg/l	*0.01	0.002
Silver	mg/l	*0.05	-
Zinc	mg/l	**5.0	0.026

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: 9E-2

SAMPLE DATE:			12/21/77	2/9/79	5/31/79	3/11/80	1/10/84
PARAMETERS:	UNITS	MCL					
pH	units		6.6	6.5	6.6	7.9	7.8
Total Coliform	mpn/100ml		-	-	-	-	-
Specific Conductivity	umhos/cm	**700	52	67	55	103	140
COD	mg/l		4	5	<4	-	4
TOC	mg/l		-	-	2	-	-
Total Organic Halogen (as Cl)	mg/l		-	-	-	-	-
Chloride	mg/l	**250	3	2	2	<1.0	2.1
Fluoride	mg/l	*4	-	-	-	-	-
Sulfate	mg/l	**250	-	-	-	-	-
Nitrate (as N)	mg/l	*10.0	0.11	0.3	0.16	0.01	0.04
Nitrite (as N)	mg/l		<0.02	<0.01	<.01	<0.01	-
Ammonia (as N)	mg/l		<0.02	0.05	0.01	0.01	0.31
Turbidity	NTU	**1	1	2	1	1	4
Total Hardness	mg/l		30	40	24	50	54
Arsenic	mg/l	*0.05	-	-	-	-	-
Barium	mg/l	*1.0	-	-	-	-	-
Cadmium	mg/l	*0.01	-	<0.01	<.02	<0.01	<0.01
Chromium	mg/l	*0.05	-	<0.02	<.02	<0.01	<0.01
Copper	mg/l	**1.0	-	0.03	<.01	0.01	<0.01
Iron	mg/l	**0.3	0.2	0.09	<.02	0.03	<0.02
Lead	mg/l	*0.05	-	<0.05	<.05	<0.1	<0.05
Manganese	mg/l	**0.05	-	<0.02	-	-	<0.02
Mercury	mg/l	*0.002	-	-	-	-	-
Nickel	mg/l		-	-	-	<0.05	<0.05
Selenium	mg/l	*0.01	-	-	-	-	-
Silver	mg/l	*0.05	-	-	-	-	-
Zinc	mg/l	**5.0	-	0.04	0.02	0.01	<0.01

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: 9E-3

SAMPLE DATE:			11/18/75	2/9/79	5/31/79	3/11/80	2/3/82	1/10/84	6/18/85
PARAMETERS:	UNITS	MCL							
pH	units		8.9	8	7.9	6.5	6.9	6.6	6.4
Total Coliform	mpn/100ml		-	-	-	-	-	-	-
Specific Conductivity	umhos/cm	**700	120	108	110	48	52	53	7.2
COD	mg/l		4	5	<4	-	8	4	16
TOC	mg/l		-	-	5	-	-	-	-
Total Organic Halogen (as Cl)	mg/l		-	-	-	-	-	-	-
Chloride	mg/l	**250	1	1	1	1	2.3	2.5	3
Fluoride	mg/l	*4	-	-	-	-	-	-	-
Sulfate	mg/l	**250	-	-	-	-	<10	-	1.4
Nitrate (as N)	mg/l	*10.0	-	<0.01	<.01	0.1	0.23	0.36	0.76
Nitrite (as N)	mg/l		-	<0.01	<.01	<0.01	<0.01	-	<0.01
Ammonia (as N)	mg/l		-	0.14	0.02	<0.01	0.28	0.01	0.3
Turbidity	NTU	**1	7	1	1	1	4	4	-
Total Hardness	mg/l		21	60	52	28	21	54	-
Arsenic	mg/l	*0.05	1	-	-	-	-	-	<0.001
Barium	mg/l	*1.0	-	-	-	-	-	-	-
Cadmium	mg/l	*0.01	-	<0.01	<0.02	<0.01	<0.001	<0.01	<0.0001
Chromium	mg/l	*0.05	-	<0.02	<0.02	<0.01	<0.005	<0.01	<0.001
Copper	mg/l	**1.0	-	<0.01	<0.01	0.02	0.009	<0.01	<0.001
Iron	mg/l	**0.3	0.2	0.03	<0.02	0.04	0.12	<0.02	<0.001
Lead	mg/l	*0.05	-	<0.05	<0.05	<0.1	0.009	<0.05	0.18
Manganese	mg/l	**0.05	-	<0.02	-	-	<0.001	<0.02	-
Mercury	mg/l	*0.002	-	-	-	-	-	-	-
Nickel	mg/l		-	-	-	<0.05	<0.005	<0.05	<0.001
Selenium	mg/l	*0.01	-	-	-	-	-	-	0.002
Silver	mg/l	*0.05	-	-	-	-	-	-	-
Zinc	mg/l	**5.0	-	0.01	<0.02	0.03	0.04	<0.001	0.14

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

MASON COUNTY LANDFILL

MONITORING WELL: T&C (Auto Wrecking Yard)

SAMPLE DATE:			6/18/85	7/29/86	11/13/86
PARAMETERS:	UNITS	MCL			
pH	units		7	7.1	-
Total Coliform	mpn/100ml		-	<1	<2
Specific Conductivity	umhos/cm	**700	104	90	99
COD	mg/l		16	7	<10
TOC	mg/l		-	-	1.1
Total Organic Halogen (as Cl)	mg/l		-	-	-
Chloride	mg/l	**250	3	1.7	2
Fluoride	mg/l	*4	-	-	-
Sulfate	mg/l	**250	1.6	1.3	1
Nitrate (as N)	mg/l	*10.0	0.1	0.08	<0.2
Nitrite (as N)	mg/l		<0.01	-	<0.005
Ammonia (as N)	mg/l		0.36	<0.01	<0.05
Turbidity	NTU	**1	-	-	-
Total Hardness	mg/l		-	-	-
Arsenic	mg/l	*0.05	<0.001	<0.001	-
Barium	mg/l	*1.0	-	-	-
Cadmium	mg/l	*0.01	0.0005	<0.0002	-
Chromium	mg/l	*0.05	0.012	0.01	-
Copper	mg/l	**1.0	<0.001	-	-
Iron	mg/l	**0.3	0.258	0.488	<0.01
Lead	mg/l	*0.05	<0.001	0.018	-
Manganese	mg/l	**0.05	-	0.012	0.012
Mercury	mg/l	*0.002	-	-	-
Nickel	mg/l		<0.001	-	-
Selenium	mg/l	*0.01	0.001	<0.001	-
Silver	mg/l	*0.05	-	-	-
Zinc	mg/l	**5.0	0.005	0.008	0.006

NOTE:

" - " = Not Tested

" * " = (MCL) Maximum Contaminant Levels
Primary Parameters (WAC 248-54)

" ** " = (MCL) Maximum Contaminant Levels
Secondary Parameters (WAC 248-54)

APPENDIX 2-4b

TABULATED CHEMICAL DATA

(Ecology Sampling Round, June, 1989)

CHRISTINE O. GREGOIRE
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Cleanwater Lane, LU-11 • Olympia, Washington 98504-6811 • (206) 407-6000

RECEIVED
OCT 24 1989
GENERAL SERVICES

October 18, 1989

Mr. John ~~Getty~~ Dennison
Mason County Environmental Health Department
P.O. Box 186
Shelton, WA 98584

Dear Mr. Getty:

In my inspection report of August 11, 1989, I noted that Ecology Staff sampled several monitoring wells at the Mason County Landfill. Data from this sampling have been received and are included with this letter.

Monitoring wells MW-1b, MW-2b, MW-3b, and MW-4 were sampled. Analyses were performed for nutrients, volatile organic compounds (EPA Method 624), base-neutral and acid extractables (EPA Method 625). Significant concentrations of compounds were discovered. The significant determinations are summarized below.

	Chemical	MW-1B	MW-2B	MW-3B	MW-4
	Nutrients (ppm)				
	Nitrogen	0.37	1.36	0.01	0.04
MCL in ppb	Volatile Organic Compounds (ppb)				
	Acetone	20	70	3600	28
	2-Butanone	<10	<10	1400	<10
≤5	Carbon Tetra-chloride	<5	61	<100	<5
≤5	Benzene	<5	8	81	<5
<2,000	Toluene	<5	690	5100	<5
<680	Ethylbenzene	<5	78	220	<5
<440	Xylene (total)	<5	390	1200	<5
	BNA's (ppb)				
	Napthalene	43	86	110	<10
	2-Methyl-napthalene	34	75	86	<10
	Diethyl-phthalate	7	9	12	<10

Maximum Contaminant Levels (MCL's) as defined in National Primary Drinking Water Standards, 40 CFR Part 141, were exceeded in monitoring well MW-3b for Benzene

and Toluene. Well MW-2b exceeded these standards for Carbon Tetrachloride and Benzene.

The Health Department should, as soon as possible, proceed according to the process outlined per WAC 173-304-490(2)(ii) resampling provisions. These wells should be analyzed for Priority Pollutants (methods enclosed) to confirm and expand the available data.

Should these data be confirmed, additional work will be necessary to define the extent of contamination. Such work will include the installation of additional wells. It is presently unclear what role the septage disposal practices at the landfill play in these findings. The Health Department should require the operator of the septage trenches to cease accepting waste now.

If you have any questions, or wish to arrange a meeting for further discussions, contact Guy J. Gregory at (206) 753-6880.

Sincerely

Guy J. Gregory, R.P.G.
Hydrogeologist
Solid and Hazardous Waste Program

GG:dr

cc: Pat Lee, Ecology
Tom Eaton, Ecology
Doug Mosich, Attorney General's Office
Howard Steeley, Ecology

APPENDIX 2-4c

TABULATED CHEMICAL DATA

(November, 1989 to Present)

NOTES PERTINENT TO METALS AND CONVENTIONAL DATA

MCL = Maximum Contaminant Level (federal and state drinking water standards)
WAC = Maximum contaminant levels - WAC 17--200 (effective 12-90)
(WAC Standards for metals are for total metals)
* = Primary MCL
** = Secondary MCL
- = Not tested
B = Possible blank contamination
E = Estimated value (quality control criteria not met)
R = Data rejected by PMX QA/QC officer
RB = Rinsate Blank
FB = Field Blank

MASON COUNTY LANDFILL

MONITORING WELL: MW-1B

SAMPLE LOCATION:				MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	5/10/90	8/9/90	11/7/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC							
Temperature	Centigrade			9.2	8.6	9.5	9.6	10.1	11.5	9
pH	units	**6.5-8.5	**6.5-8.5	6.07	6.09	6.08	6.09	5.97	6.07	5.9
Specific Conductivity	umhos/cm	**700		196	247	84	86	97	132	65
COD	mg/l			9.1	16.1	5.4	7.6	<5.0	13	9.7
Ammonia (as N)	mg/l			<0.01	<0.005	<0.01	<0.01	0.011	<0.010	<0.010
Nitrite (as N)	mg/l			0.007E	0.085	0.042	0.042	0.07	0.108	0.042
Nitrate (as N)	mg/l	*10.0	*10	1.263B	0.234	0.303	0.315	0.068	0.996	0.817
Nitrate + Nitrite	mg/l			1.27B	0.319	0.345	0.357	-	1.104	-
Total Coliform	mpn/100ml		*1	<2	<2	-	-	-	-	-
TOC	mg/l			1.5	2.5B	1.1B	0.55B	3.4	4.1	1.4
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-	-
Hardness	mg/l			71.4	60.2			32	56.3	34.3
Turbidity	NTU	**1			-	-	-	-	-	-
Total Dissolved Solids	mg/l		500	230	87.0E	23	23	81	97	50
Chloride	mg/l	**250	**250	4.9	4	2	2.3	2.2	5.3	2.1
Fluoride	mg/l	**2	*4	<0.1	<1.0	<0.05	<0.05	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	6.6	6.4	4.8E	3.3E	4.2	7.5	3.5
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-	-
METALS										
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	0.002	0.004	<0.001E	<0.001E	0.014B	0.002	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			18.5	15.6	6.6	6.54	8.28	14.6	8.91
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.031B	<0.005	<0.005	<0.005	<0.005	0.021B	0.010 B
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			6.13	5.15	2.19	2.17	2.76	4.81	2.93
Manganese	mg/l	**0.05	**0.05	1.67B	1.28	0.504	0.501	0.573	1.05	0.312
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			7.88B	7.91	4.61	4.6	5.8	6.61	5
Zinc	mg/l	**5.0	**5	0.005	0.009	<0.004	<0.004	0.008B	<0.004	0.006

MASON COUNTY LANDFILL

MONITORING WELL: MW-2B

SAMPLE LOCATION:				MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/9/90	11/7/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC						
Temperature	Centigrade			8.8	9.1	9.7	10.1	10.7	9.2
pH	units	**6.5-8.5	**6.5-8.5	6.12	6.06	6.08	5.96	6.13	6
Specific Conductivity	umhos/cm	**700		450	214	72	84	50	51
COD	mg/l			9.1	<5.0	<5.0	<5.0	14.8	<5.0
Ammonia (as N)	mg/l			0.01	<0.005	<0.01	<0.01	<0.010	<0.010
Nitrite (as N)	mg/l			0.008E	<0.005	0.033	<0.010	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.717E	1.873	0.613	0.828	0.495	0.835
Nitrate + Nitrite	mg/l			0.715E	1.873	0.646	-	0.495	-
Total Coliform	mpn/100ml		*1	<2	<2	-	-	-	-
TOC	mg/l			1.1	0.56B	0.5B	<1.4	4.9	1
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-
Hardness	mg/l			41.6	51.2	-	30.1	33.1	26.3
Turbidity	NTU	**1		-	-	-	-	-	-
Total Dissolved Solids	mg/l		500	134	78	20	52	56.0B	42
Chloride	mg/l	**250	**250	1.9	3.2	1.7	1.7	1.9	1.6
Fluoride	mg/l	**2	*4	<0.1	<1.0	<0.05	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	1.9	9.9	3.3E	2.8	5.2	2
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-
METALS									
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001E	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	<0.001	<0.001	<0.001E	0.014B	<0.001	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			11	13.5	5.71	7.89	8.74	6.97
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002	<0.002	0.003	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.008B	<0.005	0.008	<0.005	0.009B	0.024 B
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			3.44	4.25	1.8	2.52	2.74	2.15
Manganese	mg/l	**0.05	**0.05	0.005B	0.003	0.005	0.002B	0.003B	0.004 B
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001E	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			4.3B	5.26	3.53	4.53	3.94	3.44
Zinc	mg/l	**5.0	**5	0.006	0.005	0.005	0.007B	0.007	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-3B

SAMPLE LOCATION:				MW-3B	MW-3B	MW-3B	MW-3B	MW-3B
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/9/90	11/7/90
PARAMETERS:	UNITS	MCL	WAC					
Temperature	Centigrade			8.7	9.5	10.1	11	11.5
pH	units	**6.5-8.5	**6.5-8.5	6.38	6.27	6.42	6.3	6.36
Specific Conductivity	umhos/cm	**700		450	613	337	249	256
COD	mg/l			8.2	14.7	18.2	10.9	9.3
Ammonia (as N)	mg/l			0.13	0.084	0.217	0.393	0.29
Nitrite (as N)	mg/l			0.080E	<0.005	0.012	<0.010	0.015
Nitrate (as N)	mg/l	*10.0	*10	11.99E	0.046	0.006B	<0.010	2.086
Nitrate + Nitrite	mg/l			12.07E	0.046	-	-	2.101
Total Coliform	mpn/100ml		*1	<2	<2	-	-	-
TOC	mg/l			1.4	4.6B	2.5	3.76	2.4
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-
Hardness	mg/l			145.2	186.7	-	89.6	110.7
Turbidity	NTU	**1		-	-	-	-	-
Total Dissolved Solids	mg/l		500	472	265E	157	166	181
Chloride	mg/l	**250	**250	4.9	26.2	9	6.7	8.6
Fluoride	mg/l	**2	*4	<0.1	<1.0	<0.05	<0.05	<0.1
Sulfate	mg/l	**250	**250	4.8	6.4	2.5E	5.6	7.3
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-
METALS								
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	0.005	0.009	0.005E	0.014B	0.004
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			38.2	49.2	29.5	23.8	29.4
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	0.002	0.004B	0.002	0.003	<0.002
Iron	mg/l	**0.3	**0.3	0.012B	0.172	0.684	0.007B	0.302
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001	<0.001
Magnesium	mg/l			12.1	15.5	9.05	7.32	9.06
Manganese	mg/l	**0.05	**0.05	3.66B	5.01	3.04	2.44	2.95
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003E
Sodium	mg/l			22B	25.1	19.2	16.7	17.7
Zinc	mg/l	**5.0	**5	0.009	0.013	0.008	0.013B	0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-4

SAMPLE LOCATION:				MW-4	MW-4 D	MW-4	MW-4	MW-4	MW-4	MW-4
SAMPLE DATE:				11/29/89	11/29/89	2/20/90	5/9/90	8/8/90	11/6/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC							
Temperature	Centigrade			8	8	8	10.1	9.3	11.5	8.9
pH	units	**6.5-8.5	**6.5-8.5	6.64	6.64	6.33	5.87	6.22	6.36	6.28
Specific Conductivity	umhos/cm	**700		59	59	68	57	50	256	65
COD	mg/l			<5.0	<5.0	<5.0	<5.0	<5.0	6.1	<5.0
Ammonia (as N)	mg/l			<0.01	<0.01	<0.005	0.034	0.012	<0.010	<0.010
Nitrite (as N)	mg/l			0.014E	0.046E	<0.005	0.005	<0.010	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	NA	0.013E	<0.010	0.026B	0.028	0.06	0.010 B
Nitrate + Nitrite	mg/l			0.011E	0.059E	<0.010	-	-	0.06	-
Total Coliform	mpn/100ml		*1	<2	10	<2	-	-	-	-
TOC	mg/l			1	0.4	0.25B	0.54B	<1.4	<0.29	0.6
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-	-
Hardness	mg/l			22.9	22.7	15.2	-	20.7	21.9	20.6
Turbidity	NTU	**1		-	-	-	-	-	-	-
Total Dissolved Solids	mg/l		500	120	124	33.0E	9	47	49.0B	26
Chloride	mg/l	**250	**250	2.8	1.2	2.2	1.7	1.8	1.7	1.7
Fluoride	mg/l	**2	*4	<0.1	<0.1	<1.0	0.05	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	<1.0	<1.0	<1.0	<1.0E	1.4	1.4B	<1.0
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-	-
METALS										
Arsenic	mg/l	*0.05		<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	<0.001	0.001	<0.001	<0.001E	0.006B	<0.001	0.002
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			5.74	5.74	3.87	4.91	5.24	5.59	5.22
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002	0.003B	<0.002	<0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.01B	0.013B	<0.005	<0.005	<0.005	0.029B	0.048 B
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			2.01	2.02	1.34	1.75	1.85	1.94	1.84
Manganese	mg/l	**0.05	**0.05	0.003B	0.002B	<0.001	0.001	<0.001	0.002B	0.001 B
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001	<0.0001E	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			2.33B	2.22B	1.67	1.96	2.51	2.33	2.05
Zinc	mg/l	**5.0	**5	0.009	0.012	<0.004	0.005	0.006B	<0.004	0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-5B

SAMPLE LOCATION:				MW-5B	MW-5B	MW-5B	MW-5B	MW-5BD	MW-5B	MW-5B
SAMPLE DATE:				11/29/89	2/21/90	5/9/90	8/8/90	8/8/90	11/6/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC							
Temperature	Centigrade			8.5	8.9	9.8	9.7	9.5	8.6	9
pH	units	**6.5-8.5	**6.5-8.5	6.14	6.06	5.99	5.96	5.95	6.41	5.88
Specific Conductivity	umhos/cm	**700		134	205	99	82	116	70	86
COD	mg/l			<5.0	<5.0	<5.0	<5.0	<5.0	55.5	<5.0
Ammonia (as N)	mg/l			<0.01	<0.005	0.028	<0.010	0.012	<0.010	<0.010
Nitrite (as N)	mg/l			0.012E	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.095E	0.082	0.126	0.165	0.168	0.186	0.126 B
Nitrate + Nitrite	mg/l			0.107E	0.082	-	-	-	0.186	-
Total Coliform	mpn/100ml		*1	2	<2	-	-	-	-	-
TOC	mg/l			0.6	0.28B	0.59B	<1.4	<1.4	10.1	0.6
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-	-
Hardness	mg/l			54.3	57.2	-	37	36.5	40.9	53.9
Turbidity	NTU	**1		-	-	-	-	-	-	-
Total Dissolved Solids	mg/l		500	186	84.0E	42	67	67	75.0B	70
Chloride	mg/l	**250	**250	1.6	2.6	2.2	2	1.8	1.8	1.8
Fluoride	mg/l	**2	*4	<0.1	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	<1.0	1.1	<1.0E	1.1	1.6	1.1B	1.2
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-	-
METALS										
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	0.002	<0.001	<0.001E	0.046	0.012B	<0.001	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			14	14.8	9.22	9.58	9.46	10.6	14
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.019B	<0.005	<0.005	<0.005	<0.005	0.036B	<0.005
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/l			4.69	4.92	3.09	3.17	3.13	3.5	4.6
Manganese	mg/l	**0.05	**0.05	0.01B	0.004	0.002	0.002B	0.002B	0.011	0.004 B
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.001E	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			4.43B	4.6	3.45	4.77	4.46	3.68	4.21
Zinc	mg/l	**5.0	**5	0.007	0.012	0.009	0.013B	0.006B	0.007	0.006

MASON COUNTY LANDFILL

MONITORING WELL: MW-6

SAMPLE LOCATION:				MW-6
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
Temperature	Centigrade			9
pH	units	**6.5-8.5	**6.5-8.5	6.38
Specific Conductivity	umhos/cm	**700		30
COD	mg/l			<5.0 E
Ammonia (as N)	mg/l			<0.010
Nitrite (as N)	mg/l			<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.268 B
Nitrate + Nitrite	mg/l			-
Total Coliform	mpn/100ml		*1	-
TOC	mg/l			<0.18
Total Organic Halogen (as Cl)	mg/l			-
Hardness	mg/l			3.5
Turbidity	NTU	**1		-
Total Dissolved Solids	mg/l		500	39
Chloride	mg/l	**250	**250	1.3
Fluoride	mg/l	**2	*4	<0.1
Sulfate	mg/l	**250	**250	3.6
Total Petroleum Hydrocarbons	ppm			-
METALS				
Arsenic	mg/l	*0.05		<0.001
Barium	mg/l	*1.0	*1	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002
Calcium	mg/l			2.75
Chromium	mg/l	*0.05	*0.05	<0.005
Copper	mg/l	**1.0	**1	<0.002
Iron	mg/l	**0.3	**0.3	0.022 B
Lead	mg/l	*0.05	*0.05	<0.001
Magnesium	mg/l			0.85
Manganese	mg/l	**0.05	**0.05	0.002 B
Mercury	mg/l	*0.002	*0.002	<0.0001
Nickel	mg/l			-
Selenium	mg/l	*0.01	*0.01	<0.001
Silver	mg/l	*0.05	0.05	<0.003
Sodium	mg/l			3.15
Zinc	mg/l	**5.0	**5	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-7

SAMPLE LOCATION:				MW-7
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
Temperature	Centigrade			9.8
pH	units	**6.5-8.5	**6.5-8.5	6.31
Specific Conductivity	umhos/cm	**700		291
COD	mg/l			13.5 E
Ammonia (as N)	mg/l			4.02
Nitrite (as N)	mg/l			<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.012 B
Nitrate + Nitrite	mg/l			-
Total Coliform	mpn/100ml		*1	-
TOC	mg/l			4.8
Total Organic Halogen (as Cl)	mg/l			-
Hardness	mg/l			139.5
Turbidity	NTU	**1		-
Total Dissolved Solids	mg/l		500	253
Chloride	mg/l	**250	**250	13.6
Fluoride	mg/l	**2	*4	<0.1
Sulfate	mg/l	**250	**250	4.2
Total Petroleum Hydrocarbons	ppm			-
METALS				
Arsenic	mg/l	*0.05		0.002
Barium	mg/l	*1.0	*1	0.012
Cadmium	mg/l	*0.01	*0.01	<0.002
Calcium	mg/l			38.4
Chromium	mg/l	*0.05	*0.05	<0.005
Copper	mg/l	**1.0	**1	<0.002
Iron	mg/l	**0.3	**0.3	6.59
Lead	mg/l	*0.05	*0.05	<0.001
Magnesium	mg/l			10.6
Manganese	mg/l	**0.05	**0.05	4.02
Mercury	mg/l	*0.002	*0.002	<0.0001
Nickel	mg/l			-
Selenium	mg/l	*0.01	*0.01	<0.005
Silver	mg/l	*0.05	0.05	<0.003
Sodium	mg/l			31.3
Zinc	mg/l	**5.0	**5	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-8

SAMPLE LOCATION:				MW-8
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
Temperature	Centigrade			10.4
pH	units	**6.5-8.5	**6.5-8.5	6.47
Specific Conductivity	umhos/cm	**700		233
COD	mg/l			10.9 E
Ammonia (as N)	mg/l			0.054
Nitrite (as N)	mg/l			<0.010
Nitrate (as N)	mg/l	*10.0	*10	<0.010
Nitrate + Nitrite	mg/l			-
Total Coliform	mpn/100ml		*1	-
TOC	mg/l			2.2
Total Organic Halogen (as Cl)	mg/l			-
Hardness	mg/l			135.6
Turbidity	NTU	**1		-
Total Dissolved Solids	mg/l		500	213
Chloride	mg/l	**250	**250	12.1
Fluoride	mg/l	**2	*4	<0.1
Sulfate	mg/l	**250	**250	5.2
Total Petroleum Hydrocarbons	ppm			-
METALS				
Arsenic	mg/l	*0.05		<0.001
Barium	mg/l	*1.0	*1	0.004
Cadmium	mg/l	*0.01	*0.01	<0.002
Calcium	mg/l			35.5
Chromium	mg/l	*0.05	*0.05	<0.005
Copper	mg/l	**1.0	**1	<0.002
Iron	mg/l	**0.3	**0.3	0.030 B
Lead	mg/l	*0.05	*0.05	<0.001
Magnesium	mg/l			11.4
Manganese	mg/l	**0.05	**0.05	1.88
Mercury	mg/l	*0.002	*0.002	<0.0001
Nickel	mg/l			-
Selenium	mg/l	*0.01	*0.01	<0.005
Silver	mg/l	*0.05	0.05	<0.003
Sodium	mg/l			19.9
Zinc	mg/l	**5.0	**5	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-9

SAMPLE LOCATION:				MW-9
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
Temperature	Centigrade			8.5
pH	units	**6.5-8.5	**6.5-8.5	6.39
Specific Conductivity	umhos/cm	**700		31
COD	mg/l			<5.0 E
Ammonia (as N)	mg/l			0.01
Nitrite (as N)	mg/l			<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.037 B
Nitrate + Nitrite	mg/l			-
Total Coliform	mpn/100ml		*1	-
TOC	mg/l			0.36
Total Organic Halogen (as Cl)	mg/l			-
Hardness	mg/l			16.2
Turbidity	NTU		**1	-
Total Dissolved Solids	mg/l		500	36
Chloride	mg/l	**250	**250	1.3
Fluoride	mg/l	**2	*4	<0.1
Sulfate	mg/l	**250	**250	<1.0
Total Petroleum Hydrocarbons	ppm			-
METALS				
Arsenic	mg/l	*0.05		<0.001
Barium	mg/l	*1.0	*1	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002
Calcium	mg/l			4.19
Chromium	mg/l	*0.05	*0.05	<0.005
Copper	mg/l	**1.0	**1	<0.002
Iron	mg/l	**0.3	**0.3	0.052 B
Lead	mg/l	*0.05	*0.05	<0.001
Magnesium	mg/l			1.4
Manganese	mg/l	**0.05	**0.05	0.001 B
Mercury	mg/l	*0.002	*0.002	<0.0001
Nickel	mg/l			-
Selenium	mg/l	*0.01	*0.01	<0.001
Silver	mg/l	*0.05	0.05	<0.003
Sodium	mg/l			1.87
Zinc	mg/l	**5.0	**5	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: MW-10

SAMPLE LOCATION:				MW-10	MW-11 (10 D)
SAMPLE DATE:				2/7/91	2/6/91
PARAMETERS:	UNITS	MCL	WAC		
Temperature	Centigrade			10.9	10.4
pH	units	**6.5-8.5	**6.5-8.5	5.99	6.47
Specific Conductivity	umhos/cm	**700		213	233
COD	mg/l			<5.0 E	5.5
Ammonia (as N)	mg/l			<0.010	0.046
Nitrite (as N)	mg/l			<0.010	0.017
Nitrate (as N)	mg/l	*10.0	*10	0.120 B	<0.010
Nitrate + Nitrite	mg/l			-	-
Total Coliform	mpn/100ml		*1	-	-
TOC	mg/l			1.9	1.9
Total Organic Halogen (as Cl)	mg/l			-	-
Hardness	mg/l			115.7	131.9
Turbidity	NTU	**1		-	-
Total Dissolved Solids	mg/l		500	187	200
Chloride	mg/l	**250	**250	15.4	12.4
Fluoride	mg/l	**2	*4	<0.1	<0.1
Sulfate	mg/l	**250	**250	2.9	2
Total Petroleum Hydrocarbons	ppm			-	-
METALS					
Arsenic	mg/l	*0.05		<0.001	<0.001
Barium	mg/l	*1.0	*1	0.004	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002
Calcium	mg/l			30.7	34.5
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.016 B	0.031 B
Lead	mg/l	*0.05	*0.05	<0.001	<0.001
Magnesium	mg/l			9.47	11.1
Manganese	mg/l	**0.05	**0.05	1.98	1.87
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001
Nickel	mg/l			-	-
Selenium	mg/l	*0.01	*0.01	<0.005	<0.005
Silver	mg/l	*0.05	0.05	<0.003	<0.003
Sodium	mg/l			19.4	19.5
Zinc	mg/l	**5.0	**5	<0.004	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: T&C (Auto Wrecking Yard) (AY3)

SAMPLE LOCATION:				AY-3	AY-3	AY-3	AY-3	AY-3
SAMPLE DATE:				2/21/90	5/9/90	8/8/90	11/7/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC					
Temperature	centigrade			7.8	9.3	12.4	11.6	9.1
pH	units	**6.5-8.5	**6.5-8.5	7.1	6.98	6.92	6.92	7.3
Specific Conductivity	umhos/cm	**700		143	101	90	87	69
COD	mg/l			5.7	<5.0	<5.0	<5.0	<5.0
Ammonia (as N)	mg/l			0.008B	0.021	<0.010	<0.010	<0.010
Nitrite (as N)	mg/l			<0.005	<0.005	<0.010	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.177	0.12	0.134	0.106	0.147 B
Nitrate + Nitrite	mg/l			0.177	0.12	-	0.106	-
Total Coliform	mpn/100ml		*1	<2	-	-	-	-
TOC	mg/l			3.9B	0.51B	<1.4	<0.29	0.2
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-
Hardness	mg/l			38.1	-	40.2	41.9	37.9
Turbidity	NTU		**1	-	-	-	-	-
Total Dissolved Solids	mg/l		500	53.0E	30	69	62.0B	52
Chloride	mg/l	**250	**250	1.9	1.7	1.7	1.7	1.4
Fluoride	mg/l	**2	*4	<0.1	<0.05	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	1.7	<1.0E	1.4	2.5B	<1.0
Total Petroleum Hydrocarbons	ppm			<5.0	-	-	-	-
METALS								
Arsenic	mg/l	*0.05		<0.001E	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	<0.001	<0.001E	<0.11B	0.001	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			9.41	9.42	9.9	10.4	9.36
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	0.003B	0.002	<0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.008B	0.005	<0.005	<0.005	0.007 B
Lead	mg/l	*0.05	*0.05	<0.001	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			3.55	3.61	3.76	3.88	3.54
Manganese	mg/l	**0.05	**0.05	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/l	*0.002	*0.002	<0.0001E	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.002
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			2.98	2.89	3.52	3.18	3.01
Zinc	mg/l	**5.0	**5	<0.004	<0.004	0.004B	<0.004	<0.004

MASON COUNTY LANDFILL

MONITORING WELL: TH-1D

SAMPLE LOCATION:				TH-1D	TH-1D	TH-1D	TH-1D	TH-1D	TH-1D
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/8/90	11/6/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC						
Temperature	Centigrade			9.9	8.9	10.8	11.7	10.8	8.4
pH	units	**6.5-8.5	**6.5-8.5	7.65	7.47	6.9	7.62	7.69	7.6
Specific Conductivity	umhos/cm	**700		108	154	105	94	70	75
COD	mg/l			8.6	<5.0	<5.0	<5.0	<5.0	<5.0
Ammonia (as N)	mg/l			<0.01	<0.005	<0.01	<0.010	<0.010	<0.010
Nitrite (as N)	mg/l			0.002E	<0.005	<0.005	<0.010	<0.010	0.014
Nitrate (as N)	mg/l	*10.0	*10	0.056E	0.045	0.046B	0.039	0.038	0.053 B
Nitrate + Nitrite	mg/l			0.058E	0.045	-	-	0.038	-
Total Coliform	mpn/100ml		*1	<2	<2	-	-	-	-
TOC	mg/l			0.1	0.30B	0.35B	<1.4	<0.29	<0.2
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-
Total Hardness	mg/l			42.7	41	-	42.3	42.4	41.8
Turbidity	NTU		**1		-	-	-	-	-
Total Dissolved Solids	mg/l		500	166	57.0E	33	76	67	57
Chloride	mg/l	**250	**250	0.8	2	1.8	2	1.5	1.5
Fluoride	mg/l	**2	*4	<0.1	<0.1	0.06	0.05	0.1	<0.1
Sulfate	mg/l	**250	**250	1.5	1.7	<1.0E	1.6	4.1B	2.2
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-
METALS									
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	<0.001	<0.001	<0.001E	0.013B	0.001	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			11.2	10.8	10.7	11.1	11.2	11
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	0.002	<0.002	<0.002	0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			3.57	3.4	3.42	3.53	3.51	3.47
Manganese	mg/l	**0.05	**0.05	<0.001	<0.001	<0.001	<0.001	0.001B	<0.001
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			3.29B	3.16	3.08	3.5	3.23	3.19
Zinc	mg/l	**5.0	**5	0.086	0.092	0.075	0.039	0.088	0.061

MASON COUNTY LANDFILL

MONITORING WELL: TH-1S

SAMPLE LOCATION:				TH-1S	TH-1S	TH-1S	TH-1S
SAMPLE DATE:				2/20/90	5/10/90	8/9/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC				
Temperature	Centigrade			8.8	13.4	11.6	9.7
pH	units	**6.5-8.5	**6.5-8.5	6.23	6.27	6.08	6.24
Specific Conductivity	umhos/cm	**700		134	58	74	41
COD	mg/l			<5.0	<5.0	<5.0	<5.0
Ammonia (as N)	mg/l			<0.005	<0.010	<0.010	<0.010
Nitrite (as N)	mg/l			0.005	<0.005	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.787	0.159	0.259	0.254 B
Nitrate + Nitrite	mg/l			0.792	-	-	-
Total Coliform	mpn/100ml		*1	<2	-	-	-
TOC	mg/l			0.28B	0.30B	<1.4	0.4
Total Organic Halogen (as Cl)	mg/l			-	-	-	-
Total Hardness	mg/l			28.9	-	26.8	17.9
Turbidity	NTU		**1	-	-	-	-
Total Dissolved Solids	mg/l		500	46.0E	14	54	32
Chloride	mg/l	**250	**250	2.1	1.8	2	1.5
Fluoride	mg/l	**2	*4	<0.1	<0.05	<0.05	<0.1
Sulfate	mg/l	**250	**250	7	7.9E	<1.0	2.2
Total Petroleum Hydrocarbons	ppm			-	-	-	-
METALS							
Arsenic	mg/l	*0.05		<0.001E	<0.001E	<0.001	<0.001
Barium	mg/l	*1.0	*1	<0.001	<0.001E	0.014B	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			7.47	4.94	6.88	4.63
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	0.005	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	0.214	0.126	<0.005	0.415
Lead	mg/l	*0.05	*0.05	<0.001	<0.001E	<0.001	<0.001
Magnesium	mg/l			2.5	1.68	2.34	1.54
Manganese	mg/l	**0.05	**0.05	0.007	0.044	0.05	0.018
Mercury	mg/l	*0.002	*0.002	<0.001E	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003
Sodium	mg/l			3.54	2.71	3.77	2.86

MASON COUNTY LANDFILL

MONITORING WELL: Waldberger/Blucher

SAMPLE LOCATION:				Blucher	Blucher	Blucher	Blucher	Blucher
SAMPLE DATE:				11/30/89	2/21/90	5/9/90	11/6/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC					
Temperature	Centigrade			8.6	8.6	11	9.2	9.2
pH	units	**6.5-8.5	**6.5-8.5	6.39	6.5	5.85	6.84	6.4
Specific Conductivity	umhos/cm	**700		313	390	263	142	175
COD	mg/l			5.6	<5.0	8.1	<5.0	<5.0
Ammonia (as N)	mg/l			<0.01	<0.005	0.046	<0.010	<0.010
Nitrite (as N)	mg/l			0.003E	0.067	0.017	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	0.007E	0.011	0.048	<0.010	0.944
Nitrate + Nitrite	mg/l			0.010E	0.078	0.065	<0.010	-
Total Coliform	mpn/100ml		*1	<2	<2	-	-	-
TOC	mg/l			1	19.1	0.91B	1.0B	1.1
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-
Hardness	mg/l			130.1	108	-	94.2	96.9
Turbidity	NTU	**1		-	-	-	-	-
Total Dissolved Solids	mg/l		500	342	128	117	137	124
Chloride	mg/l	**250	**250	8.3	8.1	6.3	5.2	5.2
Fluoride	mg/l	**2	*4	<0.1	<0.1	0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	1.7	1.7	1.6E	5.2	1.2
Total Petroleum Hydrocarbons	ppm			-	<5.0	-	-	-
METALS								
Arsenic	mg/l	**0.05	**0.05	<0.001	<0.001E	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	0.002	<0.001	0.002E	0.001	<0.001
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			33.3	27.8	27.5	24.2	24.9
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	<0.002	<0.002	0.009	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	4.24B	8.64	0.462	1.27	1.14
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001E	<0.001	<0.001
Magnesium	mg/l			11.4	9.37	9.4	8.2	8.43
Manganese	mg/l	**0.05		0.04B	0.101	0.012	0.010B	0.011 B
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.005
Silver	mg/l	*0.05	0.05	0.003	<0.003	<0.003	<0.003E	<0.003
Sodium	mg/l			8.76B	8.18	8.01	7.06	7.32
Zinc	mg/l	**5.0	**5	<0.009	0.016	0.007	<0.004	0.011

MASON COUNTY LANDFILL

MONITORING WELL: TH-2

SAMPLE LOCATION:				TH-2	TH-2	TH-2	TH-2	TH-2	TH-2	TH-2 D
SAMPLE DATE:				11/30/89	2/20/90	2/20/90d	5/9/90	8/8/90	11/6/90	11/6/90
PARAMETERS:	UNITS	MCL	WAC							
Temperature	Centigrade			10	10.2	10.1	11.6	12	10.2	10.7
pH	units	**6.5-8.5	**6.5-8.5	6.53	6.34	6.39	6.42	6.38	6.81	6.4
Specific Conductivity	umhos/cm	**700		400	652	657	358	291	237	119
COD	mg/l			15.1	7.6	9	<5.0	25.4	<5.0	<5.0
Ammonia (as N)	mg/l			4.23	<0.005	0.006B	0.048	0.786	0.026	0.023
Nitrite (as N)	mg/l			0.006E	0.005	<0.005	0.048	<0.010	<0.010	<0.010
Nitrate (as N)	mg/l	*10.0	*10	1.594E	<0.010	0.016	0.022B	<0.010	0.013	<0.010
Nitrate + Nitrite	mg/l			1.60E	0.005	0.016	0.07	-	0.013	<0.010
Total Coliform	mpn/100ml		*1	80	<2	<2	20	-	-	-
TOC	mg/l			3.2	3.9B	3.9B	2.1	3.86	1.5B	1.2B
Total Organic Halogen (as Cl)	mg/l			-	-	-	-	-	-	-
Hardness	mg/l			138.1	184.3	183	-	109.9	122.2	122.2
Turbidity	NTU		**1	-	-	-	-	-	-	-
Total Dissolved Solids	mg/l		500	408	117.0E	248.0E	158	202	190	184
Chloride	mg/l	**250	**250	7.3	23.3	22.5	8.2	6.2	5.7	6
Fluoride	mg/l	**2	*4	<0.1	<0.1	0.1	0.12	<0.05	<0.1	<0.1
Sulfate	mg/l	**250	**250	1.7	<1.0	<1.0	6.5E	<1.0	4.4B	4.6B
Total Petroleum Hydrocarbons	ppm			-	-	-	-	-	-	-
METALS										
Arsenic	mg/l	*0.05		<0.001	<0.001E	<0.001E	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	*1.0	*1	0.005	0.005	0.005	0.003E	0.032B	0.004	0.004
Cadmium	mg/l	*0.01	*0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/l			35.5	47.9	47.4	29.5	28.3	31.8	31.8
Chromium	mg/l	*0.05	*0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/l	**1.0	**1	0.002	0.003B	0.002B	0.002	<0.002	<0.002	<0.002
Iron	mg/l	**0.3	**0.3	6.86B	2.58	2.4	2.1	<0.005	2.56	2.53
Lead	mg/l	*0.05	*0.05	<0.001	<0.001	<0.001	<0.001E	<0.001	<0.001	<0.001
Magnesium	mg/l			12	15.7	15.7	9.92	9.52	10.4	10.4
Manganese	mg/l	**0.05	**0.05	1.92B	2.99	2.96	1.96	1.81	2.01	2.01
Mercury	mg/l	*0.002	*0.002	<0.0001	<0.0001E	<0.0001E	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l			-	-	-	-	-	-	-
Selenium	mg/l	*0.01	*0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	mg/l	*0.05	0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003E	<0.003E
Sodium	mg/l			18.9B	22.6	22.6	17.9	20	19.3	19.4
Zinc	mg/l	**5.0	**5	0.026	<0.004	<0.004	<0.004	0.008B	<0.004	<0.004

NOTES PERTINENT TO ORGANIC DATA

MCL = Maximum Contaminant Level (federal and state drinking water standards)
WAC = Maximum contaminant levels - WAC 17--200 (effective 12-90)
* = Proposed federal MCL
- = Not tested
B = Possible blank contamination
J = Estimated value (less than detection limit)
M = Low spectral match parameters
E = Estimated value (quality control criteria not met)
R = Data rejected by PMX QA/QC officer
RB = Rinsate Blank
FB = Field Blank
TB = Trip Blank

MASON COUNTY LANDFILL

MONITORING WELL: MW-2B (PP)

SAMPLE LOCATION:				MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/9/90	11/7/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC						
VOLATILE ORGANICS									
Methylene Chloride	ug/l		5	0.6JB	1.0JB	1.5JB	0.6JB	1.9B	1.1 JB
Acetone	ug/l			26B	<5.0	<10	<5.0	1.2JB	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	2.3B	<1.0	<1.0	0.6JB	<1.0	<1.0
2-Butanone	ug/l				<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	51	3.3	1.1	17	7.7	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l				<5.0	<5.0	<5.0	4.2	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Toluene	ug/l	*2000		0.6JB	<1.0	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100			<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700			<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l				<1.0	<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES									
Phenol	ug/l			5.3	<2	<2	<2	<2	<2
Benzoic Acid	ug/l				<10	<10	<10	1.6J	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	55B	6	1.8B	<1	<1	<1.0
PESTICIDES/PCB									
				-	-		-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: MW-3B (PP)

SAMPLE LOCATION:				MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/9/90	11/7/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC						
VOLATILE ORGANICS									
Methylene Chloride	ug/l		5	0.4JB	1.2JB	0.7JB	0.3JB	3.2B	0.6 JB
Acetone	ug/l			40B	210B	29B	<5.0	<5.0	<5.0
1,1-Dichloroethane	ug/l		1	0.3J	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		0.3J	<1.0	<1.0	<1.0	<1.5	0.6 J
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	0.6J	<1.0	<1.0	<1.0	<1.0	1.1
Benzene	ug/l	5	1	<1.0	1.1	0.7J	<1.0	<1.5	0.6 M
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<5.0	<2.5	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0	<1.5	2
Toluene	ug/l	*2000		0.7JB	5.7	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<3.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES									
Phenol	ug/l			<2	<2R	<2	<2R	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	2	<1	<1	<1	<1.0
bis(2-Ethylhexyl) Phthalate	ug/l		6	42B	6	<1	<1	2.2	<1.0
PESTICIDES/PCB									
				-	-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: MW-4 (PP)

SAMPLE LOCATION:				MW-4	MW-4D	MW-4	MW-4	MW-4	MW-4	MW-4
SAMPLE DATE:				11/29/89	11/29/89	2/20/90	5/9/90	8/8/90	11/6/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC							
VOLATILE ORGANICS										
Methylene Chloride	ug/l		5	0.8JB	0.7JB	0.4JB	1.0JB	1.3B	3.1B	0.6 JB
Acetone	ug/l			40B	10B	<5.0	<10	<5.0	2.6JB	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<2.5	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Toluene	ug/l	*2000		0.6JB	0.5JB	<1.0	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		0.3MB	0.3MB	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluorobenzene	ug/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES										
Phenol	ug/l			<2	<2	<2	<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl) Phthalate	ug/l		6	33B	28B	12	11B	2	2.1	<1.0
PESTICIDES/PCB										
				-	-	-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: MW-5B (PP)

SAMPLE LOCATION:				MW-5B	MW-5B	MW-5B	MW-5B	MW-5BD	MW-5B	MW-5B
SAMPLE DATE:				11/29/89	2/21/90	5/9/90	8/8/90	8/8/90	11/6/90	2/6/91
PARAMETERS:	UNITS	MCL	WAC							
VOLATILE ORGANICS										
Methylene Chloride	ug/l		5	0.5JB	0.6JB	4.5B	1.2B	0.7JB	6.9B	0.5 JB
Acetone	ug/l			11B	<5.0	34B	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0	0.7JB	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	5.3	<5.0
Tetrachloroethene	ug/l	*5	0.8	0.6J	<1.0	<1.0	<1.0	<1.0	0.4M	<1.0
Toluene	ug/l	*2000		0.5JB	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES										
Phenol	ug/l			3.3M	<2	<2	<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl) Phthalate	ug/l		6	58B	10	2.0B	1.3	<1	1.8	<1.0
PESTICIDES/PCB										
				-	-	-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: MW-6 (PP)

SAMPLE LOCATION:				MW-6
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
VOLATILE ORGANICS				
Methylene Chloride	ug/l		5	0.9 JB
Acetone	ug/l			<5.0
1,1-Dichloroethane	ug/l		1	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0
Chloroform	ug/l	100	7	<1.0
2-Butanone	ug/l			<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0
Trichloroethene	ug/l	5	3	<1.0
Benzene	ug/l	5	1	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0
Toluene	ug/l	*2000		<1.0
Chlorobenzene		*100		<1.0
Ethylbenzene		*700		<1.0
Total Xylenes	ug/l	*10000		<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane				<1.0
SEMIVOLATILES				
Phenol	ug/l			<2
Benzoic Acid	ug/l			<10
Diethylphthalate	ug/l			<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1.0
PESTICIDES/PCB				
				-

MASON COUNTY LANDFILL

MONITORING WELL: MW-7 (PP)

SAMPLE LOCATION:				MW-7
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
VOLATILE ORGANICS				
Methylene Chloride	ug/l		5	0.7 JB
Acetone	ug/l			16 B
1,1-Dichloroethane	ug/l		1	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0
Chloroform	ug/l	100	7	<1.0
2-Butanone	ug/l			10
Carbon Tetrachloride	ug/l	5	0.3	<1.0
Trichloroethene	ug/l	5	3	<1.0
Benzene	ug/l	5	1	0.8 J
4-Methyl-2-Pentanone	ug/l			<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0
Toluene	ug/l	*2000		42
Chlorobenzene	ug/l	*100		1.0 M
Ethylbenzene	ug/l	*700		1.7
Total Xylenes	ug/l	*10000		2.8 M
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0
SEMIVOLATILES				
Phenol	ug/l			<2 R
Benzoic Acid	ug/l			<10
Diethylphthalate	ug/l			0.9 M
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1.0
PESTICIDES/PCB				
				-

MASON COUNTY LANDFILL

MONITORING WELL: MW-8 (PP)

SAMPLE LOCATION:				MW-8
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
VOLATILE ORGANICS				
Methylene Chloride	ug/l		5	0.7 JB
Acetone	ug/l			4.0 J
1,1-Dichloroethane	ug/l		1	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0
Chloroform	ug/l	100	7	<1.0
2-Butanone	ug/l			<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0
Trichloroethene	ug/l	5	3	0.8 J
Benzene	ug/l	5	1	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0
Tetrachloroethene	ug/l	*5	0.8	0.6 J
Toluene	ug/l	*2000		<1.0
Chlorobenzene	ug/l	*100		<1.0
Ethylbenzene	ug/l	*700		<1.0
Total Xylenes	ug/l	*10000		<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0
SEMIVOLATILES				
Phenol	ug/l			<2
Benzoic Acid	ug/l			<10
Diethylphthalate	ug/l			<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1.0
PESTICIDES/PCB				
				-

MASON COUNTY LANDFILL

MONITORING WELL: MW-9 (PP)

SAMPLE LOCATION:				MW-9
SAMPLE DATE:				2/7/91
PARAMETERS:	UNITS	MCL	WAC	
VOLATILE ORGANICS				
Methylene Chloride	ug/l		5	0.4 JB
Acetone	ug/l			<5.0
1,1-Dichloroethane	ug/l		1	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0
Chloroform	ug/l	100	7	<1.0
2-Butanone	ug/l			<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0
Trichloroethene	ug/l	5	3	<1.0
Benzene	ug/l	5	1	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0
Toluene	ug/l	*2000		<1.0
Chlorobenzene	ug/l	*100		<1.0
Ethylbenzene	ug/l	*700		<1.0
Total Xylenes	ug/l	*10000		<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0
SEMIVOLATILES				
Phenol	ug/l			<2
Benzoic Acid	ug/l			<10
Diethylphthalate	ug/l			<1.0
bis(2-Ethylhexyl) Phthalate	ug/l		6	<1.0
PESTICIDES/PCB				
				-

MASON COUNTY LANDFILL

MONITORING WELL: MW-10 (PP)

SAMPLE LOCATION:				MW-10	MW-11 (10 D)
SAMPLE DATE:				2/7/91	2/6/91
PARAMETERS:	UNITS	MCL	WAC		
VOLATILE ORGANICS					
Methylene Chloride	ug/l		5	2.1 B	0.7 JB
Acetone	ug/l			<5.0	<5.0
1,1-Dichloroethane	ug/l		1	0.6 M	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	0.5 J
Chloroform	ug/l	100	7	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0
Trichloroethene	ug/l	5	3	<1.0	0.8 J
Benzene	ug/l	5	1	<1.0	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0
Tetrachloroethene	ug/l	*5	0.8	0.6 M	0.5 M
Toluene	ug/l	*2000		<1.0	<1.0
Chlorobenzene	ug/l	*100		0.6 M	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0
Total Xylenes	ug/l	*10000		<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0
SEMIVOLATILES					
Phenol	ug/l			<2	<2
Benzoic Acid	ug/l			<10	<10
Diethylphthalate	ug/l			<1.0	<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1.0	<1.0
PESTICIDES/PCB					
				-	-

MASON COUNTY LANDFILL

MONITORING WELL: T&C Auto Wrecking (AY3)

SAMPLE LOCATION:				AY-3	AY-3	AY-3	AY-3	AY-3
SAMPLE DATE:				2/21/90	5/9/90	8/8/90	11/7/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC					
VOLATILE ORGANICS								
Methylene Chloride	ug/l		5	0.7JB	0.8JB	0.9JB	2.0B	0.8JB
Acetone	ug/l			<5.0	<10	18B	<5.0	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<2.5	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.5	<1.0
Toluene	ug/l	*2000		<1.0	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0	<1.0	1.1BM	<1.0
SEMIVOLATILES								
Phenol	ug/l			<2	<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1	<1	<1	<1	<1.0
PESTICIDES/PCB								
				-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: TH-1D (PP)

SAMPLE LOCATION:				TH-1D	TH-1D	TH-1D	TH-1D	TH-1D	TH-1D
SAMPLE DATE:				11/30/89	2/21/90	5/10/90	8/8/90	11/6/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC						
VOLATILE ORGANICS									
Methylene Chloride	ug/l		5	0.5JB	0.7JB	1.3JB	0.5JB	3.9B	0.6 JB
Acetone	ug/l			<5.0	15	<10	<5.0	1.4JB	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<5.0	<2.5	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0
Toluene	ug/l	*2000		<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES									
Phenol	ug/l			<1	<2	<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl) Phthalate	ug/l		6	1.9B	<1	<1	<1	<1	<1.0
PESTICIDES/PCB									
					-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: TH-1S

SAMPLE LOCATION:				TH-1S	TH-1S	TH-1S	TH-1S
SAMPLE DATE:				2/20/90	5/10/90	8/9/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC				
VOLATILE ORGANICS							
Methylene Chloride	ug/l		5	1.0JB	0.9JB	0.4JB	0.5 MB
Acetone	ug/l			<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		<1.0	<1.0	<1.0	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	0.6M	<1.0	<1.0	<1.0
Trichloroethene	ug/l	5	3	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	ug/l			<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0
Toluene	ug/l	*2000		<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l			<1.0	<1.0	<1.0	<1.0
SEMIVOLATILES							
Phenol	ug/l			<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	1.2
bis(2-Ethylhexyl)Phthalate	ug/l		6	<1	<1	<1	<1.0
PESTICIDES/PCB							
				-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: TH-2 (PP)

SAMPLE LOCATION:				TH-2	TH-2	TH-2	TH-2	TH-2	TH-2	TH-2
SAMPLE DATE:				11/30/89	2/20/90	2/20/90d	5/9/90	8/8/90	11/6/90	11/6/90 d
PARAMETERS:	UNITS	MCL	WAC							
VOLATILE ORGANICS										
Methylene Chloride	ug/l		5	0.6JB	0.9JB	0.8JB	0.9JB	0.6JB	5.2B	3.8B
Acetone	ug/l			1000B	<5.0	<5.0	<5.0	<5.0	2.1JB	<5.0
1,1-Dichloroethane	ug/l		1	0.4M	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		0.4J	<1.0	<1.0	<1.0	<1.0	<1.5	0.6J
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	<2.5	<2.5
Trichloroethene	ug/l	5	3	0.4J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.5
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<5.0	<5.0	<2.5	<2.5
Tetrachloroethene	ug/l	*5	0.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.5
Toluene	ug/l	*2000		0.5JB	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
Chlorobenzene	ug/l	*100		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	*700		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		0.3MB	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trichloro-1,2,2,-trifluoroethane	ug/l			<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	1.1J
SEMIVOLATILES										
Phenol	ug/l			<1	<2R	<2R	<2	<2	<2	<2R
Benzoic Acid	ug/l			<10	<10	<10	<10	<10	<10	<10R
Diethylphthalate	ug/l			0.7J	2	2	<1	<1	0.8MB	0.9MB
bis(2-Ethylhexyl) Phthalate	ug/l		6	16B	10	11	1.7B	<1	<1	<1
PESTICIDES/PCB										
					-	-	-	-	-	-

MASON COUNTY LANDFILL

MONITORING WELL: WALDBURGER / BLUCHER (PP)

SAMPLE LOCATION:				Blucher	Blucher	Blucher	Blucher	Blucher
SAMPLE DATE:				11/30/89	12/21/90	5/9/90	11/6/90	2/8/91
PARAMETERS:	UNITS	MCL	WAC					
VOLATILE ORGANICS								
Methylene Chloride	ug/l		5	0.7JB	0.4JB	1.3JB	3.3B	0.6 MB
Acetone	ug/l			5.2B	57	<10	<5.0	<5.0
1,1-Dichloroethane	ug/l		1	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	*70		0.4J	<1.0	<1.0	<1.5	<1.0
Chloroform	ug/l	100	7	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone				<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/l	5	0.3	<1.0	<1.0	<1.0	<2.5	<1.0
Trichloroethene	ug/l	5	3	0.4J	<1.0	<1.0	<1.0	<1.0
Benzene	ug/l	5	1	<1.0	<1.0	<1.0	<1.5	<1.0
4-Methyl-2-Pentanone	ug/l			<5.0	<5.0	<5.0	<2.5	<5.0
Tetrachloroethene	ug/l	*5	0.8	0.8J	<1.0	<1.0	0.6M	0.5 M
Toluene	ug/l	*2000		0.4MB	<1.0	<1.0	<2.0	<1.0
Chlorobenzene		*100		<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		*700		<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes	ug/l	*10000		<1.0	<1.0	<1.0	<2.0	<2.0
1,1,2-Trochloro-1,2,2-trifluoroethane				<1.0	<1.0	<1.0	<1.0	1.6
SEMIVOLATILES								
Phenol	ug/l			<2	<2	<2	<2	<2
Benzoic Acid	ug/l			<10	<10	<10	<10	<10
Diethylphthalate	ug/l			<1	<1	<1	<1	<1.0
bis(2-Ethylhexyl)Phthalate	ug/l		6	22B	<1	<1	<1	<1.0
PESTICIDES/PCB								
				-	-	-	-	-