Neil Thompson

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Final
Environmental Impact Statement

Midway Landfill Closure Plan

Seattle Engineering Department
Solid Waste Utility

May 1986

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FINAL ENVIRONMENTAL IMPACT STATEMENT

for

THE MIDWAY LANDFILL CLOSURE PLAN

Prepared for

Seattle Engineering Department
Solid Waste Utility
Room 750, Dexter Horton Building
Seattle, WA 98104

Prepared by

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This project is funded through a 50 percent matching grant from the Washington State Department of Ecology under Referendum 39.

May 1986

FACT SHEET

A. Title and Description: The Seattle Engineering Department, Solid Waste Utility, proposes a closure plan for the 60-acre Midway Landfill located at 24800 Pacific Highway South in Kent, Washington. The purpose of the closure plan is to provide adequate pollution control measures in accordance with regulatory and contractual requirements to mitigate the adverse impacts of the landfill on public health and the environment. Operation of the Midway site by The City of Seattle began in 1966 and ended in October 1983. The proposal includes plans for site grading and construction of a low permeability cover system, leachate management, storm water management, and gas and odor control. Three grading alternatives and four major surface water management alternatives were discussed in the Draft Environmental Impact Statement (DEIS) for the closure plan. Four additional off-site surface water management alternatives are evaluated in this Final Environmental Impact Statement (FEIS).

B. Action Sponsor and Date of Implementation: The proposed closure of the Midway Landfill is being undertaken by the Seattle Engineering Department, Solid Waste Utility. Construction activities are tentatively scheduled to begin in 1986.

C. Lead Agency, Responsible Official, and Contact Person:

Responsible Official: Mr. Richard Owings, Director
Seattle Solid Waste Utility

Contact Person: Mr. Mark Edens
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Solid Waste Utility
Room 750, Dexter Horton Building
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D. List of Required Licenses, Permits and Approvals: The following licenses, permits, and approvals may be required for final closure of the Midway Landfill:

- o Section 10/404(b) Permit: U.S. Army Corps of Engineers
- o Water Quality Certification: Washington State Department of Ecology
- o Short-Term Exception to Water Quality: Washington State Department of Ecology
- o National Pollutant Discharge Elimination System (NPDES) Permit: Washington State Department of Ecology
- o Permit for Discharge of Wastewater to a Publically Owned Treatment Plant (POTW): Washington State Department of Ecology

- o Superfund Approval: U.S. Environmental Protection Agency and Washington State Department of Ecology
- o Plan and Specifications Approval: Washington State Department of Ecology and Seattle-King County Department of Public Health
- o Hydraulic Project Approval: Washington State Departments of Fisheries and Game
- o Construction Permit: Washington State Department of Transportation
- o Archaeological Clearance: Washington State Office of Archaeology and Historic Preservation (SHPO)
- o Permission for Access and Construction: Washington State Parks and Recreation Commission
- o Waste Discharge Permit: Metro
- o Notice of Construction: Puget Sound Air Pollution Control Agency
- o Completion and Recurrent Inspection: Seattle-King County Department of Public Health
- o Shoreline Management Substantial Development Permit: King County
- o Flood Control Zone Permit: King County
- o Site Registration: King County Auditor
- o Street Opening Permit: City of Des Moines
- o Land Clearing, Filling, or Grading Permit: City of Des Moines
- o Building Permit: City of Des Moines
- o Drainage Permit: City of Kent
- o Grading Permit: City of Kent
- o Building Permit: City of Kent
- o Renegotiation of Lease Agreement: Midway Sand and Gravel, Inc.

E. Authors and Principal Contributors: This draft environmental impact statement was prepared for the Seattle Engineering Department, Solid Waste Utility, under the SEPA Rules by the following consultants:

Name	Area of Contribution
Parametrix, Inc.	Principal Author Engineering Design Surface Water Vegetation and Wildlife Fisheries Resources Energy and Natural Resources Noise Land Use Housing Aesthetics/Light and Glare Public Services and Utilities
EMCON Associates	Landfill Gas Risk of Explosion Toxic or Hazardous Releases
Golder Associates	Earth Resources Groundwater
KJS Associates	Transportation
University of Washington	Air Quality

F. Date of Issue of DEIS: August 5, 1985

G. Date of Issue of FEIS: May 28, 1986.

H. Time and Place of Public Hearing: A public workshop was held on Thursday August 22nd from 7 to 9 pm at the Kent City Council Chambers. Two public hearings were also held, the first on Thursday August 29 from 7 to 9 pm at the Kent City Council Chambers and the second on Wednesday September 11th from 6:30 to 8:00 pm in the Fourth Floor Conference Room of the Seattle Municipal Building.

I. Nature and Date of Final Action: The final action is a decision by the City Council to approve, approve with modifications, or disapprove the proposed closure plan. The tentative date for taking such action is June 1986. This date is subject to change depending on the time actually required for preparation of the staff report by the Seattle Solid Waste Utility, review of the staff report and FEIS by the City Council, and approval of the Final Closure Plan by the Washington Department of Ecology, U.S. Environmental Protection Agency (EPA), and Seattle-King County Department of Public Health.

J. Subsequent Environmental Review: As noted above, the Final Closure Plan must be reviewed and approved by Ecology, EPA, and the Health Department prior to construction. In addition, Ecology and EPA are currently directing an independent remedial investigation of the site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund).

K. Location of Background Data: Copies of the technical appendices to the DEIS, and all documents incorporated by reference in the DEIS or FEIS, are available for review at the Seattle Solid Waste Utility, Room 750, Dexter Horton Building.

L. Cost to the Public for Copy of FEIS: Copies of this FEIS may be obtained from the City of Seattle at the information counter located on the ninth floor of the Seattle Municipal Building, 600 Fourth Avenue, Seattle, Washington. The cost to the public for copies of this FEIS is $22.50 plus applicable sales tax. If requests are received for mailing copies of the FEIS, the cost will increase to cover postal charges.

TABLE OF CONTENTS

	Page
Revised Fact Sheet	iii
Table of Contents	viii
I. SELECTION OF PREFERRED ALTERNATIVES	I- 1
II. REVISED EIS SECTIONS	II- 1
Surface Water Management	II- 1
Groundwater	II- 8
Surface Water	II-15
Vegetation and Wildlife	II-18
Risk of Explosion and Hazardous Emissions	II-19
Vicinity Land Use	II-26
Transportation Systems	II-26
III. ERRATA	III- 1
IV. COMMENT LETTERS AND RESPONSES	IV- 1
V. PUBLIC HEARING TRANSCRIPTS AND RESPONSES	V- 1

APPENDICES

A. Supplemental Information
D. Geotechnical Reports
F. Water Quality Data
M. Work Plan for Ongoing Groundwater Investigations
N. Beneficial Use Survey
O. Public Health Study
P. Correspondence
Q. Off-Site Surface Water Management Plan Alternatives

I. SELECTION OF PREFERRED ALTERNATIVES

This section indicates the preferred alternative selected by the City of Seattle Landfill Steering Committee for each major engineering element of the Midway Landfill Closure Plan. The rationale for selecting each alternative is also provided. These preferred alternatives will be recommended to the Seattle City Council for approval:

Engineering Element: Site Surface Grade

Preferred Alternative: Intermediate Grade

Rationale: The Intermediate Grade Alternative was judged superior to the Minimum Grade Alternative even though capital costs would be higher by approximately $350,000. This alternative provides for improved surface water runoff; is more aesthetically compatible with surrounding property grades; provides additional grade to allow surface water drainage in the event of landfill settlement; and is more compatible with park development on the southerly section of the property, should such development eventually occur, than the Minimum Grade Alternative. The Intermediate Grade Alternative was judged superior to the Maximum Grade because the Maximum Grade Alternative would require an additional year of construction time, and would cost approximately $1,000,000 more than the Intermediate Grade Alternative, with only minimal performance improvements.

Engineering Element: Final Cover System

Preferred Alternative: Multi-Layer Cover System

Rationale: The primary objective of the final cover system is to reduce surface water infiltration and thereby reduce leachate generation. The multi-layer cover system shown in Figure I-10 of the DEIS reduces leachate generation by over 22 million gallons per year more than the minimum cover system required by the revised State Minimum Functional Standards for Solid Waste Handling (WAC 173-304). Since the risk of groundwater contamination is one of the primary concerns associated with the Midway Landfill, the multi-layer cover system presented in the DEIS is the preferred alternative. As noted in the Fact Sheet, an independent remedial investigation of the Midway Site is being conducted under CERCLA. It is possible that a different cover system will be required to meet more stringent CERCLA guidelines.

Engineering Element: Surface Water Management - Detention

Preferred Alternative: On-Site Detention

Rationale: Detention of surface water runoff is preferred in that it allows flows to be controlled to avoid aggravating existing downstream flooding problems, and provides for removal of contaminants through sedimentation. These two factors will help maintain overall water quality in Smith Creek.

On-site detention is preferred over off-site detention because it allows total control of runoff from the Midway Landfill at the landfill site itself. In particular, monitoring of surface water quality can be conducted on site to allow immediate identification of any problem. If leachate contamination should be detected, surface water runoff will be held in the on-site detention basin and removed to the Kent Highlands Landfill for treatment and disposal until the cause of the contamination is identified and the problem corrected. Finally, an on-site detention basin would preclude the need to convert the existing off-site wetland to an off-site basin, thus preserving the natural character of the wetland.

Engineering Element: Surface Water Discharge

Preferred Alternative: Wetland Discharge Alternative

Rationale: Two alternatives were evaluated in the DEIS for discharging storm water runoff from an on-site detention basin west to Puget Sound, and four more are evaluated in Section II of this FEIS. These alternatives include two wetland discharge options (the On-Site Detention Alternative in the DEIS and the Wetland Discharge Alternative in this FEIS), a tightline route to Puget Sound, and tightline routes to the North Fork or South Fork of Smith Creek along S. 246th Street, S. 250th Street, and S. 252nd Street. A matrix comparing these six alternatives on the basis of environmental variables, potential construction difficulties, and cost is included as Table 2 in Appendix Q of this FEIS.

The Wetland Discharge Alternative described in Section II of the FEIS (page II-4) was selected as the preferred alternative based on a number of factors. In addition to providing a discharge for surface water from the Midway Landfill, this route corrects existing drainage problems between Highway 99 and the wetland area, but causes very little change in the existing conditions in the wetland and North Fork of Smith Creek. The Wetland Discharge Alternative also causes inconvenience to the fewest number of adjacent residences and businesses, and results in the least disruption to local access and school bus routes. Because this alternative requires the shortest pipeline route and involves the jurisdiction of only one municipality (the City of Kent), it can be constructed in the shortest time. Furthermore, the Wetland Discharge Alternative offers flexibility in that it is capable of being extended along any one of the other alternative discharge routes if future conditions should warrant. Because this alternative discharges into drainage courses that eventually lead to Parkside Elementary School and City of Des Moines storm drainage facilities that currently have inadequate capacity for the 25-year storm, the City of Seattle will pursue with the School District and City of Des Moines plans for improving these under-capacity facilities.

II. REVISED EIS SECTIONS

This section of the FEIS presents additional information to be added to certain sections of the DEIS, or repeats some sections in their entirety in cases where substantial revisions were required within the text. Most of the additional information presented in this section is new information that has been developed since the DEIS, such as additional surface water management alternatives and associated impact analyses. Small revisions to the existing text of the DEIS to correct errors or omissions are presented in Section III, Errata.

The revisions below are keyed to specific sections of the DEIS. Complete bibliographic information for references cited in this section is included in Section III of the DEIS.

SECTION I

C. DESCRIPTION OF CLOSURE PLAN ALTERNATIVES

1. MINIMUM GRADE ALTERNATIVE

b. Surface Water Management Plan

Page 22, under 2 Puget Sound Discharge Alternative with On-Site Detention, add the following discussion of additional alternatives for routing the discharge from the on-site detention basin west to Smith Creek:

In comment letters on the DEIS, and testimony given at public hearings, concern was expressed about routing storm water runoff from the on-site detention basin through the wetland area in the vicinity of Parkside Elementary School. To respond to this concern, three additional alternatives were investigated that involve pipeline discharges which bypass the wetland. The three pipeline routes are as follows:

1. Tightline along S. 246th Street to the vicinity of 20th Avenue S.

2. Tightline along S. 250th Street to the vicinity of 16th Avenue S.

3. Tightline along S. 252nd Street to the vicinity of 16th Avenue S.

In addition, in response to City of Des Moines concerns about routing storm water from the Midway Landfill through the city limits, an alternative was developed which involves discharges of storm water near the eastern edge of the natural wetland area within the City of Kent. No storm water management facilities will be constructed within the City of Des Moines under this alternative.

The three alternatives for bypassing the wetland area, and the additional wetland discharge alternative, are described and evaluated in detail in a technical memorandum included in Appendix Q of this FEIS. Graphics are also provided in the appendix. A summary of each of the additional on-site detention alternatives follows. All of the alternatives use the same route for the pipe from the on-site detention basin to the west side of Highway 99 as shown for the On-Site Detention Alternative in the DEIS (Figure I-6). In addition, as for the previous On-Site Detention Alternative, all of the following alternatives include diversion of some of the storm water flows from Highway 99 into the on-site detention basin so that the combined peak discharge from the basin and the undiverted portion of the surface water drainage would not exceed the present peak flow at the point of discharge to Smith Creek.

- Tightline Along S. 246th Street. The S. 246th Street pipeline route is shown in Figure 2 of Appendix Q. After crossing under Highway 99, the pipeline would continue west for about 100 feet and then turn north following the right-of-way for 27th Avenue S. to S. 246th Street. An easement would be required for the portion between Highway 99 and 27th Avenue. Additional easements may be necessary if 27th Avenue right-of-way is insufficient.

  On 246th Street the pipeline would continue west, crossing the northern end of the wetland area to 24th Avenue. The portion of the pipeline that crosses the north end of the wetland would require substantial foundation stabilization by overexcavating and backfilling with granular material or even possibly piling supports because of deep peat soils that would not provide a firm foundation. Recently, construction of a sewer line along this same portion of the route was reportedly abandoned because of the unstable bottom conditions.

  From 246th Street and 24th Avenue, the pipeline would continue westerly for about 300 feet to the eastern property line of Parkside Elementary School. This 300-foot portion would require an easement. Once on the school property, the pipeline would run northerly and then westerly along the east and north school property lines until it ended at the North Fork of Smith Creek near 20th Avenue S. An easement would be required for the portion of pipeline on the school property.

  The total length of the pipeline from Highway 99 to the discharge point in the North Fork of Smith Creek east of 20th Avenue would be about 2,900 feet. This discharge point would be the same as the discharge point for the On-Site Detention Alternative in the DEIS. Pipe size would vary from 18 to 30 inches in diameter, depending on the pipeline slope. As with the On-Site Detention Alternative in the DEIS, culvert improvements would be provided at S. 245th Place, S. 246th Place, and 20th Avenue S. to correct existing under-capacity conditions.

- Tightline Along 250th Street. West of highway 99, the route of this pipeline and the discharge point into the North Fork of Smith Creek would be the same as for the No Detention Alternative described on page I-25 and shown in Figure I-8 of the DEIS (see also Figure 4 in Appendix Q of this FEIS). Because on-site detention would be provided, however, the size of the pipeline would be smaller than with the No Detention Alternative.

  The total pipeline length would be about 4,400 feet, with pipe size varing from 18 to 30 inches in diameter depending on the slope. An easement would be required for that portion of the pipeline that proceeds southwest behind properties located on the west side of Highway 99. Because the on-site detention basin would limit the discharge so that it does not exceed existing peak flows (unlike the No Detention Alternative), no downstream improvements are included in this alternative to correct existing flooding problems in Saltwater State Park.

- Tightline Along S. 252nd Street. The S. 252nd Street pipeline route is shown in Figure 5 of Appendix Q. This route would initially follow the same alignment as the S. 250th Street route along the west side of Highway 99, but would continue southwest to 252nd Street. This portion of the pipeline would require an easement. The pipeline would then proceed on S. 252nd Street to 16th Avenue S. The westerly 1,000 feet of this portion of the route would be on an undeveloped section of S. 252nd Street and would require construction of a road for construction equipment access. Depending on the width and location of the right-of-way, easements may also be necessary along this portion of the pipeline. The pipeline route to this point is entirely within the City of Kent and King County.

  At 16th Avenue S., the pipeline could proceed either north to the North Fork of Smith Creek, west to the North Fork, or south to the South Fork. The route to the north would enter the City of Des Moines and be subject to that City's requirements. The route to the west would be within Salt Water State Park and would require an easement from the State Parks Commission. The route to the south would enter the South Fork drainage basin and be subject to King County requirements.

  The route to the South Fork is about 200 feet shorter than either of the other two and would not disrupt any traffic or access to residences on the east side of 16th Avenue. Since the discharge point on the South Fork is only a short distance upstream from where the North Fork enters Smith Creek, the additional flows would not impact the South Fork basin significantly. However, to meet the requirements of the King County Surface Water Runoff Policy (King County Code 20.50), it would have to be demonstrated that downstream conditions in the short section of the South Fork could accommodate the increased flows.

With either of the three discharge alternatives, the pipeline would proceed down a steep hillside to the creek. Slope anchors would be provided for this short section. An energy dissipator at the bottom of the slope would be provided to slow the velocity of the flow prior to discharge into Smith Creek. No other downstream improvements would be included, since the discharge from the on-site detention basin would be controlled so as not to exceed existing peak flows. The total length of the off-site pipeline for the S. 252nd Street route would be about 5,200 feet. The size of the pipe would vary from 18 to 30 inches in diameter, depending on the slope.

o Wetland Discharge Route. The wetland discharge route is shown in Figure 6 of Appendix Q. With this alternative, the pipeline follows the approximate route of the natural drainage from Highway 99 on the west side of Midway Landfill to the nearest point where it can end in an existing drainage course. This location is near the eastern edge of the natural wetland area and within the City of Kent limits.

After crossing under Highway 99, the pipeline continues west for about 100 feet, then turns north following the right-of-way for 27th Avenue S. until it is approximately 150 feet south of S. 246th Street. Up to this point, the alignment is the same as that of the S. 246th Street route. At this point the pipeline route turns west and continues for approximately 400 feet to where it discharges into a natural drainage course that flows directly into the wetland a short distance away. The discharge point is a short distance east of 26th Avenue S. and approximately 150 feet south of S. 246th Street. There would be no construction activity in the wetland itself. However, drainage problems that are presently occurring between Highway 99 and the wetland would be corrected.

The total length of the pipeline from Highway 99 to the discharge point would be about 900 feet. Pipe size would vary from 18 to 30 inches in diameter, depending on the pipeline slope. The location of the discharge point with this alternative would be the same as the discharge point to the wetland with the On-Site Detention Basin Alternative in the DEIS. Because of the fairly steep pipeline slope just prior to the discharge point, an energy dissipator would be provided to slow the velocity of the flow prior to discharge into the natural drainage course that leads to the wetland. Nearly all of this route would be located on private property and easements from several property owners would be required.

The discharge point for this alternative is located within the City of Kent. Therefore, this alternative will be subject to compliance with the City of Kent Surface Water Drainage Code (Ordinance No. 2130). A review of this ordinance and discussions with City of Kent Engineering Department personnel indicate that it is very similar to the King County Surface

Water Runoff Policy and that facilities designed to comply with King County requirements would also comply with the City of Kent requirements. Because all Surface Water Management Plan Alternatives for the closure of the Midway Landfill are intended to comply with King County requirements, this alternative will not be subject to significant additional requirements to comply with the City of Kent ordinance.

This alternative is essentially the same as the On-Site Detention Basin Alternative in the DEIS, except that no additional improvements downstream of the discharge point are included. Thus, unless mitigation measures are implemented (see revised Section II.A.3.c on page II-17 of this FEIS), there would be no correction of the present drainage problems at Parkside Elementary School and no increased culvert capacity at 20th Avenue South, 245th Place, or 246th Place. By design, this discharge alternative would not increase the peak discharge from the 25-year storm.

Several other off-site routing alternatives were also investigated, but were eliminated from detailed study because they have clear disadvantages compared to the alternatives described above. One of these is a pipeline route along S. 248th Street as shown in Figure 3 of Appendix Q. Both the S. 248th Street route and the S. 246th Street route meet the objective of routing the flow so that it bypasses the wetland and Parkside Elementary School. The 248th Street route offers the advantage of construction activities bypassing the school grounds all together. However, a major disadvantage is that the discharge point would be at the upstream end of a small pond in the North Fork of Smith Creek located on private property. Easements would be necessary for access during construction, as well as for future maintenance. Furthermore, the total length of the off-site pipeline for the S. 248th Street route would be 3600 feet, compared to 2900 feet for the S. 246th Street route. The additional pipeline length would significantly increase the time required for construction, as well as the number of adjacent properties affected. Disruptions to street access would also be greater. Based on these considerations, the S. 248th Street route is not as desirable an alternative as the 246th Street route for bypassing the wetland and the school and will not be evaluated further in this EIS.

Four potential off-site pipeline routes to the south or southwest of the Midway Landfill were also investigated. These are shown in Figure 7 of Appendix Q. As discussed on pages 17 to 23 of that appendix, all the potential routes to the south or southwest appear to have more disadvantages than advantages. These include construction difficulties such as the need for storm line installation on unstable slopes, conflicts with existing utilities and traffic at certain intersections, and the need to improve the existing drainage system to accommodate the increase in storm water runoff. However, the major disadvantage of all the southerly routes is the introduction of storm water into the South Fork of Smith Creek, which is currently not in the drainage basin of the Midway Landfill, and would not be the natural discharge point for surface water runoff from the landfill if outlets for such runoff were provided. This implies liability associated with increased erosion, requirements to

upgrade culvert crossings, etc. Compared to the S. 252nd Street route to the South Fork discussed on page II-3, these southerly routes would discharge into the South Fork a significantly greater distance upstream of where the North Fork enters Smith Creek. Therefore, it is less likely that the requirements of the King County Surface Water Runoff Policy could be met. However Route No. 1 (Figure 7 in Appendix Q) discharges much closer to the North Fork than the other three routes. The creek bottom is quite wide at the discharge point, so the impact on this reach of Smith Creek would likely not be signficant. Route No. 1 is essentially a modification of the S. 252nd Street route discussed previously, and should be considered further only if the S. 252nd Street route is eventually selected as the preferred alternative.

The environmental impacts of the four additional on-site detention alternatives described as bulleted items above are evaluated in later subsections of this section of the FEIS. The evaluation is limited to revisions to the following sections of the DEIS: Section II.A.3 Surface Water, Section II.A.5 Vegetation and Wildlife, and Section II.B.4 Vicinity Land Use. These are the areas where the potential impacts of the additional alternatives are of most concern; or where impacts of the different alternatives would be expected to differ to some degree, allowing a comparison.

1. MINIMUM GRADE ALTERNATIVE

b. Surface Water Management Plan

Page I-28, replace Section (b) Green River Discharge Alternatives with the following section:

(b) Green River Discharge Alternatives. Several options were considered for discharge of surface water runoff from the Midway Landfill Site to the Green River. However, discharges to the Green River are subject to strict regulation under the Green River Management Agreement. The terms of this agreement make the implementation of any Green River discharge alternative highly problematic.

The Green River Management Agreement is an interlocal agreement adopted in 1985 by King County and the Cities of Auburn, Kent, Renton, and Tukwila. As clarified in a letter dated December 5, 1985 from King County's Surface Water Management Division (Appendix P), the Management Agreement requires the County and Valley cities to cooperatively develop plans and programs to more effectively deal with regional surface water and flood control problems in the lower Green River Valley. The letter states in part:

> During high river flow conditions which occur annually in the lower basin, the Green River channel has limited capacity to accept additional discharges, either pumped or gravity-drained, without compromising channel freeboard and potentially risking levee overtopping and/or levee failure. As a consequence, the Management Agreement has prescribed limitations on the timing

> and quantity of these river discharges until such time as the channel is enlarged through a comprehensive levee improvement project.
>
> The Agreement requires that all new pumped discharges into the Green River be limited in operation to periods when the river flow, as measured at the Auburn gage, is less than 9,000 cubic feet per second (cfs). Further, these pumping facilities must be designed with sufficient on-site storage to retain the excess surface flows (non-pumped) for a 100-year flood event on the Green River. The Corps of Engineers estimates the 100-year flood event will result in the river remaining at or above 9,000 cfs for 7 days. Any deviations from these requirements or requests for new drainage capacity into the Green River must be reviewed and approved by the Green River Technical Committee, in accordance with the provisions of the Management Agreement. The Technical Committee is comprised of the Public Works and Planning Directors of the Valley Cities and King County.
>
> In order to implement the directives of the Management Agreement concerning pumping and river discharges, the parties to the Agreement are currently preparing a pumping/discharge procedures plan. The procedures plan will establish additional design parameters and operating guidelines for new pumping facilities and gravity outfalls. Under the current draft of the procedures plan, pumping plants and gravity discharges are both limited to the operating conditions and storage requirements specified in the paragraph above.

The requirements of the Green River Management Agreement stated in the second paragraph above do not actually prohibit storm water discharge from the Midway Landfill to the River. However, it would not be technically feasible to provide sufficient storage on the landfill site to retain surface water runoff from the 100-year storm for a period of 7 days. Furthermore, drainage plan requirements specified in King County Code 20.50 and the Storm Drainage Design Manual prohibit the diversion of surface waters to non-natural discharge points.

> Under no circumstances shall drainage be diverted in the proposed development to points of discharge other than those points receiving drainage prior to the proposed development (Section b - Storm Drainage Design Manual).

The Midway Landfill presents a unique situation, in that there is currently no discharge of storm water from the site (see page II-26 of the DEIS under (2) Water Movement and Runoff). However, if the ponds on site overflowed during a storm and there was natural surface drainage to convey the storm water off-site, it would flow west toward Puget Sound via Smith Creek rather than east toward the Green River. Therefore, under King County policy, the Green River is not considered the natural discharge point and diversion of surface water from the landfill to the River would not be authorized.

SECTION II

A. THE NATURAL ENVIRONMENT

2. GROUNDWATER

a. Existing Conditions

Pages II-14 through II-18, replace subsection (2) Groundwater Quality and (3) Public Water Supplies with the following revised sections:

(2) Groundwater Quality. One of the primary problems associated with a landfill site is the potential for contamination of the local groundwater by leachate. Leachate is an aqueous solution generated by water percolating through waste materials. After percolating through the waste the liquid may contain organic and inorganic constituents and have the potential to contaminate the surrounding soils, groundwater, and/or surface waters. Leachate quality can vary widely, even within sites with similar waste types. Table II-1 shows the range in values observed from two different landfill sites filled with the same type of wastes. It is apparent that there is wide variation in the measured parameters both between and within the sites. Some data from the Midway site leachate is also included. (Priority pollutant data for Midway leachate can be found in Table A-3 in Appendix A). This information on leachate quality is added to give an indication of the type of pollutants that may be expected. The concentration of the different pollutants will vary depending upon the age and type of waste material buried and upon dilution of the leachate. Because of this large variation in leachate quality and strength, surface water removed from the Midway site is measured for dissolved oxygen, pH, and conductivity to make a quick determination of its degree of contamination. The outcome of these measurements determines where the water will be disposed of as discussed in Section II.A.3.a.(2).

Leachate typically contains large quantities of organic and inorganic contaminants, and high concentrations of dissolved solids (Freeze & Cherry, 1979). Significant indicators of leachate (from municipal refuse) include high levels of biological oxygen demand (BOD), chemical oxygen demand (COD), iron, chloride, inorganic nitrogen (Hammer & MacKechan, 1981). The presence of some of these constituents will result in high measurements of specific conductivity. Thus this parameter is often used as a quick indicator of leachate contamination.

A field survey to determine specific conductivity of groundwater wells was conducted by Golder Associates (1982). Results of the survey are shown in Figure II-6. In order to maintain consistency with past reports and to more easily differentiate between them, testing wells have been divided into two series labelled as boreholes (e.g., BH-1B) and monitoring wells (e.g., MW-1). Relatively high specific conductivity values, ranging from 1,250 to 3,650 micromhos per centimeter (umhos/cm), were measured in wells BH-3, BH-6, BH-7 and BH-8 completed in units underlying or surrounding the landfill. These high values indicate the presence of leachate in these wells. A background level of specific conductivity of 245 umhos/cm was

Table II-1. Composition of initial leachate[1] from municipal solid waste.

Component	Midway Site[3]	Site A Low	Site A High	Site B Low	Site B High
pH	7.16	6.0	6.5	3.7	8.5
Hardness, $CaCO_3$	1490.	890	7,600	200	550
Alkalinity, $CaCO_3$	3910	730	9,500	-	-
Ca (Calcium)	-	240	2,330	-	-
Mg (Magnesium)	-	64	410	-	-
Na (Sodium)	-	85	1,700	127	3,800
K (Potassium)	-	28	1,700	-	-
Fe (Iron) (total)	0.16	6.5	220	0.12	1,640
Ferrous iron	-		8.7[2]	8.7[2]	-
Chloride	464	96	2,350	47	2,340
Sulfate	39.7	84	730	20	375
Phosphate	-	0.3	29	2.0	130
Organic N (Nitrogen)	-	2.4	465	8.0	482
NH_4-N	-	0.22	480	2.1	177
BOD (Biological Oxygen Demand)	-	21,700	30,300	-	-
COD (Chemical Oxygen Demand)	-	-	-	809	50,715
Zn (Zinc)	0.01	-	-	0.03	129
Ni (Nickel)	0.04	-	-	0.15	0.81
Suspended solids	-	-	-	13	26,500

(1) Average composition, mg per liter of first 1.3 liters of leachate per cubic foot of a compacted, representative, municipal solid waste.
(2) One determination.
(3) Composition of leachate sample collected directly on-site.
Source: Brunner, D.R. and D.J. Keller, 1972.

measured in well MW-1 (installed and sampled in 1985) located upgradient of the landfill (see Figure II-2). Other measurements probably reflecting background levels were obtained in wells MW-5 and MW-6 (also installed and sampled in 1985). These wells, located as shown in Figure II-2, had specific conductivity values of 158 and 180 umhos/cm, respectively.

A specific conductivity measurement was also taken on water from the Reith Road spring (located approximately 1/8 mile southeast of the intersection of S. 260th St. and 25th Ave. S.) in July of 1985. A concern had been expressed that this spring was contaminated by landfill leachate. The conductivity measured was well within the normal range for groundwater (220 umhos/cm) and thus did not indicate that contamination had occurred.

By examining water samples taken from boreholes or monitoring wells and analyzing them for these constituents, some indication may be made as to whether or not they have been contaminated by leachate. Tables A-2 and

A-3 in Appendix A summarize water quality data from wells on and near the Midway Landfill site

The important difference between all the groundwater testing wells is their location in reference to the landfill site. Wells BH-3. BH-4 BH-5 and BH-7 are located inside the landfill site (Figure II-5); wells BH-1B, BH-6, BH-8 and MW-2 are located near the perimeter of the site; (Figure II-5) and MW-1, MW-4, MW-5, and MW-6 are located further from the site (Figure II-2). Because MW-1 is located upgradient of the apparent groundwater flow, it is used to represent background water quality that is out of the area of influence by the landfill. Low concentrations of trichloroethene and tetrachloroethene, two man-made chlorinated solvents. were detected in groundwater from well MW-1. Other constituents detected in well MW-1 were within the range of typical values for a non-degraded aquifer. The source of the chlorinated solvents in well MW-1 was not determined, but they would not be expected to originate from the landfill since the well is located hydraulically upgradient of the site.

Those boreholes located inside the landfill site are also at different depths. BH-4 and 5 sample from directly within the fill material while wells BH-3 and 7 sample from glacial outwash (primarily layers of gravel and sand deposited by running water from a melting glacier) immediately below the fill material. As might be expected from the above description. BH-4 and 5 show the most contamination with highest solids, conductivity, and heavy metal content. BH-3 and 7 are also contaminated, although 7 has lower concentrations of most of the indicators, perhaps due to its greater depth in the aquifer. None of these wells meet drinking water standards.

Some wells located along the perimeter of the site show signs of contamination in terms of their heavy metal concentrations, and there are apparent differences in the magnitude of contamination. BH-6 and BH-8 seem to have much higher concentrations of metals such as iron, manganese and boron along with elevated measurements of specific conductivity and solids content than wells BH-1B or MW-2. Well BH-1B may be situated outside of the main pathway of groundwater flow and is completed in a unit of the aquifer that is comprised of clay and silt. This unit would have a much lower transmissivity of fluids than the gravel and sand layer that wells BH-6 and 8 sample from. These differences may explain the variation in the degree of contamination between these wells. Conversely, MW-2 does not appear to be contaminated. Although high concentrations of iron and manganese have been measured in the well, these metals occur naturally at variable concentrations in the region's groundwater. No other pollutants or possible leachate indicators have been observed in well MW-2, yet it is in the direct pathway of groundwater flow and is completed within a gravel and sand unit similar to wells BH-6 and 8. It is possible that contaminated groundwater that would normally have been reaching this well was intersected by the pond at the south end of the site, or that some other geological barrier was diverting the flow from this area.

Results of sampling and analysis of groundwater samples from the monitoring wells located further from the landfill (MW-4, and MW-5 and MW-6) are not indicative of degradation by landfill leachate. Levels of iron and manganese elevated above background (i.e., MW-1) were observed in all three of these wells. However as noted previously, iron and

Table II-1A. Data included in preparation of the groundwater quality section of the Midway Landfill EIS.

Data Source	Date	Parameters Analyzed	Wells Tested
EPA	Jan. 1983	Priority Pollutants Heavy Metals	BH-Series
EPA	June 1983	Priority Pollutants Heavy Metals	BH-Series
WDOE	1983	Conventional Parameters Heavy Metals	BH-Series
Analytical Technologies, Inc.	April 1985	Priority Pollutants Heavy Metals	MW-Series BH-6, BH-8
Analytical Technologies, Inc.	June 1985	Priority Pollutants Heavy Metals Conventional Parameters	Leachate
Analytical Technologies, Inc.	July 1985	Priority Pollutants Heavy Metals Conventional Parameters	MW-5, MW-6

manganese are common naturally occurring constituents of groundwater in the area. One organic compound was detected in MW-6 and two in MW-5, but at concentrations below the normal detection limit. No indication of significant leachate contamination was detected. Additional planned sampling and analysis will increase the understanding of water quality in these wells.

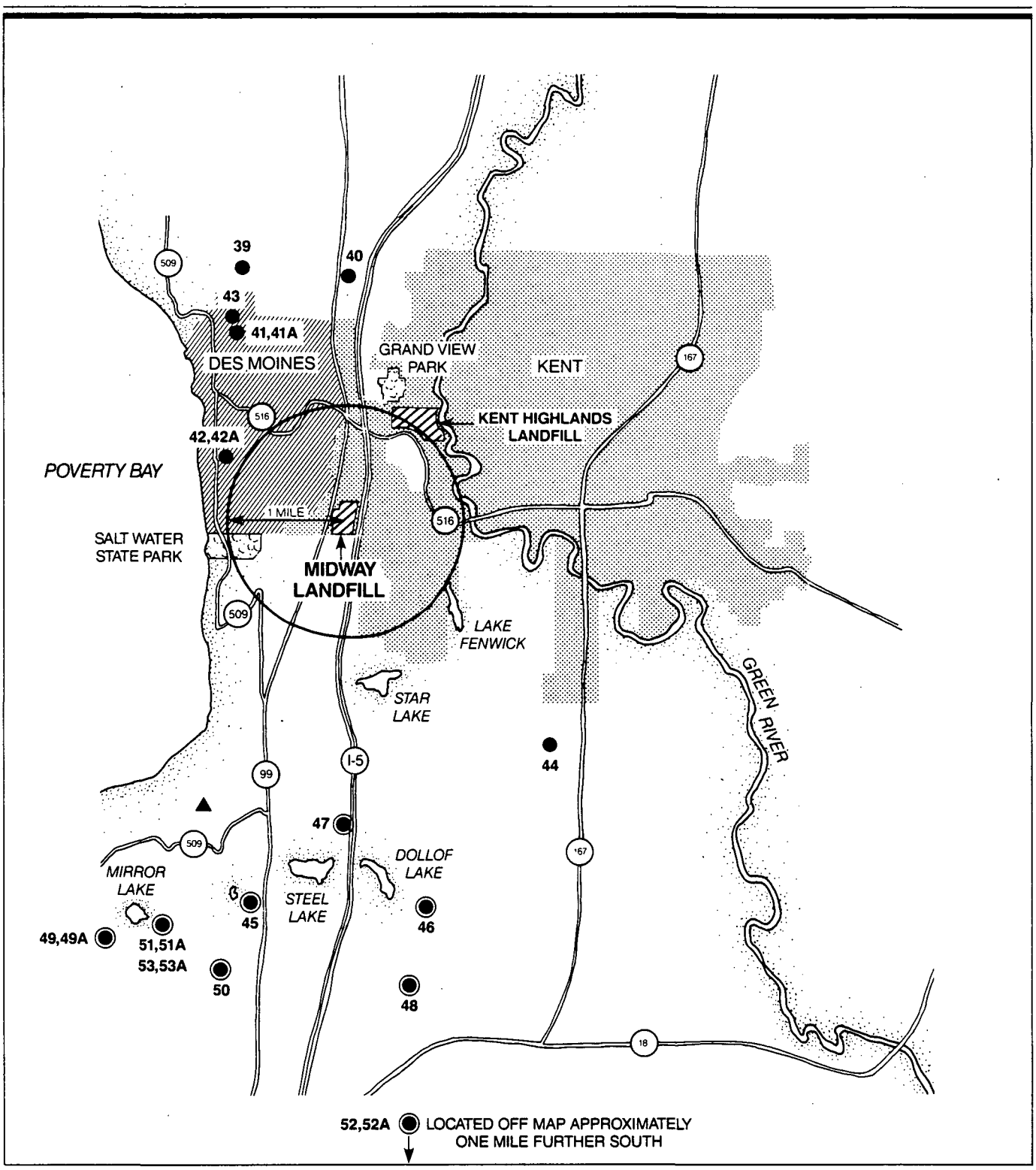
For all of the wells, the heavy metals that are most important are iron, lead, manganese, and zinc, because they are indicators of leachate contamination. Organic pollutants do not seem to be a problem; most were below detectable limits or detected in concentrations too low to quantify. Ethyl benzene was the only organic priority pollutant consistently detected in the contaminated wells, with a range of 5 to 350 micrograms per liter (ug/l), as shown in Table A-3. (Priority pollutants refer to a

list of 129 compounds established by EPA which are of the greatest environmental concern. The list includes known and suspected carcinogens, mutagens, teratogens, and other compounds known to have toxic effects on human and aquatic life.) Although there are no criteria established for this pollutant, one 96 hour aquatic toxicity test resultedin a threshold limit, at which 50% mortality occurred, of 10,000 ug/l. This high threshold limit indicates that the concentrations in the wells may be below a level of immediate concern. Other organics were also detected but the detections were spotty; a pollutant would show up in one or two of the boreholes, or on one of the two sampling dates at fairly low concentrations.

As shown in Figure II-5 of the DEIS, existing data indicate that the general direction of leachate migration is probably southward from the landfill. The current extent of the leachate plume has not been identified with existing wells. However, significant leachate contamination has not been found in wells MW-4, MW-5 and MW-6 located off-site to the south as shown in Figure II-2. Significant contamination has also not been measured in well MW-2, located at the southwest corner of the site. As discussed previously, there is a potential for vertical migration of leachate into deeper units in the area of MW-3.

Since groundwater degradation has been verified in groundwater monitoring wells located off of the landfill property, additional work is being planned to further characterize this and develop the necessary information to design any remedial measures that may be required. A work plan for on-going groundwater investigations is presented in Appendix M. The closure plan for the landfill includes remedial measures which will significantly reduce the amount of new leachate being generated. These measures include control of surface water runoff and capping of the landfill to reduce infiltration of incidental precipitation. Remedial measures to mitigate any further degradation of groundwater could include a number of engineering techniques such as those described on page I-36 of the DEIS. Additional measures may be identified as part of the remedial investigation being conducted under CERCLA.

(3) Public and Private Water Supplies. The results of a survey of groundwater supply wells in the vicinity of the Midway landfill site are included in Appendix N of this EIS. The survey entailed compiling an inventory of private water supply wells located within one mile of the landfill site, and public wells within five miles of the site (Figures II-7 and II-7A). King County Water Districts #54, #75 and #124 (Federal Way Sewer and Water) obtain groundwater supplies from wells located as shown in Figure II-7. The nearest publicly owned water supply wells are located northwest of the site at a distance of approximately one mile. The nearest well south of the site is located approximately two to three miles away. It is not known whether any of these wells are drawing water out of the same glacial outwash deposits which occur in the vicinity of the site or to what degree hydraulic continuity occurs between the water supply sources and groundwater at the landfill site; however, it is unlikely that any of these wells are affected by the Midway Landfill due



N

SCALE IN MILES

0 1 2

42,42A 43,44 Privately Owned Public Supply Wells

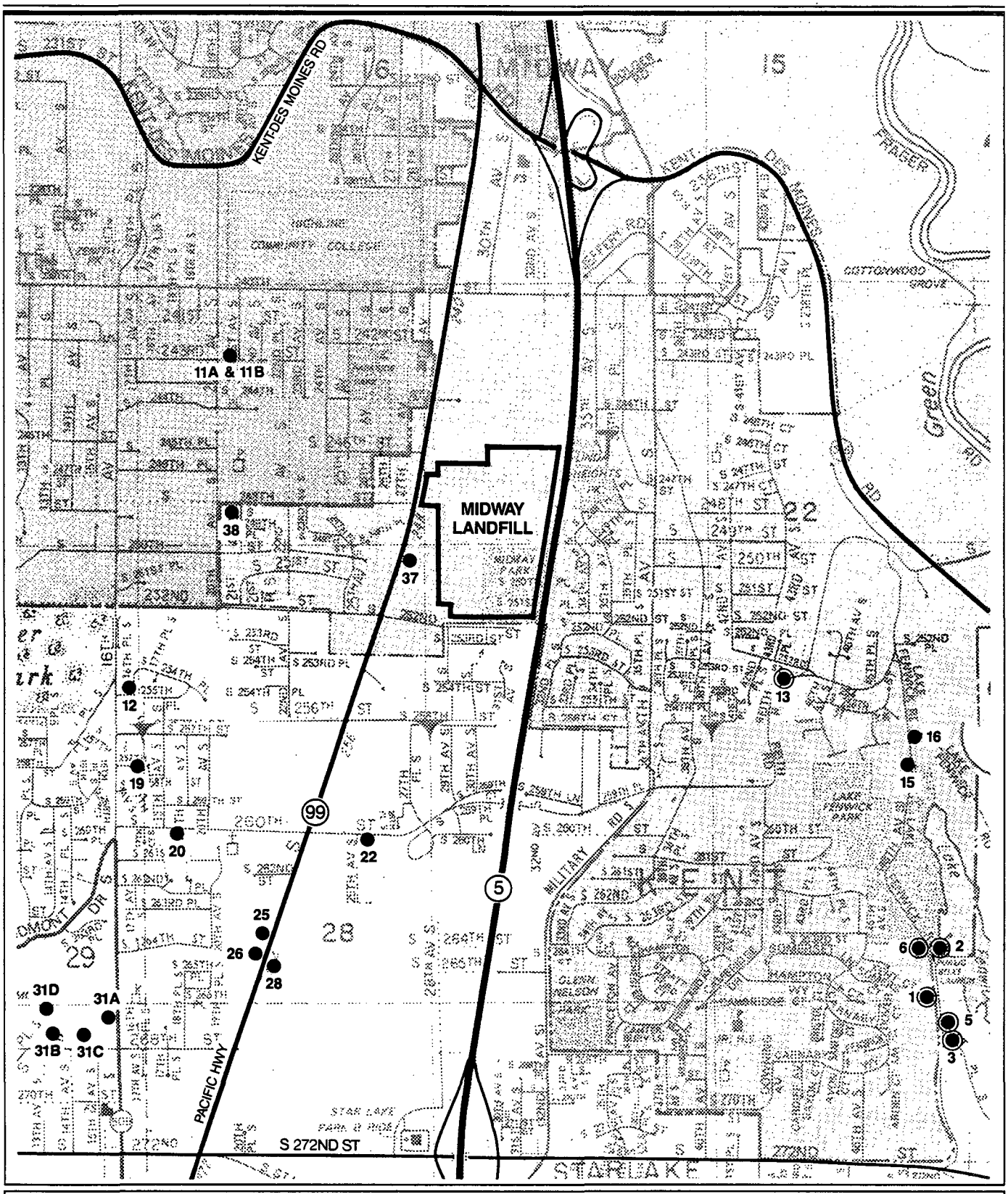
▲ Water District #56 No Wells, Springs Used as Water Source

Federal Way Sewer and Water

39,40 Water District #75 2 Wells in Construction

41,41A Water District #54 2 Wells in Use, 1 New Well Proposed at Same Location

Figure II-7. Location of public water supply wells.



SCALE IN FEET

0 1,000 2,000

N

● Wells Presently Being Used for Human Drinking Supplies

● Wells Not Currently in Use for Human Drinking Supplies

Figure II-7A.
Private wells, being utilized or capable of being utilized that are located within a one mile radius of the landfill site.

to their distance from the site or the fact that regional groundwater level contours indicate that these wells are located upgradient from the site (Figure II-3 of the DEIS).

Most private wells are located southeast and southwest of the site. Those southeast of the site are not thought to be within the path of groundwater flow from the landfill site. None of the wells located southwest of the site are currently being used from domestic purposes (Appendix N, Table N-1).

No water quality data was available for the private wells. Water quality data from public wells indicated that all measured parameters were within the normal range for groundwater except manganese. The manganese concentration ranged from <0.01-0.59 mg/l in the public water supply wells. As discussed in Appendix N, the concentration of this heavy metal exhibits high natural variation in groundwater in this area, and there is no indication that landfill leachate is its source.

3. SURFACE WATER

b. Impacts of Alternatives

Page II-37, under 2 On-Site Detention Alternative, add the following evaluation of the four additional off-site routing alternatives described in revised Section I.C.1 above:

Impacts of the three off-site tightline routing alternatives (S. 246th Street, S. 250th Street, and S. 252nd Street) would differ somewhat from those of the On-Site Detention Alternative described in the DEIS. Because some of the Highway 99 drainage is diverted to the on-site detention basin and the pipeline discharges downstream of the wetland, flows in the natural drainage courses between Highway 99 and the pipeline discharge point, including the wetland and Parkside School grounds, would be decreased. In the case of the S. 252nd Street tightline alternative, if the pipeline discharged into the South Fork of Smith Creek, flows would be reduced in the entire North Fork of the creek. With all three tightline alternatives, impacts on Smith Creek flows downstream of the discharge point would be minimal. Discharge from the on-site detention basin would be controlled so that it doesn't exceed the existing peak flows. The duration of peak flows would be extended in the north drainage basin of which the landfill is a part (see page II-22 of the DEIS). However, since the basin contributes only a small portion of the flow in Smith Creek, the resulting effect on the duration of flooding in the creek would be negligible.

The water quality of the surface water runoff discharged under the three tightline alternatives may be slightly degraded compared to the On-Site Detention Alternative described in the DEIS and the additional wetland discharge alternative evaluated below. As described on page II-37 of the DEIS, wetlands have been determined to be effective in removing nutrient and heavy metals from surface water runoff. By bypassing the wetland, the three tightline routing alternatives do not take advantage of this natural "treatment".

As described in revised Section I.C.1 above, the additional wetland discharge alternative is essentially the same as the On-Site Detention Alternative in the DEIS, except that no additional improvements downstream of the discharge point are included. Thus, there would be no correction of the present drainage problems that are occurring at Parkside Elementary School and no increased culvert capacity at 20th Avenue S., S. 245th Place or S. 246th Place. By design, this discharge alternative would not increase the peak discharge from the 25-year storm. However, the school drainage system and the road culverts were identified as being under-capacity for the 25-year design storm in work done for the DEIS.

A storm event that occurred on January 17 and 18, 1986, subsequent to the issuance of the DEIS, presented an opportunity to verify the extent of the problem at these locations and to check the assumptions made to determine capacities of existing facilities. The storm resulted in 3.22 inches of precipitation in a 24-hour period (recorded at Sea-Tac Airport). Based on information provided on pages 15 and 16 of Appendix Q, it appears that this storm was at least close to the 25-year storm at Sea-Tac Airport and might have been greater. Because Sea-Tac is close to the Midway Landfill site, it is assumed that the precipitation in the vicinity of the landfill was similar.

Telephone conversations with City of Des Moines Engineering Department personnel (Mr. Ron Longhi, February 24, 1986) confirmed that certain areas of the City experienced flooding on the dates of the storm. However, the City was not aware of any flooding problems in the North Fork of Smith Creek, and there were no reports of street flooding at 20th Avenue S., S. 245th Place and S. 246th Place. The culverts may have been restricting the flows somewhat, however, because of inadequate capacity.

A telephone conversation with Highline School District personnel responsible for maintenance of school grounds (Mr. Blaine Larson and Mr. Paul Bray, February 24, 1986) determined that there were substantial flooding problems at Parkside Elementary School. The buildings were not threatened, but flooding of the playground was quite extensive and somewhat worse than in the past. Water was flowing over the playground from the southeast corner (near the wetland) to the northwest corner where it could get into the drainage channel of the North Fork of Smith Creek. The school district personnel contacted (see above reference) indicate that the district has been under a lot of public pressure to correct this existing flooding problem, and may proceed to do so this year regardless of the City of Seattle's plans for landfill closure.

School personnel report that flooding from the January 17 - 18 storm was over by January 21. Parametrix, Inc. personnel made field investigations of the school grounds and the culverts discharging to the North Fork of Smith Creek on three occasions between January 24 and March 3. No evidence was observed of any extensive damage as a result of flooding. The creek near each of the culverts showed evidence of recent high flows, but there was no new major erosion or other damage. It appeared that the creek had handled the flow from the storm with little, if any, problem.

The school playgrounds were quite muddy and saturated with water in places where the flows had gone overland. If the school district proceeds to improve the drainage system, this condition will be avoided in the future.

It appears from these investigations that although certain existing culverts in the North Fork of Smith Creek basin may be under-capacity for the 25-year storm, the problems they are causing are not too substantial and are of short-term duration. The assumptions made to determine culvert capacity for purposes of the DEIS were evidently over-conservative. Therefore, as long as the wetland discharge alternative includes provisions to limit the peak discharge from the 25-year storm so as not to exceed the existing peak discharge, no improvements to these culverts appear to be necessary.

By limiting the discharge to the wetland area so that it does not exceed the existing peak discharge, the existing flooding condition in the wetland area and at the school will not become more extensive. However, because more water is being routed through the area, the duration of the existing flooding conditions would be extended. Although detailed computations have not been prepared, it is estimated that this extended duration would be one day for the 25-year design storm. Mitigation for this impact is discussed below.

c. Mitigation Measures

Page II-39, add the following discussion to the mitigation section:

> Because the Wetland Discharge Alternative would extend the duration of an existing flooding condition at Parkland Elementary School, mitigating measures will be investigated if this alternative is selected. By increasing the capacity of the school storm drainage system, the existing flooding of the wetland area and the playground would be reduced or eliminated. However, the increased capacity of the school storm drainage system would result in increased flow in the downstream sections of the North Fork of Smith Creek. To accommodate this increased flow without causing increased flooding, the capacity of the culverts at 20th Avenue S., S. 245th Place and S. 246th Place would have to be increased. It appears that the North Fork of Smith Creek channel would be adequate for this increased flow and, as long as the increased culvert capacities were provided, there would not be any increased flooding near the channel. It should be noted that the increased flow in the North Fork of Smith Creek would be solely the result of increasing the capacity of the school storm drainage system, and would occur without the discharge of surface water from the Midway Landfill to the wetland area. Mitigation of existing flooding conditions by improving the school storm drainage system and downstream culverts will be pursued with the School District and the City of Des Moines if the Wetland Discharge Alternative is selected as the preferred alternative.

5. VEGETATION AND WILDLIFE

b. Impacts of Alternatives

Page II-52, under 2 On-Site Detention Alternative, add the following evaluation of the four additional off-site routing alternatives described in revised Section I.C.1:

The effect of the new wetland discharge alternative on wetland vegetation would be similar to that of the On-Site Detention Alternative (see page II-52 of the DEIS). With either of the three tightline routing alternatives (S. 246th Street, S. 250th Street, or S. 252nd Street), diversion of some of the Highway 99 drainage into the on-site detention basin would result in a decrease of existing surface water flow through the wetland. However, this decrease in runoff entering the wetland would not alter the water regime in the wetland sufficiently to cause a significant change in vegetation. With the S. 246th Street route, a portion of the pipeline crosses the north end of the wetland. Construction would disturb a strip of wet land approximately 400 feet long by 50 feet wide within the same corridor previously disturbed by construction of a sewer line. Vegetative cover in this area is now minimal. If the S. 246th Street alternative is selected, a wetland expert should be consulted prior to construction to recommend construction techniques and develop an active program of revegetation of the disturbed corridor.

All four additional off-site routing alternatives would result in temporary disturbance of vegetation along the pipeline route from construction activities. The number of feet of pipeline corridor that would result in destruction of existing vegetation under each alternative is as follows:

- Tightline Along S. 246th Street - trees and brush along 800 feet of undeveloped land, 900 feet of Parkside Elementary School playground, and 600 feet of undeveloped road right-of-way.
- Tightline Along S. 250th Street - brush along 1,400 feet of undeveloped land.
- Tightline Along S. 252nd Street - trees and brush along 3,200 feet of undeveloped land.
- Wetland Discharge Alternative - trees and brush along 700 feet of undeveloped land.

The total construction time for these alternatives would range from several months in one construction season for the S. 246th Street route and wetland discharge alternatives to potentially more than one construction season for the other two alternatives. However, disturbance

along any one segment would be temporary and not result in significant impacts to terrestrial resources.

B. THE BUILT ENVIRONMENT

Page II-68, replace Section 2. Risk of Explosion and Hazardous Emissions with the following revised section:

2. RISK OF EXPLOSION AND HAZARDOUS EMISSIONS

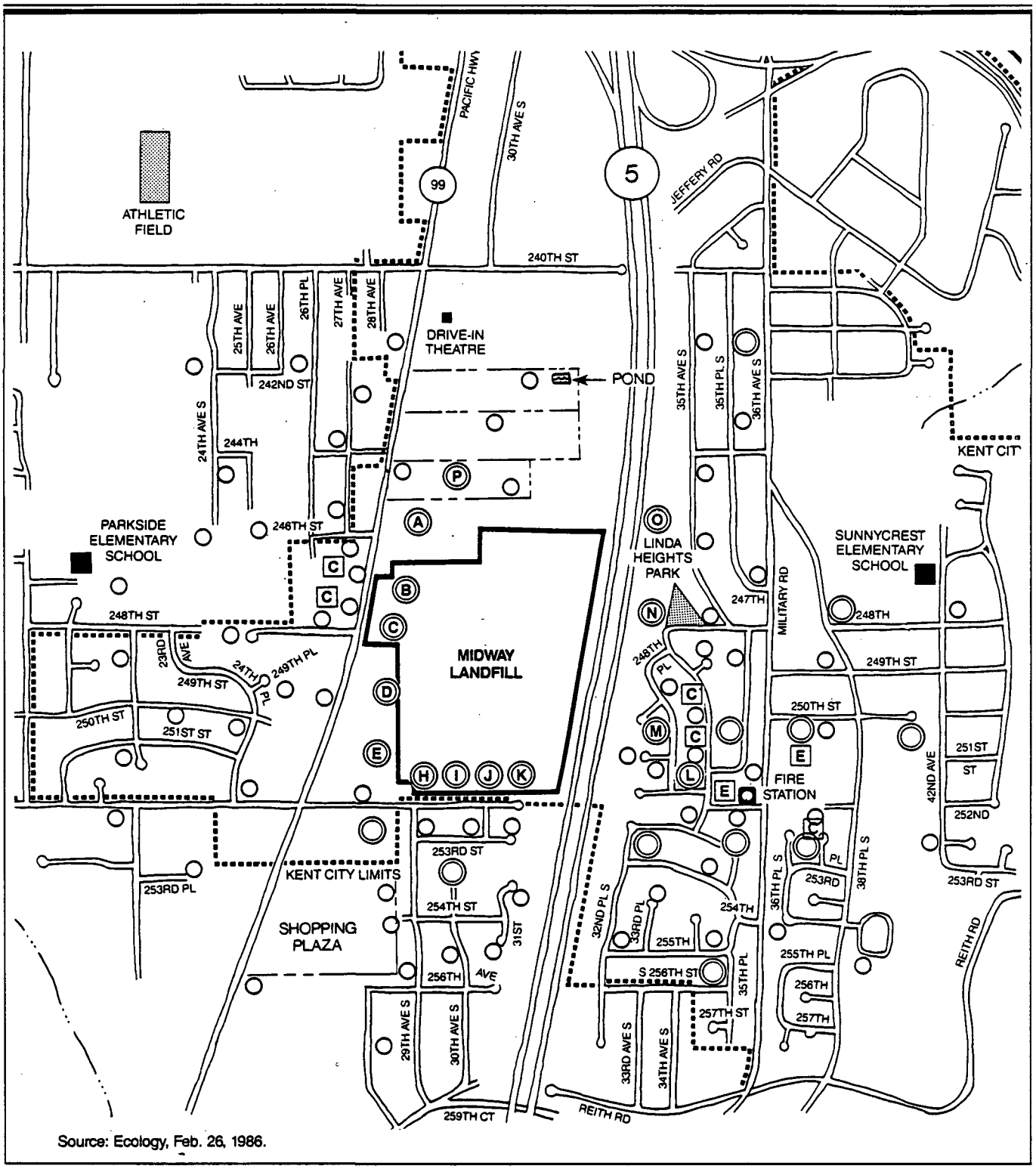
a. Existing Conditions

Landfill gas generated by the decomposition of solid waste within the landfill generally contains 40 to 60 percent methane. In the soil, this methane presents little risk of explosion due to the lack of oxygen. However, landfill gas is potentially explosive if permitted to collect in an enclosed space where methane reaches concentrations of from 5 to 18 percent by volume. Landfill gas from unlit flares at the Midway Landfill was analyzed for trace amounts of toxic compounds by the University of Washington (Appendix G). Data was collected and ambient air measurements made on May 17, 1985. Based on measurements made in the field, Larson and Wineman (Appendix H) modeled the dispersion of landfill gas. They predicted that under worst case assumptions when flares are unlit and northerly winds and stable meterorological conditions occur, concentrations of benzene and/or hydrogen sulfide could exceed the regulatory guidelines established by several states at the southern boundary of the site (see Table II-11 in Section II.A.4).

It is important to note that gas samples taken from probes within refuse (the unlit flares) are subject to the effects of refuse components near the probe and may not represent the characteristics of the overall landfill gas produced. For instance, if a probe was inadvertently installed near a broken solvent can, the gas sampled at the probe would have significant concentrations of that solvent. But if the same probe had been installed 20 feet distant, no solvent might be detected. It is difficult to conclude what trace compounds might be detected in the composite landfill gas except by sampling the gas collected by an active withdrawal system.

In 1985 a number of multilevel landfill gas monitoring probes were installed in native soil around the landfill's perimeter to determine the extent of landfill gas migration. These 1985 probes are shown as probes A through E and H through P in Figure II-13. (Probes F and G were planned, but never installed). Since that time, an extensive network of probes has been installed at some 90 locations in the vicinity of the landfill (Figure II-13).

Data from these probes indicates that part of the landfill gas produced on the site during the last 20 years has migrated off-site as far away as 2500 feet (Figures II-13A and II-13B). It appears that the methane has



Source: Ecology, Feb. 26, 1986.

N

SCALE IN FEET

0 500 1,000

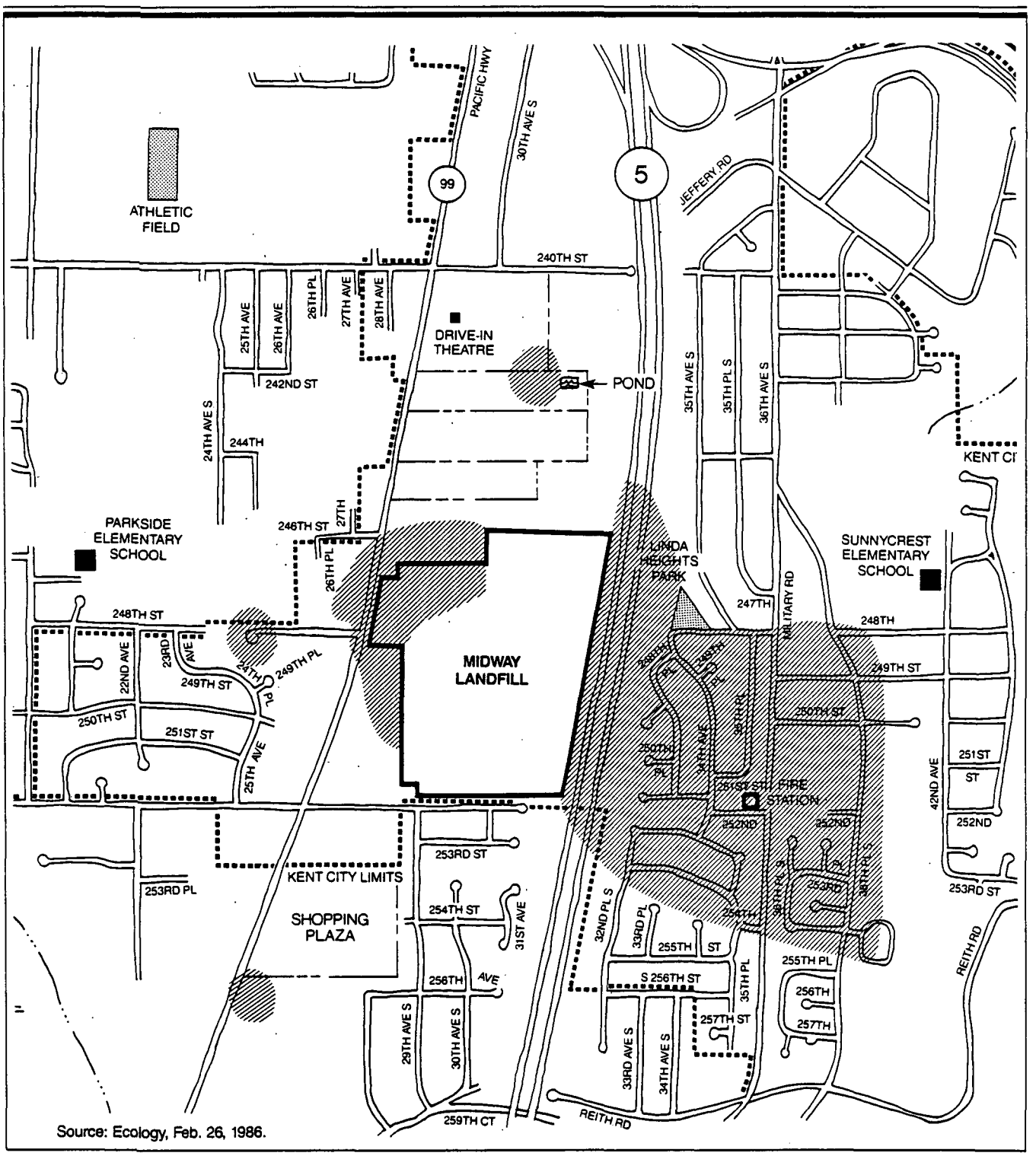
Single Level Probes

Multi-Level Probes

E Ecology Extraction Well

C City of Seattle Extraction Well

Figure II-13.
Location of gas monitoring probes and gas control wells.



Source: Ecology, Feb. 26, 1986.

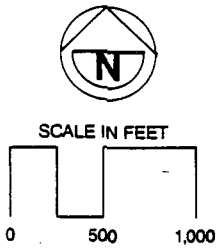
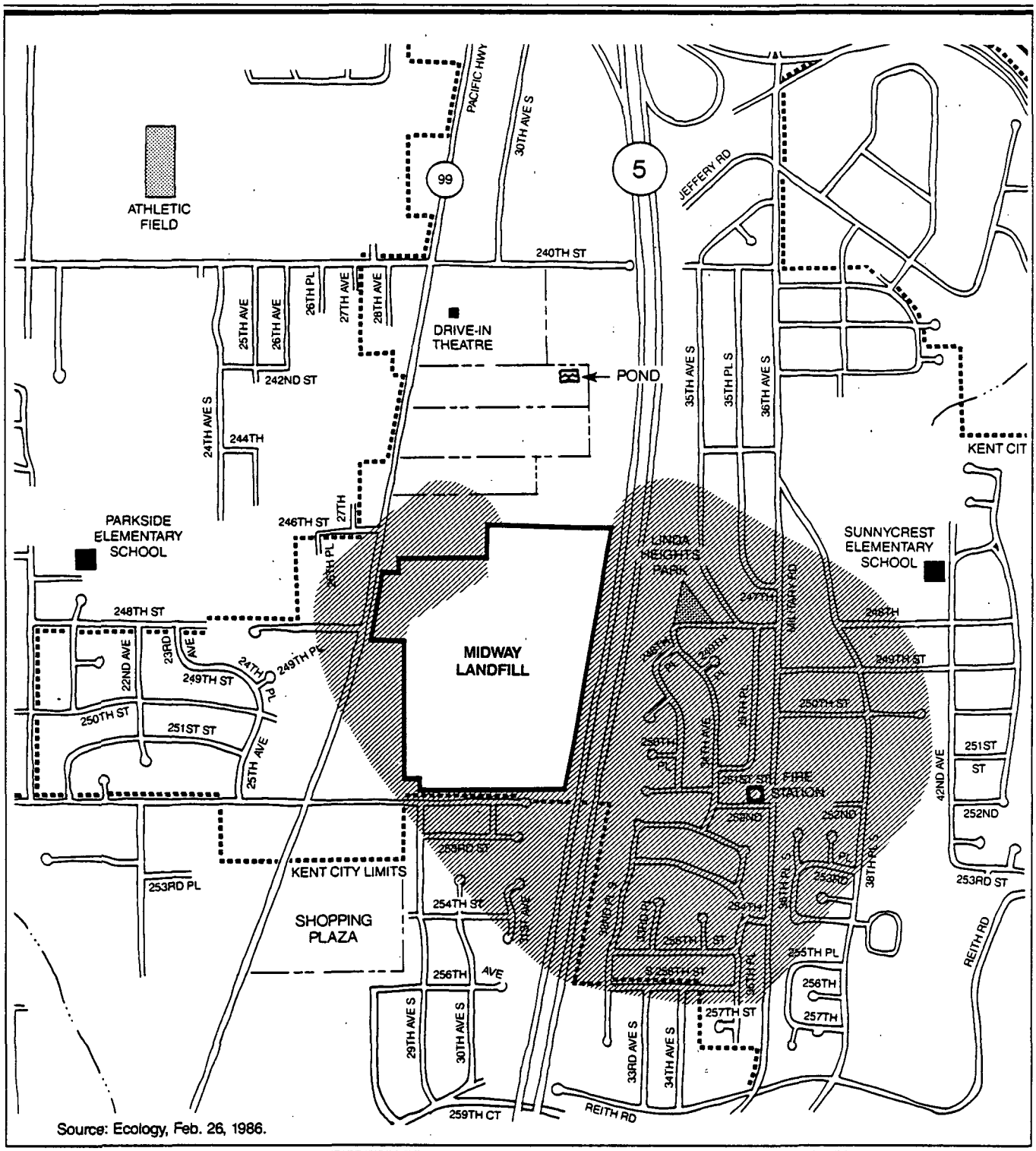


Figure II-13A.
Areas where methane gas has been found near the ground surface in excess of the lower explosive limit.



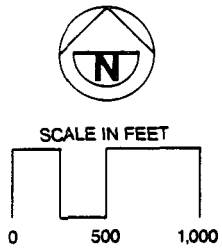


Figure II-13B.
Areas where methane gas has been found at depth in the ground in excess of the lower explosive limit.

migrated fastest in the more porous sand and gravel soils present at 60 foot depth and below. The methane then spreads upward into the silt and clay soils near the surface (Kmet, Department of Ecology, memo dated February 27, 1986, Appendix P). This migrating methane has accumulated as an extensive "reservoir" in several areas around the site. Gas from the reservoir has seeped into homes and businesses around the site, especially during rapid drops in atmospheric pressure. Where explosive levels of methane have been found in these structures, residents and businesses have been evacuated. Approximately ten homes and one business have been evacuated to this date.

In September 1985 the City of Seattle installed a series of gas migration control wells around the perimeter of the site as an emergency part of final closure. These wells are connected by temporary manifold piping on the surface to motor blowers to withdraw the gas out of the landfill. Based on reductions in methane levels in the multilevel probes around the landfill's perimeter (Table II-15) this system appears to prevent new gas generated at the landfill from migrating laterally off site.

In addition to the gas migration control wells near the site, the City of Seattle and the Department of Ecology have installed seven off-site gas extraction wells in neighborhoods around the landfill. These were installed in January and February, 1986 as an emergency measure to prevent methane from reaching explosive levels in structures. The extraction wells remove methane from the off-site reservoir described above, and prevent gas seepage into structures within approximately four hundred feet of each well. Testing of air in homes and businesses, and data from probes in the vicinity of the extraction wells, indicate that they are successful in reducing methane levels (Kmet, Department of Ecology, memo dated February 27, 1986, Appendix P). Analysis of the discharge from these wells has shown that no health hazards will be created by venting them to the atmosphere (Eaton et al. 1986. Appendix O).

b. Impacts of Alternatives

(1) Minimum Grade Alternative

(a) Landfill Closure. The permanent gas migration control system manifold pipes, motor blowers, flares and controls will be installed during the summer of 1986. Additional monitoring probes will be installed near the perimeter of the landfill to further verify the effectiveness of the migration control system. More migration control wells will be added if necessary to completely control gas migration. To more precisely define migration limits and zones of high gas concentration, the number of off-site gas monitoring probes will be increased. Based on data from new and existing probes, additional off-site gas extraction wells will be located and installed.

During construction of the final cover system, including permanent leachate and gas control systems, some landfill gas will escape from the refuse. These gases will not present a health hazard because they will be rapidly diluted by ambient air. However, the methane component will result in a small but unavoidable chance of fire or explosion at the construction site. Proper construction procedures will greatly reduce

Table II-15. Landfill gas probe monitoring data for Midway Landfill

Probe	Depth	% Methane by Volume 04/18/85	% Methane by Volume 01/24/86	Probe	Depth	% Methane by Volume 04/18/85	% Methane by Volume 01/24/86
A	30	58	12	I	30	0	0
	55	55	1		61	B	0
	95	52	35		95	31	0
B	25	58	31	J	35	0.4	6
	50	46	0.2		64	39	0
	90	42	30		95	39	39
C	32	47	1.4	K	43	19	12
	50	38	31		73	48	18
	95	44	9		105	B	46
D	37	41	11	L	14	23*	3.2
					55	41*	0
					98	51*	0
	68	41	5	M	14	3*	0
					64	16*	0
					104	23*	0
	90	44	34	N	42	42	6
E	32	B	8		78	42	5
	59	0	0		117	35	10
	90	0	0	O	8	71*	0
					40	50*	20
					74	2*	5
				P	22	0	0
					40	B	B
H	25	0	0		77	B	B
	50	B	B				
	95	B	B				

B = Blocked, apparently by subsurface water
* = Average of data collected on July 16 and 18, 1985.

this potential (see Mitigation Measures). The potential for explosion in confined areas of nearby structures will not be impacted by the actual installation of the control systems. Once the landfill gas migration control system is operational, and the gas "reservoir" is removed with off-site control wells, any potential off-site explosion hazard will be eliminated.

Any on-site construction activities which necessitate excavation into the landfill will require the work to be done in accordance with a health and safety plan to protect the health of the work crew. The work area would be monitored continuously for explosive levels of landfill gas and monitored periodically for toxic gases. Site personnel will be supplied with the equipment necessary to meet the health and safety plan.

(b) Post-Closure. The application of additional fill material may increase the potential for lateral landfill gas movement by reducing gas seepage through the cover and compressing the refuse, causing some settlement. This will increase the potential for off-site explosion hazards. However, the lateral migration control system, properly installed, operated and maintained, will prevent migration of landfill gas from the site. In addition, the off-site gas extraction wells will remove the gas from the soil around the site. Therefore, final closure will have the long-term impact of reducing the risk of explosion or fire, both on and off-site. Long-term monitoring requirements are described in Section I.C.1.d.

The proposed gas and odor control system will collect most of the landfill gas before it reaches the atmosphere, and most of the potentially hazardous trace organic compounds will be oxidized in gas flares. However, the combustion products from the flares will contain sulfur dioxide concentrations. Emissions from these flares will be tested to confirm that they are within permitted levels, and emission control devices installed if necessary. Thus, implementation of the proposed Gas and Odor Control Plan should result in an improvement in ambient air quality and reduction in human health risks due to existing emissions of toxic materials from the landfill.

(2) Intermediate Grade Alternative. The risk of explosion and hazardous emissions during construction of the final cover system will be similar to that described for the Minimum Grade Alternative. Post-closure impacts and monitoring requirements will also be similar. The addition of soil to the landfill to bring it up to subgrade elevation, plus the addition of the final cover system with a low permeability barrier layer will impede the movement of landfill gas through the landfill cover. This will increase the potential for the lateral movement of landfill gas from the site. The potential for the lateral migration of landfill gas would be slightly higher with the Intermediate Grade Alternative than for the Minimum Grade Alternative. This is due to additional reduction in gas seepage through the cover and additional settlement of refuse. However, the potential movement of landfill gas from the site would be controlled by the gas migration control system, and no impacts are expected to occur.

(3) Maximum Grade Alternative. The risk of explosion and hazardous emissions during construction of the final cover system will be similar to that described for the Minimum Grade Alternative. Post-closure impacts and monitoring requirements will also be similar. The potential for the lateral movement of landfill gas from the site due to the additional depth of soil necessary to bring the site to subgrade elevation is expected to be the greatest with the Maximum Grade Alternative, for the same reasons given for the Intermediate Grade Alternative above. However, the lateral gas control system is expected to control any potential off-site migration of landfill gas, and no impacts are expected to occur.

c. **Mitigation Measures**

If properly operated and maintained, the Gas Migration and Odor Control Plan will prevent methane from migrating beyond the landfill boundary. The post-closure monitoring program will verify that this system is functioning properly. The gas migration and odor control systems have been designed so that additional wells can be added to the system if monitoring data shows it is necessary to control migration. The off-site extraction wells will remove the gas from the "reservoir" around the site. Additional off-site extraction wells will be added if necessary. Methane levels will also be monitored in off-site and on-site buildings and excavation areas, and specific construction procedures should be followed to minimize the potential for fire or explosion. This potential hazard should also be considered in planning any structures on or near refuse within the landfill property boundary. Furthermore, safety procedures developed for construction in or near landfills will be followed to prevent accidents relating to landfill gas. These procedures include providing constant and copious ventilation of excavation areas, and spark arrestors on construction equipment.

d. **Unavoidable Adverse Impacts**

Some landfill gases will escape from the refuse during construction of the landfill gas control system. These gases will not present a health hazard because they will be rapidly diluted by ambient air. However, the methane component will result in a small but unavoidable chance of fire or explosion at the construction site. Proper construction procedures will greatly reduce this potential.

4. VICINITY LAND USE

b. **Impacts of Alternatives**

Page II-82, at the end of Section (a) Landfill Closure, add the following evaluation of the impacts of the four additional off-site routing alternatives for storm water runoff from the site (see revised Section I.C.1).

The four additional off-site routing alternatives will result in temporary impacts on land use during construction in terms of noise and disruption of vehicle access to residences along the pipeline route, as well as long-term impacts in terms of the need for easements on private property. Table II-15A on the following page summarizes the estimated extent of these impacts for each of the four alternatives.

7. TRANSPORTATION SYSTEMS

a. **Existing Conditions**

Page II-90, at the end of Section (1) Vicinity and Street System, add the following discussion:

Table II-15A. Land use effects of the four additional off-site routing alternatives for storm water runoff from the Midway Landfill site.

	246th St. Route	250th St. Route	252nd St. Route	Wetland Discharge Alternatives
No. Residences Affected	Approx. 15 plus school.	Approx. 50 plus businesses along Highway 99.	Approx. 35 plus businesses along Highway 99.	Approx. 5
Effect on Local Access*	Minor disruption on S. 246th St. and at 3 street crossings.	Disruption all along S. 250th St. between 16th Ave. S. and 25th Ave. S. Disruption to school bus routes.	Disruption on S. 252nd St. between 20th Ave. S. and Pacific Highway. Main connector street to Pacific Highway S. for this area. Disruption to school bus routes.	Minor disruption at one street crossing
Easement Requirements	1,700 ft. on approx. 5 properties and school.	1,400 ft. on approx. 10 properties.	2,000 ft. on approx. 15 properties.	700 ft. on approx. 5 properties

* Construction of the pipeline route would occur in segments, so individual residences and businesses would be inconvenienced for only a portion of the construction period.

In response to the City of Kent's comments on the DEIS (see Letter No. 11, Comment 8 in Section IV of this FEIS), an alternative truck haul route to the Midway landfill was evaluated in addition to the primary access route described earlier. This alternative route allows the haul trucks easier access to the landfill via a series of right turns. The alternative route for incoming loads would use southbound I-5 and exit at the S. 272nd Street off-ramp. The route turns right from the off-ramp to westbound S. 272nd Street, then right again to northbound SR 99 until a right turn into the site entrance at S. 252nd Street. Trucks exiting the site would return to northbound I-5 via a right turn from the site entrance onto northbound SR 99, a right turn onto SR 516, and a right turn again onto the northbound I-5 on-ramp which loops up onto I-5.

Each of the intersections utilized by this route is controlled by a fully actuated traffic signal and each has right turn only lanes which facilitate turns by trucks. Although there is not a right turn lane at the landfill entrance, the paved shoulder allows trucks to pull off and slow down before entering the site from SR 99.

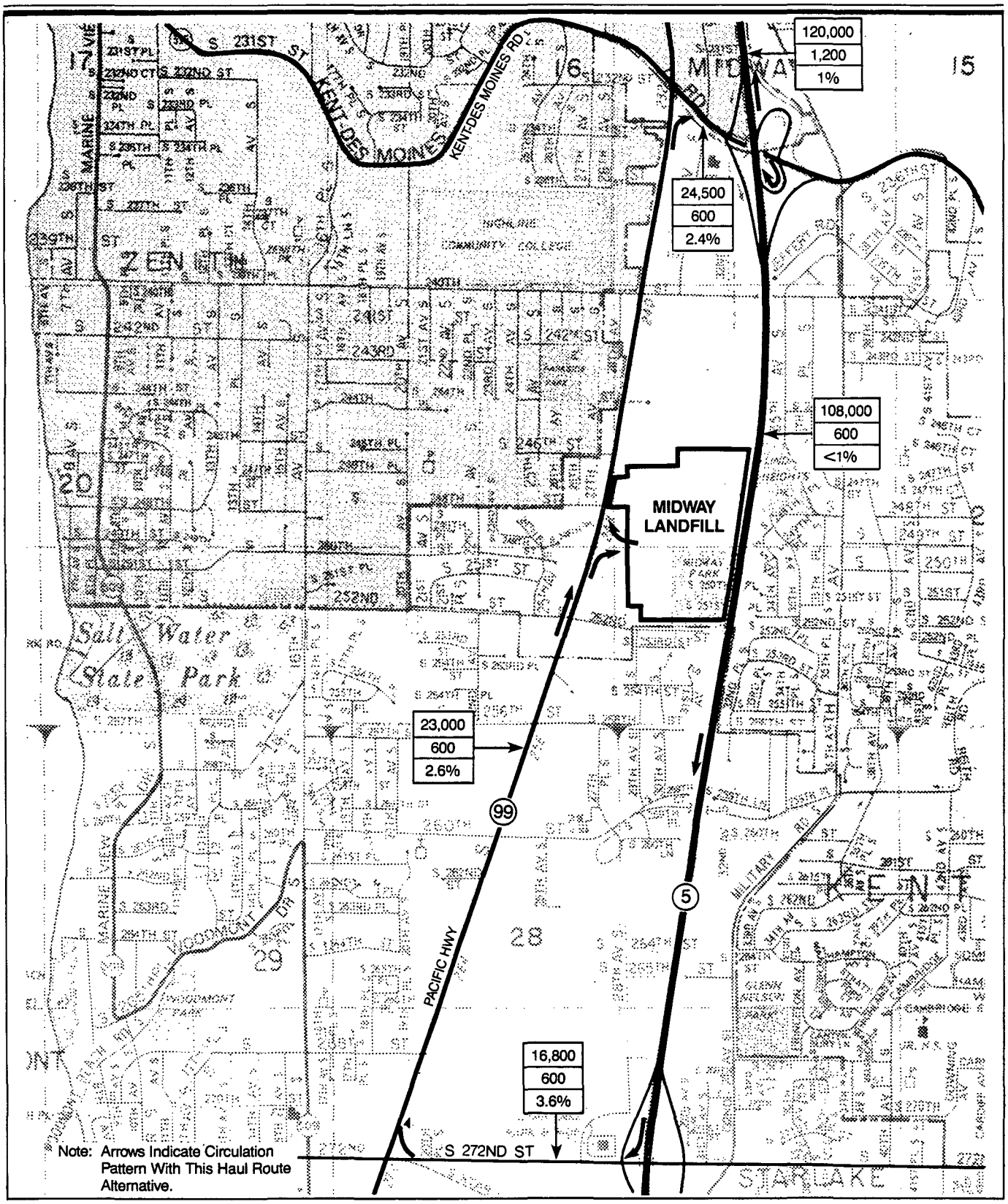
All of the roadways comprising the alternative route have been described previously (pages II-89 and II-91 of the DEIS) except S. 272nd Street and the intersection of SR 99 with SR 516. S. 272nd Street is a major east-west link between I-5 and SR 99. The section of roadway between I-5 and SR 99 is classified as a minor arterial by King County and is two lanes each direction, with curb, gutter and sidewalks. It is in good condition and the speed limit is 35 MPH. At the intersection of SR 99, 272nd Street widens to three lanes; right and left turn only lanes and one through lane. This section of roadway carries an average weekday traffic (AWDT) of about 16,800 vehicles per day.

At the intersection with SR 516, the northbound SR 99 approach has separate turn lanes for right turns as well as for left turns; the right turn lane is controlled by a yield sign and right-turning vehicles can bypass queues at the signal to make their turn. Within the site vicinity, SR 99 carries about 23,000 AWDT.

b. Impacts of Alternatives

Page II-98, at the end of Section 2 Volume and Congestion Impacts, add the following discussion:

An evaluation was also conducted of the alternative truck haul route recommended by the City of Kent. As noted previously, a typical workday would generate about 250 round trips (500 total one-way trips), with peak days of up to 300 round trips (600 one-way trips). Since the haul trucks circulate clockwise on this new access route, there would be an additional 300 truck trips on each section of the route. Haul trucks have a greater effect on traffic volumes due to their lengths and slower acceleration rates. Therefore, to estimate their impact, truck volumes were converted to passenger-car equivalents (1 truck = 2 PCE). Figure II-16A shows the resulting increase in AWDT on affected road segments due to the alternative truck haul route.



SCALE IN FEET

0 1,000 2,000

N

23,000	Average Weekday Traffic (AWDT)
600	Project Traffic (PCE's)
2.6%	% Increase in AWDT Due to Project Alternative

Figure II-16A. Alternative truck routing for closure of the Midway Landfill.

Daily traffic increases range from negligible to less than 4 percent of non-project traffic flows, with the greatest impact on S. 272nd Street. Increases of less than 3 percent are not noticed by drivers in most cases. Although the increase on S. 272nd Street would be 3.6 percent, the presence of a right-turn only lane would help reduce congestion caused by the additional traffic, and there should be no noticeable effect to drivers. Because of the right-turn only lanes provided at all major intersections, this haul route will not adversely affect level of service at critical intersections within the site vicinity.

There also do not appear to be any significant safety impacts due to this alternative access route. There is adequate sight distance at all the intersections and landfill site entrance to allow safe turning movements. The existence of right-turn-only lanes at all intersections provides easier access to the landfill with a clockwise circulation pattern. Although this route is approximately 4 miles longer, the ability of the haul trucks to turn right at the major intersection will reduce the waiting times at the intersections and total travel time may be about the same.

c. **Mitigation Measures**

Page II-99, add the following sentence to the end of the first paragraph in the mitigation section:

If the alternative truck haul route recommended by the City of Kent is used, advance truck warning signs will be required on the northbound approach of SR 99 to S. 252nd Street.

III. ERRATA

The primary information to be added to the DEIS in response to public hearing testimony and comment letters is included in Section II of this FEIS. The errata presented in this section are smaller revisions to the text of the DEIS to correct errors or omissions. The General section below represents a general change to be made throughout the DEIS. Remaining errata are keyed to specific sections of the DEIS.

GENERAL

In a number of places in the DEIS, including the first sentence on p. xx of the Summary and the first sentence of the last paragraph on p. I-35, statements such as the following are made:

> "If the monitoring program indicates the movement of contaminated groundwater off the site, some remedial action measures will be necessary to correct the problem."

As discussed in the revised Groundwater Quality section in Section II of this FEIS, groundwater degradation has been verified in groundwater monitoring wells located off the site. Therefore, such statements should be revised to read:

> "A groundwater monitoring program consistent with the requirements of the State of Washington Minimum Functional Standards (MFS) is being implemented (see Work Plan for Ongoing Groundwater Investigations in Appendix M.) If the data indicates a statistically significant increase in any of the MFS parameters above background values, the Seattle-King County Health Department must be notified in writing within 7 days. The Health Department has the authority to require corrective action programs if the performance standard of WAC 173-304-460(2)(a) is exceeded."

FACT SHEET

d. List of Required Licenses, Permits and Approvals

Page iii, add the following:

- o Waste Discharge Permit: Metro
- o Flood Control Zone Permit: King County
- o Drainage Permit: City of Kent

Page iii, change "Substantial Development Permit: King County" to

> "Shoreline Management Substantial Development Permit: King County".

SUMMARY

b. Description of Proposed Alternatives

Page xxi, first paragraph, delete the words "and treatment" from the fourth and fifth lines so the phrase reads:

"...inspection of the leachate collection system;..."

SECTION 1

A. DESCRIPTION OF THE PROPOSED PROJECT

1. PURPOSE AND NEED

a. Objectives and Background Information

Page I-1, second paragraph, delete the word "non-putrescible" from the second sentence and revise to read as follows:

"The landfill received demolition waste from commerical haulers, industrial waste, and municipal solid waste (with the exception of household waste) from the City's transfer stations."

C. DESCRIPTION OF CLOSURE PLAN ALTERNATIVES

1. MINIMUM GRADE ALTERNATIVE

b. Surface Water Management Plan

Page I-21, second paragraph, change third sentence to read:

"The new storm drain would be routed west under Highway 99 to an existing wetland near Parkside Elementary School. This wetland would serve as a natural detention basin."

SECTION II

A. NATURAL ENVIRONMENT

2. GROUNDWATER

a. Existing Conditions

Page II-8, second paragraph under (1) Groundwater Flow, third sentence, change the parenthetical reference to the Linda Heights well to "Figure II-6" rather than "Figure II-2."

3. SURFACE WATER

b. Impacts of Alternatives

Page II-36, third paragraph, change last three sentences to read:

"The diversion of I-5 runoff to the detention basin would increase the heavy metal loading to receiving waters. However, since the volume of runoff diverted from I-5 is relatively small compared to the volume of runoff from Highway 99 that currently enters the wetland, the increase in heavy metal loading is not considered significant."

4. AIR

a. Existing Conditions

Page II-41, second paragraph, change "carbon dioxide" to "carbon monoxide."

Page II-41, change last sentence to read:

"The table also indicates the occupational threshold limit value (TLV), which is an established guideline for determining maximum allowable 8-hour exposure levels that will not produce adverse health effects in healthy adult workers."

Page II-47, second paragraph, change third and fourth sentences to read:

"However, some of the odorous gases are contained in the gas that migrates underground off-site. The odor level of this lateral gas mixture is usually quite low, both because the flow rate is relatively low compared to gas migrating vertically through the landfill cover and because the soil tends to remove odorous compounds as the gas passes through the soil."

5. VEGETATION AND WILDLIFE

b. Impacts of Alternatives

Page II-52, under Off-Site Detention Alternative, change third sentence to read:

"Although the waters of the detention basin, in combination with the natural vegetation around the perimeter, will provide some wildlife habitat, there will be some permanent loss of habitat associated with constructing the basin."

c. Mitigation Measures

Page II-53, change second sentence of mitigation section to read:

"Mitigation for the loss of 6 acres of wetland habitat could include creation of an open water/island mosaic that would provide the needed open water storage as well as wildlife habitat."

6. FISHERIES

c. Mitigation Measures

Page II-60, add the following sentence to mitigation section:

"Additional mitigation measures that could be implemented if the Tightline to Puget Sound Alternative is selected include a requirement for relandscaping the pipeline corridor along Smith Creek with natural vegetation similar to that which was destroyed; and maintenance of a 100-foot undisturbed buffer zone adjacent to the creek."

B. BUILT ENVIRONMENT

1. NOISE

b. Impacts of Alternatives

Page 67, under (b) Post Closure Impacts, add the following paragraph:

"The flare and blower assembly for the permanent gas and odor control system will be located on the western portion of the site (see Figure I-13) and will consist of four flares and the centrifugal blowers. The sound level produced by the blower is very low, well below ambient sound levels produced by activities surrounding the landfill. The flares produce a maximum of 70 dBA each at 5 feet. At the landfill easement line, 65 feet away, all four flares would produce a total of 55 dBA. This level is acceptable under most guidelines and is considerably below existing sound levels. No significant noise impacts would result from the operation of the permanent gas and odor control equipment."

4. VICINITY LAND USE

b. Impacts of Alternatives

Page II-82, last paragraph, delete second sentence referring to the City of Kent developing a neighborhood park in the southwestern corner of the site, since it is unclear whether the City of Kent plans to do so. Combine the first and third sentences to read:

"After the landfill has finished settling and the surface has stabilized, the Midway site could be developed to serve a variety of public or private uses."

6. AESTHETICS/LIGHT AND GLARE

c. Mitigation Measures

Page II-89, add the following paragraph to the mitigation section:

"The design of an on-site detention basin would comply with all requirements of King County and City of Kent drainage ordinances for fencing and additional buffer space. At present the design includes a level buffer area approximately 10 feet wide surrounding the detention basin, with an 8-foot chain link fence around the perimeter of the buffer area. Additional buffer space would be acquired and maintained as required by local ordinance. The present design would leave approximately 100 feet of woods between the detention basin and mobile home park to the north."

7. TRANSPORTATION SYSTEMS

c. Mitigation Measures

Page II-99, add the following statement to the mitigation section:

"Additional mitigation will be provided as required by Kent City Code 4.07.28, which states:

'The (permit) applicant shall continuously keep the streets and storm drain system free from all debris attributed to the work performed under the ... permit.'"

IV. COMMENT LETTERS AND RESPONSES

This section contains copies of the comment letters on the DEIS. Following each letter are the responses to comments in that letter. Responses are keyed to numbers in the left margin of the letters. A total of 37 comment letters were received. The letters are numbered and responded to in the following order:

1. U.S. Environmental Protection Agency, Region 10.
2. U.S. Department of the Interior, Fish and Wildlife Service
3. U.S. Department of Commerce, National Marine Fisheries Service
4. Washington State Department of Ecology
5. Washington State Parks and Recreation Commission
6. Washington State Department of Transportation
7. Municipality of Metropolitan Seattle (METRO)
8. Puget Sound Air Pollution Control Agency
9. King County Department of Planning and Community Development
10. Seattle-King County Department of Public Health
11. City of Kent
12. City of Des Moines
13. Highline Public Schools
14. (b)(6) [redacted] ıle resident
15. [redacted] residents
16. [redacted] :le resident
17. [redacted] ıer of property near landfill
18. [redacted] lent
19. [redacted] , Kent residents
20. [redacted] ; resident
21. [redacted] leral Way resident
22. [redacted] lent
23. [redacted] resident
24. [redacted]
25. [redacted] resident
26. [redacted] resident
27. [redacted] resident, past coordinator of Citizens Against Midway Landfill
28. (b)(6) [redacted] ıes resident
29. [redacted] ıt
30. [redacted] , Kent residents
31. [redacted] l, Kent residents
32. [redacted] , Des Moines residents
33. Petition to Object Proposed Midway Landfill Drainage Proposal, signed by 27 Des Moines and Kent residents
34. Marcus Whitman Church
35. Copple Ferm & Wade, attorneys for Midway Sand and Gravel
36. John C. O'Rourke, attorney for Kentview Properties, Inc.
37. Washington Wildlife Heritage Foundation

LETTER NO. 1

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

85 SEP 23 A 9:41

SEP 1? 1985

ROUTING	DATE	INITIAL
ACTION		
FILE		
INFORMATION		
EVA		
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RDO		
MHG		LAW

OCT 9 1985

REPLY TO ATTN OF: M/S 443

MI - Landfill Closure, Kent Highlands / Midway

5c

Richard Owings, Director
Seattle Solid Waste Utility
Seattle Engineering Department
Room 606, Seattle Municipal Building
Seattle, Washington 98104

Re: Draft Environmental Impact Statement, Midway Landfill Closure Plan

Dear Mr. Owings:

1 The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Midway Landfill Closure Plan. The DEIS examines plans for site grading, low permeability cover system, leachate management, storm water management, landfill gas control, and odor control.

The Midway Landfill is a site undergoing closure in compliance with solid waste laws and regulations. As part of planning for closure the City of Seattle, operator of the site, has installed several wells to monitor ground-water quality. Ground-water quality data from these monitoring wells were used by the Washington State Department of Ecology (WDOE) to rank the site as a proposed National Priority List (NPL) site under the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), PL 96-510. EPA has been actively following the closure plan since the site was ranked in 1983.

EPA has a cooperative agreement with WDOE to develop a Remedial Investigation/Feasibility Study (RI/FS). The purpose of the RI/FS is to address any problems associated with the hazardous materials component found in wastes migrating from the site. Due to EPA's continuing involvement with this landfill and the details of the closure plan, we are providing our comments on this proposed action.

We have several major concerns with the closure plan as it is presented in the DEIS. We also have several recommendations to help reviewers of this EIS better understand and assess the impacts of this proposed action. A more detailed discussion can be found in the attached comments. Our major concerns include:

- long term impacts of the landfill on ground-water quality;
- maintenance of the integrity of the multilayer cover system during differential settling and any impacts this settling would have on the leachate generation rate;

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SOLID WASTE UTILITY

- the feasibility of interim active leachate control measures prior to the completion of the cover system;
- inclusion of remedial action as part of the closure plan for cleaning up existing ground-water contamination; and
- potential problems with the short-term screening model analysis for air quality.

We appreciate the opportunity to review this DEIS. If you have any questions, you may contact either Sally Brough at 442-8512 or Leigh Woodruff at 442-1223, both of my staff.

Sincerely,

Robert S. Burd
Director, Water Division

Attachment

SEP 1: 1985

U.S. ENVIRONMENTAL PROTECTION AGENCY

DETAILED COMMENTS

Impacts on Ground-Water Quality

Based on our review of the DEIS, a number of questions remain regarding the current and long term impacts of the landfill on ground-water quality. The deterioration of ground-water quality in and near the landfill may affect existing and future drinking water supplies both directly and indirectly. Because of this potential, a clear understanding of the anticipated impacts is necessary prior to the landfill's final closure.

(2) Contrary to the statement found on the first line on page xx of the summary and numerous other places in the text of the DEIS, the movement of contaminated groundwater off-site is not in question. Groundwater contamination has already occurred. Nine of twelve monitoring wells which have been sampled have shown significant leachate contamination as evidenced by elevated conductivity levels and metals concentrations; five of these are outside of the landfill lease boundary. The extent, direction, and velocity of the contaminant plume are not known. The existing monitoring wells, most of which are contaminated, are not capable of establishing an outer bound of plume migration. Borehole 1-B, which shows high conductivity levels and high arsenic, mercury, lead, iron and manganese concentrations, appears contaminated, contrary to the statement on page II-15 of the EIS.

(3) There are several areas where the discussion of ground-water movement is incomplete and the potential use of the groundwater is unclear. As stated on pg. II-8 of the EIS, ground-water conditions are "complex," and the direction of its flow is "inferred" (Fig. II-2). In addition, leachate may be migrating into deeper geologic units that are not now being sampled (pg.II-12). Several wells/boreholes lie in the immediate (less than 1 mile) path of the inferred leachate plume (Fig. II-3). The current use of many of these wells is unclear, since they do not appear in Fig. II-7. Some loss of ground-water recharge is anticipated due to the impermeability of the proposed landfill cover. We do not know whether the localized lowering of the ground-water table will adversely affect existing or potential drinking water supplies.

(4) In order to more adequately assess the impact of the continued leachate production and leachate movement on ground-water quality and ground-water use, we have the following recommendations:

1. Conduct further investigations of the ground-water aquifer(s) in and near the landfill to define important parameters such as the plume size, direction and rate of travel. It is expected that additional monitoring wells would be necessary to define the plume and track its movement. These should include wells located upgradient of the landfill and wells located to alert public and private users of the aquifer of approaching contamination. The study should address whether contamination of deeper aquifers has occurred or might be expected and whether additional deep monitoring wells are in order.

2. Describe in detail all existing wells/boreholes in the one-mile radius, including the location, depth, existing water quality data, construction details, and number of users. The detailed study of the aquifer and leachate plume should be used to determine if wells/boreholes outside the one-mile radius should be investigated. In addition, the Final EIS should include a discussion of the significance of the one-mile radius. The details of contaminant/leachate attenuation should be presented in the body of the Final EIS to justify this distance which has been chosen for impact assessment.

3. Once substantial information regarding the aquifer and leachate plume is established, an assessment of its expected effect on existing and future drinking water supplies (including loss of recharge) should be made. Appropriate mitigating measures should be evaluated.

4. In the long term monitoring plan for ground and surface water, specify what concentrations of the sampling parameters are indicative of contamination. The guidelines should allow for changes as new information, including cumulative effects, develops regarding the contaminants. Manganese, sodium, phenols, and total organic halogens (TOX) should be added to the list of indicator parameters monitored. The actions to be taken if monitoring detects leachate contamination should be clearly defined.

Multilayer Cover System

Considerable effort has gone into the design of a landfill cover that will minimize further generation of landfill leachate. This is an important preventive measure and the effort is commendable. It is anticipated that the proposed cover FC-1 (Table 1) will reduce the yearly volume of leachate produced by 94% (pg. 1-32).

It appears that the key to the multilayer system is the four-inch barrier layer (permeability 10^{-7} cm/sec with a bentonite admixture) in conjunction with an upper and lower more highly permeable drainage layer to channel off infiltration from the surface and intercept leachate from the landfill, respectively. We have a few concerns about this approach.

5 First, the potential exists for the barrier to be ruptured during differential settling. The DEIS states that settlement of fill may be as great as 15% (pg. I-16). It is unclear as to what the 15% should be applied; the 10 to 50-feet of clean fill on top (1.5 to 7.5 feet of settling), the 120-feet of garbage (18-feet of settling), or 170-feet of garbage and soil fill (25.5-feet of settling). In any case, differential settling could result in discontinuities in the barrier layer. It is unclear whether the bentonite clay mixture barrier layer would be sufficiently plastic to withstand the settling (1.5 to 25.5-feet) that is expected to occur.

(6) Second, the DEIS states that a periodic maintenance plan will be developed to monitor the integrity of the cover. It would be helpful if more detail about the maintenance program were provided. We are particularly concerned about the frequency of inspections and the priority given to regrading areas that have settled. Cracks, channels, or depressions that are undetected or left unrepaired for long periods of time could affect the 94% efficiency of the cover system.

(7) Finally, the exact layering appears to be critical to the efficiency of the multilayer system. If a localized depression is regraded, a potential exists for the more highly permeable drainage layers above and below the barrier layer to be disrupted, causing localized discontinuities. We are concerned that this could adversely affect the drainage of surface water infiltration through the drainage layer and leachate interception at the toe seep collection system points. Could these pathways to the storm drain system and the toe seep collection system be blocked or their efficiencies decreased enough to cause problems with the effectiveness of the cover system, especially in the long run?

(8) All of these potential problems could decrease the efficiency of the cover system. This in turn could result in a greater leachate generation rate and greater effects to ground-water and surface water quality. The Final EIS should address these problems in some detail and propose a method for field verification of this system.

Active Leachate Control

(9) We feel that serious consideration should be given to the removal of leachate that is now trapped in the landfill (estimated at 98 million gallons pg. II-19) above the perched water table to prevent it from draining into the ground-water system. This is particularly important during the interim time frame before the cover system is in place. If the maximum grade alternative is chosen, then active control becomes even more important due to the three years required for the completion of this alternative.

Remedial Action

(10) We would prefer to see a detailed remedial action plan as an intergal part of the closure plan. There are adequate data to show that there has been migration of the leachate plume off-site. (At this time the extent and direction of the contaminant plume are unknown.) The groundwater in the vicinity of the landfill is a documented drinking water source and there is at least one domestic water supply that is located within one mile of the site. Several other boreholes and other wells are shown, on Fig. II-3, to be within this one mile radius. There is documentation of priority pollutant contamination (Table A-3). The potential exists for there to be public health concerns. The Final EIS should address the problem of existing ground-water contamination.

Air Quality

(11) The short-term screening model analysis shows potential problems, particularly for benzene. A more refined modeling analysis should be performed using, for example, one or more years of hourly meteorological data from Sea-Tac Airport and the Industrial Source Complex-Short Term (ISCST) model for short-term estimates and the Industrial Source Complex-Long Term (ISCLT) model for long-term estimates. A larger receptor grid could be used to better define the spatial extent of this problem. Population data should be used to estimate exposures and calculate risk estimates, if necessary.

(12) Six hundred truck trips per day would probably cause significant degradation of air quality in the vicinity of the landfill due to increased total suspended solids (TSP). In addition to water spraying the loading/unloading activities, haul roads should be watered regularly during dry periods and local paved roads could be watered and/or swept.

(13) The landfill gas collection and burning system ought to alleviate air quality impacts from existing emissions. Monitoring of the emissions from the flare, which is proposed, is important to determine if the contaminants are destroyed. The DEIS indicates however that condensate will collect in the landfill gas collection system prior to reaching the flares. The chemical characteristics and the quantity of the condensate should be determined. This is particularly important if the condensate contains hazardous components.

RESPONSE TO LETTER NO. 1: U.S. ENVIRONMENTAL PROTECTION AGENCY

1. Comment acknowledged. Please see the text below for responses to the five specific areas of concern listed in your letter.

2. Comment acknowledged. A revised Groundwater Quality section (Section II.A.2) is included in Section II of this Final EIS, and statements such as the one on p.xx of the Summary have been corrected (see Errata under General).

3. Figure II-7 on page II-17 of the DEIS shows those public water supply wells identified in the vicinity of the landfill. Wells and boreholes discussed and not shown in this figure are not public water supply wells. Note that the DEIS section on Public Water Supplies, including Figure II-7, has been revised and is included in Section II of this FEIS.

   Localized lowering of groundwater levels in the vicinity of the landfill may in fact occur if recharge to the groundwater is limited by placement of a lower permeability cover and other measures to reduce the generation of leachate within the fill. It should be noted that the groundwater recharge to be reduced by placement of the cover is leachate, which may have the potential to contaminate the aquifer and restrict its use as a groundwater supply. The actual hydraulic effect of removal of this recharge to the aquifer would be difficult to identify and measure due to the significant amount of modification to the original land surface and water management that has occurred during the urbanization of the entire recharge area for this aquifer.

4. Comment acknowledged. Most of your recommendations are reflected in the Work Plan for On-Going Groundwater Investigations, Appendix M; and the Beneficial Use Survey, Appendix N.

   With regard to Recommendation 2, the decision to use a one-mile radius for the identification of water supply wells is based on experience at other landfill sites and sites where groundwater contamination may have occurred. Within the area of the study, alternative community water supplies are available for privately owned domestic water supplies. If further studies indicate that this radius needs to be increased, it will be increased at that time. A larger radius of study was used for the identification of community water supplies (five miles).

   With regard to Recommendation 4, determination of contamination will be based on procedures set forth in current applicable regulations (federal, state and local). It is assumed that regulations will be modified when necessary to account for changes in information regarding a particular contaminant. Potential actions to be taken if monitoring detects leachate contamination are described on p. I-36 of the DEIS. It is not appropriate to speculate at this time on the specific actions to be taken, since that decision will be based largely on data that has not yet been collected.

RESPONSE TO LETTER NO. 1, CONTINUED

5. Eventual settlement will be about 15 percent of the total depth of refuse. The principal cause of settlement is decomposition of organic refuse. The typical rate of settlement is such that most of the settlement will occur within the first five years after the refuse has been placed. The Midway landfill stopped receiving organic refuse in October 1983. Under the intermediate grading plan, the earliest that the final cover would be installed would be the summer of 1987. By that time, most of the settlement will have occurred, so the final cover should not be significantly impacted by settlement.

6. The schedule for final cover inspections would be as discussed under Post Closure Plan and Activities (page I-43 of the DEIS). The inspection would be visual in nature and would concentrate on locating localized depressions, cracks or areas of erosion. Repairs would be initiated immediately where required.

7. Localized depressions would be repaired by removing the top three layers (top soil, filter layer, and drainage layer) in the vicinity of the depression. The barrier layer would then be brought to grade by filling with a bentonite amended soil. This method would fill any cracks in the barrier layer and would restore the prexisting grade. The top three layers would then be replaced in a manner to retain their integrity. The original efficiency of the cover would thus be restored. This method would also be used to repair any excavations required to maintain the gas and odor control system or other closure facilities.

8. Comment acknowledged. See responses to Comments 5, 6, and 4 above.

9. Removal of trapped leachate is an available corrective action option (see page I-36 of the DEIS) if results of the groundwater monitoring program indicate that a corrective action program is required in accordance with state Minimum Functional Standards (WAC 173-304). It is not feasible to remove this leachate during the interim time frame before the cover system is in place. In addition to the estimated 98 million gallons presently trapped in the landfill, 48 million gallons enter the landfill annually through infiltration of precipitation falling directly on the landfill and inflow from off-site surface water runoff (p. I-28). The time required to plan, design and construct facilities to remove and dispose of this leachate in an environmentally acceptable and agency approved manner would be as long or longer than required for construction of the final site grading and cover system.

10. See responses to Comments 2, 3, and 4 above. An independent remedial investigation of the site is being conducted under CERCLA. When the results of this investigation are available, it may be necessary to issue an addendum to this EIS or a supplemental EIS.

11. The measurements made of emissions from the landfill had several fundamental limitations that were stated in the EIS. First, direct vent samples were taken at only a few flares on a limited number of occasions. No attempt was

made to characterize the detailed spatial and temporal patterns of the emissions of any particular compound from the landfill site. To our knowledge, such a study has not been conducted anywhere in this country to date. Second, the upwind/downwind difference measurements were at or below the detection limit of our sampling methods most of the time. On those occasions where we did observe greater downwind versus upwind concentrations, such differences were not uniquely associated with a single emission pattern from the landfill. Despite these limitations, it was still possible to identify the large number of compounds being emitted by the landfill and to estimate their emission rates during the limited sampling period. In addition, the agreement between these emission estimates and the ambient measurements, in combination with the agreement between the relative amounts of various compounds both in the unlit flare gas and in the ambient samples, constitute strong evidence that most of the emissions were coming from the unlit flares.

To perform a modeling analysis using ISCST and ISCLT would require detailed information on the emissions from each flare. Concurrent measurements of every flare would have to be made on a regular basis over a period of a year or more. In addition, daily (or even hourly) measurements of several flares would have to be made continuously for at least a year. Such measurements are not justified by the additional insight gained by the modeling analysis. Furthermore, now that an active gas control system has been installed, most of the flares on site do not have enough gas to continue burning, and many have been removed and plugged. The DEIS adequately characterizes "worst case" conditions and states where and how frequently these conditions may occur.

The permanent active gas collection system will include shielded flares that provide high temperature incineration of landfill gas. The DEIS recommends (p. II-50) that emissions from the permanent flares be monitored and that the resulting data be used in a screening level analysis such as the one already performed. If this analysis indicates a potential public health problem, additional emission measurements would be justified and should be accompanied by ambient exposure estimates using the more detailed dispersion models (such as ISCST and ISCLT).

12. Comment acknowledged. Haul roads will be watered during dry periods and paved roads watered and swept as needed.

13. The quantity and chemical characteristics of the condensate from the landfill gas collection system will be determined after installation of the system. If required, facilities for collection, treatment and disposal will be developed.

LETTER NO. 2

85 SEP 23 A 9: 29

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
2625 Parkmont Lane S.W., Bldg. B-3
Olympia, Washington 98502

MI-Landfill Closures, Kent Highlands/Midway

September 19, 1985

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SEP 23 1985
SOLID WASTE UTILITY

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OCT 9 1985

Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
600 Fourth Avenue
Seattle, Washington 98104

Re: Review of the Draft Environmental Impact Statement for the Midway Landfill Closure Plan

Dear Mr. Edens:

1 This is in response to your August 2, 1985 memorandum requesting that we review the subject document. We have been unable to make an in-depth review of this rather complicated document. However, at this time we can provide you with some general recommendations for the protection of fish and wildlife resources. If needed we are willing to assist you in developing detailed plans for an alternative that will give optimal protection to these resources.

We recommend that:

2 1. All project-related stormdrain waters should be piped around the 10 acre wetland that lies immediately east of Parkside elementary school and not into the wetland. Furthermore, it is our understanding that the 10 acre wetland may be receiving some polluted water under existing conditions. In addition to your work on the subject project you should make the effort to eliminate or substantially reduce the present movement of pollutants and sediment into the wetland.

3 2. Facilities should be constructed to treat polluted, sediment laden surface water before it reaches Smith Creek, Puget Sound or any other local waterbody including the groundwater system.

4 3. The final selected alternative should contain design plans that avoid or restrict project-related work in Smith Creek or its riparian zone. Smith Creek contains coho salmon and may also contain chum salmon and cutthroat trout.

5 4. The project should be developed so that it will not unnecessarily add to the flood burden of Smith Creek. Flooding can adversely impact fish and wildlife, particularly during the early lifestages.

26939

(6) 5. All precautions should be taken to prevent landfill leachates from entering the groundwater system. This is necessary to eliminate or reduce the possibility of leachate contaminated groundwater reaching the surface waters of area streams and/or Puget Sound.

(7) In accordance with Section 7 of the Endangered Species Act of 1973, as amended, the Environmental Protection Agency (EPA) is required to assure that their actions have taken into consideration impacts to Federally listed or proposed threatened or endangered species for all Federally funded, constructed, permitted, or licensed projects.

Through coordination with our endangered species staff we have determined that, to the best of our knowledge, no listed, proposed or candidate threatened or endangered species are known to occur within the immediate vicinity of the proposed project. However, we are concerned that adverse impacts to anadromous fish in Smith Creek may result from the discharge of toxic materials from project area waters. Since fish (salmon) is a primary food source for bald eagles, any losses or reduction in runs could impact eagles located off the project area. This risk should be evaluated in the Final EIS and if EPA determines that the project may affect bald eagles or their food supply, EPA should request formal Section 7 consultation with the Fish and Wildlife Service.

If you have any question regarding endangered species or your responsibilities under the Act, please contact Jim Michaels at phone (206)754-9444, or address:

U.S. Fish and Wildlife Service
Endangered Species Office
2625 Parkmont Lane S.W., B-2
Olympia, Washington 98502

(8) It should be noted that the proposed project may be subject to permits for which we have review responsibilities. Accordingly, our comments do not preclude an additional and separate evaluation by the U.S. Fish and Wildlife Service, pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.), if eventual project development requires a permit from the U.S. Coast Guard and/or the U.S. Army Corps of Engineers (Sections 9 and 10 of the River and Harbors Act of 1899 and Section 404 of P. L. 92-500). In review of permit applications, the Fish and Wildlife Service may concur, with or without stipulations, or object to the proposed work, depending on specific construction practices which may impact fish and wildlife resources.

In the event that such permits do become necessary, we would encourage the project sponsor to contact our office (phone number 206-753-9440) prior to permit application. We may be able to give guidance on design criteria which will facilitate the permit-review process.

We appreciate the notification of this proposed project and the opportunity to review the subject document for its affects on fish and wildlife resources and their habitats.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

cc: EPA
NMFS
WDE
WDF
WDG
SE, Olympia

RESPONSE TO LETTER NO. 2: U.S. FISH AND WILDLIFE SERVICE

1. Comment acknowledged. See the response to your specific comments below.

2. The Surface Water Management Plan section of the DEIS (Section I.C.1.b) has been revised to include alternatives for piping surface water runoff around the wetland (see Section II of this FEIS). It is the intent of the Midway Landfill Closure Plan to eliminate all landfill-caused pollutants and sediments that may be reaching the wetland. Under some alternatives, other sources that are presently discharging to the wetland would be redirected along with surface water runoff from the landfill to a different discharge point. As discussed in the responses to Letter No. 12, Comment 3, no leachate contamination of the wetland has been detected in testing to date.

3. Surface water discharged from the Midway Landfill will be treated as necessary to comply with all applicable water pollution control regulations. Present regulations require erosion/sedimentation control and the use of oil pollution control devices. Specifically, surface water discharge will comply with King County Code, Chapter 20.50, Surface Water Runoff Policy; and Chapter 90.48 RCW, Water Pollution Control.

4. Comment acknowledged. If the selected Surface Water Management Plan alternative requires work in Smith Creek or its riparian zone, an application for hydraulic project approval will be submitted to the Washington State Department of Fisheries. It is expected that once the requirements of the application have been fulfilled, the approval will be issued with conditions to adequately protect the fisheries resources in Smith Creek during construction. Construction work will be conducted in accordance with such conditions.

5. For Surface Water Management Plan alternatives that discharge to Smith Creek, the rate of runoff in Smith Creek will not exceed the peak rate of runoff prior to the proposed installation of the surface water discharge line. This will be accomplished by using detention basins and/or discharging to Smith Creek at a point where there is a negligible increase in the peak flow as a result of the additional flow from the landfill.

   Although the peak flow rate from the site will not increase due to the project, the duration of the peak flow rate will be extended. However, as discussed on page II-22 of the DEIS, the north drainage basin of which the landfill is a part contributes only a small portion of the flow in Smith Creek. The majority of the flow is contributed by Basin A-2 south of the landfill. Therefore, even though the project could have the effect of extending the duration of peak flows in the north drainage basin, the resulting effect on the duration of flooding in Smith Creek would be negligible.

6. Comment acknowledged.

7. Comment acknowledged. As discussed in the Fisheries section of the DEIS, (Section II.A.6), the proposed project is not expected to significantly impact anadromous fish runs in Smith Creek. Therefore, no significant

RESPONSE TO LETTER NO.2 (CONTINUED)

impacts are expected to bald eagles which might be using these fish as a food source. No bald eagles are known to be currently using the project vicinity as a perching or nesting area.

8. Comment acknowledged.

LETTER NO. 3

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232-2279
(503) 230-5400

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85 SEP 19 A11:16

MI-Landfill Closures-Kent Highlands/Midway

September 16, 1985

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SOLID WASTE UTILITY

OCT 7 1985

Mr. Richard Owings, Director
Seattle Solid Waste Utility
Rm 606, Seattle Municipal Bldg.
Seattle, WA 98104

Dear Mr. Owings:

We have finished our review of the Draft Environmental Impact Statement for the Midway Landfill Closure Plan. The National Marine Fisheries Service has responsibilities for the protection and enhancement of marine, estuarine, and anadromous fishes and their habitats. We offer the following comments that are concerned with the potential for fisheries impacts of the various project alternatives.

General

1 We are primarily concerned with the surface water management alternatives of the landfill closure plan. Of the four surface water management alternatives, we believe that the Tightline to Puget Sound Discharge Alternative best protects the fisheries resource. The Tightline Alternative eliminates the risk of landfill leachates and roadway pollutants reaching Smith Creek. Smith Creek supports known runs of chum and coho salmon and probably supports runs of cutthroat trout and Dolly Varden char.

Plan B of the Tightline Alternative would create an on-site detention basin that would result in a significantly lower peak runoff into Puget Sound. An on-site detention basin could also provide a convenient water sampling station by which one could determine the quality of the runoff water from the landfill and roadway areas before it reaches Puget Sound. If polluted, this water could be treated before it is discharged into Puget Sound. Therefore, we recommend implementation of Plan B of the Tightline Alternative.

We appreciate this opportunity to provide comments. If you have any questions about our comments, please contact Edmond Murrell of my staff at (503) 230-5429.

Sincerely,

for Dale R. Evans
Division Chief

85 SEP 19 A11:50

cc: Washington Dept. of Fisheries
Washington Dept. of Game
Washington Dept. of Ecology
Fish and Wildlife Service, Olympia
Environmental Protection Agency

26904

RESPONSE TO LETTER NO. 3: NATIONAL MARINE FISHERIES SERVICE

1. Your recommendation is noted.

LETTER NO. 4

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

85 SEP 23 AM 11:01

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MI- Landfill Closures, Kent Highlands / Midway

September 18, 1985

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Mr. Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

OCT 9 1985

Dear Mr. Edens:

Thank you for the opportunity to comment on the draft environmental impact statement (DEIS) for the Midway Landfill Closure Plan. We reviewed the DEIS and have the following comments:

(1) 1. The thickness and extent of the glacial units underlying the landfill and surrounding areas need to be determined more accurately, especially the finer-grained strata (silts and clays) which appear to influence groundwater occurrence and movement. A better definition of subsurface conditions beyond the landfill boundaries is also necessary.

(2) 2. The DEIS presents fluid levels and chemical data from two onsite wells. Although this data is useful, additional leachate wells are needed to define fluid levels and leachate quality within the site.

(3) 3. The existing monitoring well network does not provide sufficient information to establish groundwater flow direction, vertical groundwater gradients from the water table to deeper hydrogeologic units, or the extent of groundwater contamination. To develop this information, a detailed well inventory should be compiled, additional monitoring wells installed (including piezometers), hydraulic conductivity determinations made, and additional sampling of existing and new monitoring wells performed.

(4) 4. Data included in the DEIS indicate high levels of methane exist in a large area surrounding the landfill. In order to assess the effectiveness of the gas control system and further define the areas of concern, additional data is needed to determine the following;

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a) pressure gradients in the vicinity of the gas control system;
b) composition of landfill gas as it migrates from the site;
c) manmade and natural migration conduits and accumulation points; and
d) geologic stratigraphy and material properties.

27017

(5) 5. Results summerized in the DEIS indicate that hydrogen sulfide, methane, and a wide variety of organic trace compounds comprise the landfill gas. In order to assess the effectiveness of the proposed gas control system, additional information on the composition of the landfill gas and on and off site receptors needs to be developed.

(6) 6. The proposal for capping and rerouting of surface water will greatly improve the present rate of infiltration and subsequent leachate generation at the landfill. However, given the nature of the wastes disposed of at the landfill and the potential for groundwater contamination, a more secure cap design may ultimately be necessary. The discussion of capping alternatives should be expanded to consider the use of alternate materials such as natural silts/clays and/or synthetic membranes and various multi-layered configurations. An alternative that would comply with the minimum RCRA requirements should be included in this analysis.

If you have any questions, please call Mr. Dave Bradley of our Remedial Action Section at (206) 459-6255.

Sincerely,

Kari R. Samuelson

Kari R. Samuelson
Environmental Review Section

KRS:pk

cc: Dave Bradley

RESPONSE TO LETTER NO. 4: WASHINGTON STATE DEPARTMENT OF ECOLOGY

1. Comment acknowledged. The Work Plan for On-Going Groundwater Investigations (Appendix M) will provide a better definition of subsurface conditions within and beyond the landfill boundaries.

2. The existing wells completed within the landfill (see Figure II-1 in the Draft EIS) provide important information regarding the chemical and physical dynamics of the perched leachate within the landfill. Generally, the data from these wells show that leachate levels within the fill vary in response to hydraulic inputs (as would be expected), and leachate quality is poor and variable (as is typical in most solid waste landfills).

   Additional wells could provide more supporting data to these two important points. However, installing additional wells to fully characterize leachate quality, hydraulics within the fill, and the extent and properties of the perching layer beneath the fill, would risk damaging the natural protection that does exist below the landfill. Groundwater monitoring wells have been installed around the perimeter of the landfill to monitor leachate that may be escaping from the site. These wells will also serve to monitor the effectiveness of remedial measures designed to control leachate generation within the fill and its movement from the fill.

3. Comment acknowledged. The Beneficial Use Survey conducted for this FEIS (Appendix N), and studies described in the Work Plan for Ongoing Groundwater Investigations (Appendix M), will provide this information.

4. All indications are that the current wide-ranging system of monitoring probes being installed around the Midway Site by the Washington Department of Ecology will provide the requested information.

5. Samples will be taken from the gas flare emissions and an analysis conducted to determine whether there is a potential public health problem (see response to Letter No. 1, Comment 11). Information on gas composition at off-site receptors is being accumulated by the City and other agencies during their neighborhood house and business check.

6. The numerous odor control wells proposed and the potential for excavating to make repairs on the wells or gas pipelines makes the use of alternative synthetic materials impractical from an operational viewpoint. Natural soils that can be compacted to achieve a minimum permeability of 10^{-7} cm/sec could be used in the barrier layer if they exist within an economically feasible hauling distance. At this time no such source has been identified. A wide range of final cover configurations and materials were investigated as part of the preparation of the EIS. The configuration proposed was the most efficient based on model results. It exceeds the minimum RCRA requirements (40 CFR 264.310) and recommendations in the draft RCRA Guidance Document (U.S. EPA, 1982).

LETTER NO. 5

JAN TVETEN
Director

85 SEP 20 A 9:35

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504-5711 • (206) 753-5755

MI- Landfill Closures,
Kent Highlands / Midway

September 18, 1985

Re: 35-795-0720 (DEIS-2980)
Saltwater State Park
Midway Landfill
Closure Plan Draft

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SOLID WASTE UTILITY

Mr. Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

Dear Mr. Edens:

Thank you for the opportunity to review the above noted document by the staff of this agency.

1 As indicated in Mr. Heiser's letter to you dated April 6, 1984, we are experiencing water quality and quantity problems in Smith Creek which flows through Saltwater State Park. The above noted document addresses most of the key points necessary to mitigate these problems and upgrade the Midway Landfill to a sanitary condition.

2 Because fo the high peak stormwater runoff problems, stream bank erosion and possible leachate discharge to Smith Creek, we prefer the tightline discharge to Puget Sound with retention alternative outlined in the Draft EIS. The other alternatives would discharge stormwater from the landfill into Smith Creek. This would raise stream flow volumes and present the risk of leachate discharging into the creek.

3 The proposal to locate the tightline within Saltwater State Park will require the approval of the Director and the Washington State Parks and Recreation Commission. This is a 90 day process. However, because this is a non-conforming use, it is questionable that approval can be obtained. Enclosed you will find a copy of Non-Conforming Use of Park Lands - Draft Policy - Report. This document is in the draft stage and is proposed for approval by the Commission. A copy of the approved document will be mailed to you around December 1985 or January 1986.

26947

Again, thank you for the opportunity to comment.

Sincerely,

Ron Effland

Ron Effland Environmentalist
Environmental Coordination

bh
Enclosure
cc: Bruce Bartling, Saltwater State Park

Hydraulic Division, King County
Building and Land Development
431 King County Administration Bldg.
Seattle, WA 98104

RESPONSE TO LETTER NO. 5: WASHINGTON STATE PARKS AND RECREATION COMMISSION

1. Comment acknowledged.

2. Your preference for the tightline to Puget Sound is noted. With regard to the effect of other alternatives on Smith Creek, the response to Letters No. 2, Comments 2 through 5, are relevant. As discussed in the first paragraph on page II-33 of the DEIS, the final landfill cover and leachate collection system will ensure that surface water runoff from the site does not contain leachate. The response to Letter No. 9, Comment 18 is also relevant.

3. The attachment to your letter presents the Washington State Parks and Recreation Commission staff's recommended policy statement regarding non-conforming use of state park lands and the variance guidelines that would allow non-conforming uses. Paragraphs No. 2 and 3 of the variance guidelines indicate that non-conforming use may be permitted by the Commission when overall public benefit clearly exceeds preservation and/or recreational losses to parks and can be adequately mitigated or compensated for; or when use of park land is of significant public benefit and would correct public health and/or safety problems. It would appear that if the tightline discharge within Saltwater State Park to Puget Sound were the selected alternative, a variance application could be submitted and approval granted on the grounds cited above.

LETTER NO. 6

DUANE BERENTSON
Secretary

85 SEP 23 A 9:53

MI-Landfill Closures, Kent Highlands/ Midway

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
Office of District Administrator • D-1, 6431 Corson Ave. So., C-81410 • Seattle, Washington 98108

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September 19, 1985

Mr. Richard Owings, Director
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
Seattle, Washington 98104

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SR 5
Midway Landfill Closure Plan
Seattle Engineering Department
(File K-574)

OCT 9 1985

Dear Mr. Owings:

This Department has reviewed the subject proposal and offer the following comments for your consideration:

1. Any work within Washington State Department of Transportation right-of-way will require a new permit. Please contact Mr. Paul Johnson, District Utilities Engineer (233-2308) for further information.

2. The conditions of the previous permit (Enumclaw 2439) have not yet been completed, complied with, or addressed. This must be resolved.

3. The I-5 west right-of-way line must be re-established and the fence replaced.

4. Surface water from SR 99 is a City problem.

5. The pump station and retention pond east of I-5 and within Washington State Department of Transportation right-of-way, if acceptable, could require an airspace lease. The lease should consider a) common benefits, b) the cost of a bridge over this area if I-5 widening is ever required.

6. We wish to be kept informed of further design refinement for I-5 surface water management.

7. A general solid waste problem keeps plaguing our maintenance forces. Your haul trucks, to various sites, deposit a considerable amount of litter on our highways. We have noted many trucks with ill fitting doors and top screens in disrepair. This problem costs us many thousands of dollars and hundreds of man hours every year to clean up this litter. We would certainly appreciate your resolving this matter.

Thank you for the opportunity to comment on this document. We look forward in working with your staff and consultants to rescheule our mutual concerns. Please call me or Patrick Leavy (233-2416) of my staff.

Sincerely,

R. F. JOHNSON, P. E.
District Design Engineer

26979

PRL/hl
cc J. R. Olson
Utilities

RESPONSE TO LETTER NO. 6: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

1. Comment acknowledged. The City of Seattle will obtain the appropriate permits necessary to construct the proposed project.

2. Comment acknowledged.

3. Comment acknowledged.

4. Comment acknowledged. The question of the City of Kent's jurisdiction over SR 99 is a legal issue and is not within the scope of this EIS.

5. Comment acknowledged.

6. Comment acknowledged. The City of Seattle will coordinate with the Department of Transportation during the design phase of the proposed project.

7. The Midway Landfill is presently closed and has been closed to transfer station loads since 1983. None of the project alternatives for final closure propose hauling materials to the landfill other than clean fill and cover. Trucks hauling solid waste in the vicinity of the Midway Landfill are most likely bound for the Kent Highlands Landfill and their operation is beyond the scope of this document. A separate environmental impact statement on closure of the Kent Highlands Landfill is being prepared and will address issues related to the continued operation and closure of that landfill.

LETTER NO. 7

METRO
Municipality of Metropolitan Seattle

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Exchange Bldg. • 821 Second Ave., Seattle, Washington 98104

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August 30, 1985

MI-Landfill Closures
Kent Highlands/Midway

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Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606 Seattle Municipal Building
600 Fourth Avenue
Seattle, Washington 98104

Draft Environmental Impact Statement
Midway Landfill Closure Plan

Dear Mr. Edens:

Metro staff has reviewed this proposal and offers the following comments.

1) Page ii:-

(1) Mention should be made of the waste discharge permit from Metro. The draft EIS does mention a "Permit for Discharge of Wastewater to a POTW"; this may be their way of referring to the Metro permit. The present Metro permit for the Kent-Highlands Landfill (No. 7115-R11/83) authorizes discharge of transported leachate to the Metro system, after proper treatment, until January 1, 1986 (see Comment 6 below).

2) Page xix:-

(2) Leachate from the toe seep collection system would only be allowed to be discharged through the Kent Highlands pretreatment system if the present permit condition authorizing this practice is renegotiated and/or extended.

3) Page xxi:-

(3) The section titled "e. Post-Closure Plan and Activities," mentions "inspections of the leachate collection and treatment system." This section describes the leachate collection sytem but makes no mention of a "treatment system." Is the EIS referring to a pretreatment system at Midway, at the Kent-Highlands Landfill or elsewhere?

4) Table A following page xxiv:-

(4) In Element 2., "Groundwater Resources," the EIS indicates that Midway leachate trucked to the Kent Highlands

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pretreatment facility would amount to an additional 500,000 gallons/year (or less than 1% of the total treatment flow) and that "no significant impact to the plant is anticipated." This is probably true but the pollutant concentrations of this leachate are not discussed. It may have a significantly greater strength than previous Midway or Kent Highlands leachate and might cause operational problems at the Kent Highlands pretreatment facility.

5) Page I-36:-

(5) In Section (a)-2 "Groundwater Pumping," the EIS mentions that "pipeline trransport (of contaminated groundwater) to the local sewer system would be one alternative for treatment." Which "local sewer system" is this referring to? Discharge of significant quantities of groundwater to any sewer system presents difficulties.

6) Page I-38:-

(6) This extra leachate shares the same considerations as mentioned in Comment 1 above, regarding discharge authorization by permit. Additionally, it may be discovered that this leachate has different pollutant concentrations than that collected at the toe seep collection system.

7) Page II-18:-

(7) Section (b)-1, "Impacts of Alternatives - Minimum Grade Alternative." Metro staff has some reservations about the conclusion that, "No impacts from this additional leachate are anticipated to either the Kent Highlands leachate treatment facilities or to the Metro sewer systems and Renton Treatment Plant." Please refer to the concerns regarding this conclusion as stated in Comment 4.

8) Page II-20:-

(8) We assume the statement that "This leachate would then have to be collected and trucked off-site for treatment and disposal," refers to transport to the Kent Highlands Landfill pretreatment facility. If this is the case, we are concerned about its pollutant characteristics.

In conclusion, Metro staff has two primary concerns regarding this DEIS.

9 1. To allow discharge of Midway leachate at Kent Highlands, the existing permit will have to be renegotiated and/or revised as the provision allowing this practice expires on January 1, 1986, well before the need will arise for this leachate disposal option.

10 2. The solid Waste Utility seems to be basing much of their leachate disposal strategy on the perceived capability of the Kent Highlands pretreatment system to handle any additional load (volume and/or pollutant concentration). This confidence may not be well-founded. During periods of heavy, sustained rainfall the Kent Highlands pretreatment system is being used "to capacity." Additional leachate from Midway at these times may create significant operational problems at the pretreatment system.

Thank you for the opportunity to review and comment.

Very truly yours,

Judith Cochran

for Gregory M. Bush, Manager
Environmental Planning Division

GMB:pbw

cc: Gary Brugger, DOE
B. Burrow (H)

RESPONSE TO LETTER NO. 7: METRO

1. Comment acknowledged. A waste discharge permit from Metro has been added to the list of required licenses, permits, and approvals on page ii of the DEIS (see the Errata section of this FEIS).

2. Comment acknowledged. If disposal of leachate from the Midway Landfill toe seep collection system is not in conformance with the present Metro permit for the Kent Highlands Landfill (No. 711*-R11/83), the permit will be renegotiated and/or extended to allow this practice.

3. The words "and treatment" have been deleted from the fourth and fifth line on page xxi so that the phrase reads: "inspections of the leachate collection system" (see Errata section of this FEIS).

4. Pollutant concentrations in the leachate collected in the toe seep system at Midway Landfill and trucked to the Kent Highlands Landfill for pretreatment are anticipated to be typical of leachate from a mixed municipal solid waste landfill. This is also true of the pollutant concentrations in leachate from the Kent Highlands Landfill. Because the strengths and characteristics of the two leachates are anticipated to be similar, no operational problems are expected at the Kent Highlands pretreatment facility.

5. The referenced section on page I-36 of the DEIS is one of the available remedial action options in the event that the leachate management contingency plan is needed. Because there are presently no specific plans to implement any of the available remedial action options, the site for treatment and discharge of any leachate removed from the Midway Landfill as a result of a remedial action plan has not been identified. The monitoring program described on page I-33 of the DEIS and expanded upon in the Work Plan for Ongoing Groundwater Investigations in this FEIS (Appendix M) will determine the need for any remedial action measures. Should a groundwater pumping measure become necessary, the details of the pumping plan, including quality and quantity of groundwater and method of treatment and discharge, will be developed and subjected to all required agency and public reviews.

6. See response to Comment 2 above, which would apply to any leachate removed from the Midway Landfill and delivered to the Kent Highlands Landfill pretreatment facility.

7. See response to Comment 4 above.

8. The statement you quote refers to remedial action measures that may be implemented under the leachate management contingency plan. See response to Comment 5 above.

9. Comment acknowledged. See response to Comment 2 above.

RESPONSE TO LETTER NO. 7: METRO (CONTINUED)

10. Leachate management plans for the Midway Landfill that propose the use of the Kent Highlands Landfill pretreatment facilities will include an evaluation of the Kent Highlands system to handle the additional load (volume and/or pollutant concentrations) as part of the predesign engineering analyses. Modifications will be provided if deemed necessary. Ongoing performance monitoring of the Kent Highlands system will be conducted to confirm the capability of the system.

PUGET SOUND AIR POLLUTION CONTROL AGENCY

ROUTING	DATE	INITIAL
ACTION		
FILE		
INFORMATION		
EVA		
JDO		
RDO		
	MHE	

3c

LETTER NO. 8

200 West Mercer Street, Room 205, P.O. Box 9863
Seattle, Washington 98109
(206) 344-7330

MI - Landfill Closures, Kent Highlands/Midway

September 11, 1985

OCT 1 1985

05 SEP 13 AM 10:55

Richard Owings, Director
Seattle Solid Waste Utility
Seattle Engineering Department
Room 606, Seattle Municipal Bldg.
Seattle, WA 98104

Dear Mr. Owings:

Midway Landfill Closure Plan

We have reviewed the draft environmental impact statement for the Midway Landfill Closure Plan and have several comments to make. Our first three comments are general.

1. The closure plan proposes capture of gases migrating both laterally and vertically, with odor control provided for the vertical venting system. Details of the migration control and vertical venting control systems should be included as part of the Notice of Construction and Application for Approval to this Agency.

2. Since there is some uncertainty about whether the migration and vertical venting/odor control systems will adequately capture the gases, consideration should be given to establishing a check on the effectiveness of the Vertical Venting System by specifying maximum and average ambient methane concentrations. Although the DEIS provides for off-site monitoring to determine the effectiveness of the migration control system, the details of the monitoring plan need to be specified in the EIS.

3. The EIS should address the impacts expected from deep horizontal leachate movement, since air problems could arise from distant surfacing of leachate.

4. The following specific comments are page-related. Regarding page I-40, third paragraph: The statement should explain how emissions from the flares will be monitored "to make sure contaminants are destroyed..."

26720

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A.R. Dammkoehler, Air Pollution Control Officer

(5) Regarding page I-40, 4th paragraph: We are concerned that even PVC pipe could crack due to differental settlement. What steps will be taken to detect and remedy leaks in the header pipe?

(6) Page I-40, last paragraph: It is not clear from this discussion that the threshold limit value (TLV) is intended to protect healthy adult workers from adverse effects. Also, The American Conference of Governmental Industrial Hygienists (ACGIH) warns that TLV's should not be used as fine lines between safe and dangerous concentrations.

(7) The second paragraph on page I-40 should have the words "carbon dioxide" changed to "carbon monoxide."

Thank you for circulating this draft to us for our comments.

Sincerely,

Arthur R. Dammkoehler
Air Pollution Control Officer

sjn

RESPONSE TO LETTER NO. 8: PUGET SOUND AIR POLLUTION CONTROL AGENCY

1. Comment acknowledged. Details of the two gas control systems will be included in the Notice of Construction and Application for Approval to PSAPCA.

2. The City of Seattle and Washington Department of Ecology are currently installing gas control wells at various off-site locations to reduce levels of methane gas (see response to Letter No. 11, Comment 7, as well as the revised Risk of Explosion and Hazardous Emissions section included in Section II of this FEIS). No maximum or average ambient levels of methane have yet been established. Background levels at which the landfill can be considered "stabilized" will likely be established as part of the final closure plan. However, the immediate goal is to reduce methane concentrations in the soil below the level at which there is a risk of fire or explosion. Experience with monitoring methane levels and subsurface air pressures in the existing gas control wells will serve as the basis for the long-term monitoring program to be included in the final closure plan.

   The effectiveness of the vertical venting system will be determined subjectively by the extent to which odor is reduced; and more scientifically by testing the emissions from the permanent shielded flares to determine if odor-producing constituents such as hydrogen sulfide are present at levels above the established odor thresholds.

3. On-going groundwater investigations described in Appendix M of this FEIS will better characterize the groundwater regime in the site vicinity and the extent of leachate movement. Air problems from distant surfacing of leachate are considered unlikely. There is no evidence that leachate is surfacing anywhere in the site vicinity at the present time. See response to Letter No. 12, Comment 3.

4. Samples will be taken of gases emitted from the permanent shielded flares. These samples will be tested to determine concentrations of constituents known to be present in gas from the landfill (see Table II-10 on page II-43 of the DEIS), as well as toxic constituents that may result from combustion. Testing data will be used to perform a screening level atmospheric dispersion analysis such as that performed for the DEIS (see last paragraph of response to Letter No. 1, Comment 11). The analysis will focus on hydrogen sulfide and benzene, the only two compounds predicted to exceed regulatory guidelines under worst case assumptions (page II-44 of the DEIS). Other compounds will be tested in response to remedial investigation activities under CERCLA.

5. Methane and oxygen concentrations in the collection system will be monitored for evidence of leaks. The particular section of pipe leaking would be isolated by successive testing at each well. Further pinpointing of the leak would be accomplished by a visual check of the landfill surface for differential settlement or equipment damage, and/or checking the interior of the pipe with a remote camera. The damaged pipe would be uncovered by excavating with a backhoe and repaired. The cover layers disturbed by the repair would be carefully replaced to maintain the integrity of the cover system.

RESPONSE TO LETTER NO. 8: PUGET SOUND AIR POLLUTION CONTROL AGENCY (CONTINUED)

6. We assume your comment is intended to refer to page II-41 rather than I-40. The air quality consultant for the EIS concurs with your comments about TLV values. To provide clarification, the first sentence on page II-44 has been revised to indicate the applicability of TLV's only to healthy adult workers (see Errata section of this FEIS). Note that the DEIS uses the much more stringent (and appropriate) state guideline values that are circulated by the EPA Air Toxics Clearinghouse to assess ambient impacts on the general population (see Table 11, page II-43). These guideline values are typically one three-hundreth of the TLV value or less.

7. Again, we assume your comment refers to page II-41 rather than I-40 of the DEIS. The change you recommend has been made (see Errata section).

LETTER NO. 9

King County Executive
Randy Revelle
Department of Planning and Community Development
Holly Miller, *Director*

September 19, 1985

Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606 Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

RE: DEIS on Midway Landfill Closure Plan

Dear Mr. Edens:

We have reviewed the draft EIS and appreciate this opportunity to comment. Specific comments, organized by subject area, follow.

1. Off-Site Detention (Wetland as Detention Facility)

1 a. References to the use of an "existing natural detention basin" fail to make clear that it is an existing wetland. This wetland has been identified by King County as a sensitive area, and is catalogued #34, Lower Puget Sound, in the County's map folio of sensitive areas.

2 b. Because of the potential for leachate contamination, not to mention addition of heavy metals, oil, and grease from I-5 runoff, water quality into, and leaving, the wetland may suffer. The assertion that the diversion of I-5 runoff, and runoff from the landfill site, to the wetland will not increase the heavy metal loadings to the wetland (pg. II-36, paragraph 3) is incorrect. It may be that increased loadings will not be significant, but an increase in the roadway surface area tributary to the wetland can only result in increased pollutant loading.

3 The statement that the wetland will "not change dramatically if flow rates through the site remain at current levels" (pg. II-52, paragraph 3), is contradicted by the next line which indicates that the existing plant community may be altered by the additional flows anticipated.

4 Water quality and sediment impacts to the wetland appear to be understated. In particular, citation of METRO research on toxicant behavior in streams (pg. II-35) does not appear applicable since the mechanisms described as preventing toxicant buildups in streams (erosion, scouring, and sediment transport) do not occur with any great effect in a wetland of this type.

811 Alaska Building 618 Second Avenue Seattle, Washington 98104 (206) 344-7503

5 The claim is made that there is advantage using a wetland for detention (pg. II-37, paragraph 1) because many pollutants would "settle out". It is likely, however, that the pollutants will be retained in the wetland, resulting in gradual increased contamination and consequent biological effects in the wetland.

Recent research indicates that a wetland's ability to absorb pollutants may eventually become saturated and subsequent influxes of contaminated water may actually cause release of increased levels of contaminants ("Mechanisms Controlling Phosphorous Retention Capacity in Freshwater Wetlands", Curtis J. Richardson, Science vol. 228). The EIS needs to acknowledge the uncertainties associated with use of the wetland as a detention facility and propose an adequate monitoring program to determine subsequent impacts and necessary mitigations.

6 d. Mitigation proposed for potential impacts to the wetland is inadequate. The proposed use of the wetland as a detention facility would necessitate dredging of the majority of the wetland and, it appears, reduce its area from ten acres to six acres. Retention of perimeter vegetation near the wetland should not be considered a mitigation measure, since it does not restore any of the wetland values that would be lost through the proposed modifications.

Appropriate mitigation measures to compensate for lost wetland values should be proposed. Possible on-site mitigation measures could include creation of an open water/island mosaic that would provide the needed open water storage and provide wildlife habitat. Passing inflow through grass lined swales and sedimentation traps before it reaches the wetland could reduce some sedimentation and water quality impacts. The need for enhancement and/or restoration should also be addressed. (King County required mitigations can include enhancement and/or restoration.)

2. On-Site Detention

7 a. On-site detention would appear to minimize the relative environmental impacts. This comment presumes that the on-site facility would not be built over any portion of the landfill and the proposed liner and barrier would effectively prevent migration of contaminated water.

8 b. Discussion of this alternative should be expanded to include acknowledgement and explanation of the risks and potential effects of failure of the separation dike on both surface water and groundwater.

3. No Detention

9 a. Puget Sound discharge with no detention would not allow compliance with KCC Chapter 20.50, Section.050.

10 b. The assertion that impacts to fisheries resulting from the no-detention proposal would be similar to the off-site detention proposal (pg. II-59) is not correct. The no-detention alternative would result in increased flow rates and short duration flood events that would result in cumulative impacts to the fisheries resource.

4. Tightline to Puget Sound

11 a. Tightline to Puget Sound would require a Hydraulics Project Approval, a Flood Control Zone permit, and a Shorelines Management Substantial Development permit.

12 Building a pipeline along Smith Creek would leave a large scar through Salt Water State Park and may reduce the tree canopy over the creek. Steep slopes in the area would mean a fairly large clearing for construction and an increased potential for erosion during and after construction.

13 b. Construction of the pipeline would appear to have very significant potential adverse environmental impacts. The requirement of landscaping after construction and the retention of a 100 foot minimum undisturbed buffer zone adjacent to the creek might reduce the potential impacts. However, the environmental "cost" of this alternative may be too high to be acceptable relative to other options.

5. Surface Water Concerns (Smith Creek)

14 a. The description of existing conditions (pg. II-54) acknowledges the presence of salmon, but fails to indicate the current level of use of Smith Creek. How many fish, and of what species, use the Creek? Do they spawn or rear there? In what streams segments? Information on the present use of the stream by salmon must be included to determine if proposed mitigation measures are adequate.

15 b. Under the discussion of Unavoidable Adverse Impacts, the EIS states that "none of the impacts due to erosion are expected to result in adverse impacts to water quality", (pg. II-39). The impacts due to erosion may not have a permanent effect on water quality in Smith Creek, but it is difficult to believe that two to three years of sediment loadings will not adversely impact the fisheries resource of Smith Creek and the delta at the mouth of the creek.

16 c. The description of post-closure impacts states that the concentrations of heavy metals would be acceptable due to the large dilution effect below the confluence of the North and South Forks of Smith Creek. This ignores potential heavy metal impacts to the North Fork of Smith Creek above the confluence. What effects should be anticipated above the confluence?

The EIS must also note that heavy metals are being flushed into Puget Sound from a number of sources. The assimulative capacity of Puget Sound may be large, but cannot be taken for granted. This project should be described in terms of its relative contribution.

17 d. This proposal would increase the volume of runoff to Smith Creek. Although the peak rate of runoff may be controlled for certain size storms, this new source of storm water may have adverse impacts on the creek. Regardless of the alternative chosen, improvement should be made to Smith Creek to reduce flooding and enhance fisheries. These improvements could include culverts, rock dams, pools and riffles, and sediment removal.

18 e. Water quality monitoring programs on Smith Creek should be conducted to adequately address and establish requirements for additional treatment or pollution reduction.

19 f. Given the probability of contamination of Smith Creek, an aeration system should be considered. An aeration system incorporating the wetland and existing pond north of South 250th could be included in a stepped pond design that allows for removal of organics and heavy metals and reduces the BOD entering Smith Creek. Concurrently, an enhancement program mitigating for the loss of wetland habitat would have to be provided.

20 g. Surface water sampling conducted at both the present time and after closure would be of immense value in determining both background levels and the adquacy of closure implementation.

6. <u>Groundwater Concerns</u>

21 a. The leachate management plan addresses influx of stormwater, but not groundwater. Is groundwater influx a significant contributor to leachate generation? This concern should be addressed.

22 b. Direction of groundwater flow and leachate contamination of the groundwater have not been completely addressed. Have beneficial acquifers been impacted? Will the proposed alternative sufficiently protect the area's groundwater or should additional containment methods be used?

23 c. Why is a fecal coliform count included in the list of indicator parameters? This is not as good an indicator of leachate contamination as a scan of heavy metals might be. Testing for levels of silver, arsenic, barium, cadmium, chromium, copper, manganese, nickel, and lead as well as iron and zinc should be made. An attempt should be made to determine if any of these metals occur naturally in the groundwater of this areas as an aid to evaluation of analytical data.

7. Cover Design

24 a. The soil layer proposed in the design of the final cover system appears to be effective in reducing infiltration and conforms to profiles prepared for buildings which have earth cover or shelter. However, it potentially discriminates against healthy growth of a full range of plant species in at least two ways.

The barrier caused by the difference in hydrostatic pressure between significantly different soils types will cause the roots to spread out along the top of the second layer, limiting the growth to the first layer -- in effect causing the plants to be "pot-bound". Only those plants which have shallow roots and which can tolerate the stress of being over-crowded and over-saturated will survive. Consequently the diversity of plant species will be limited and, in natural competition, weeds will have a better chance of surviving. Choice of soils which will work to slow or stop infiltration will also affect the success of planted cover.

25 b. The depth of layers which are specified would limit the sizes of materials to weeds, commercial grass seeds, and small shrubs. Dr. Harold Pellet, University of Minnesota, has done research into appropriate soil depths for various sizes of plants. His work could be helpful in making field determinations of soil depths. Decisions about immediate and future revegetation should be considered as part of the model before the final soils types and depths are chosen.

8. Methane Gas

26 a. The description of project alternatives, existing conditions, and impacts for air quality, housing, and land use all seem to ignore the documented public health, risk of explosion, and nuisance impacts associated with migration of landfill gases into nearby buildings at this site. The EIS must discuss the air quality impacts on public health and the potential for explosion. Discussion would be appropriate under both existing conditions and alternative closure proposals.

27 b. The first sentence in Section 4.4 on page 28 of the Geotechnical and Hydrological Investigation should read: "Methane gas has been found to be migrating off-site along all sides of the landfill."

28 c. The first sentence of Section 2.2.4, pg. 8 of the Geotechnical and Hydrological Investigation should read: "Based on the initial barhold testing conducted in 1981 by the Seattle-King County Department of Public Health, the Seattle Engineering Department installed a series of 19 shallow gas sampling wells west of the landfill."

29 d. Unlit gas flares are not a problem unique to the Midway Landfill. The King County Solid Waste Division had this problem at its regional landfill until a staff engineer redesigned the flares. The new flares have proved very reliable and are easily manufactured. These may be used until an active gas collection system is installed. (A drawing and specifications for this redesign is attached.)

9. Miscellaneous

30 a. Table II-2 (pg. II-25) references drainage sub-basins that are not shown on Figure II-10 (pg. II-24).

We appreciate that landfill closure is a complex and difficult undertaking. We hope these comments will be helpful. If you have questions or need additional information, please contact Meredith Getches at 344-7503.

Sincerely,

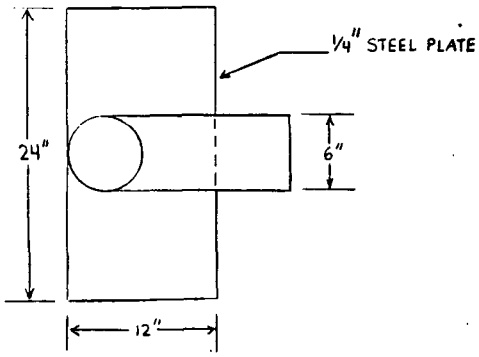
HOLLY MILLER
Director

HM:MG:me

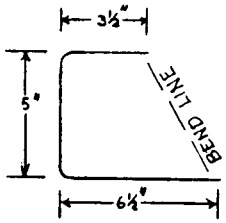
cc: Bud Nicola, M.D., Director, Seattle-King County Department of Public Health
ATTN: Chuck Kleeberg, Acting Chief, Environmental Health Services
Greg Bishop, Supervisor, Environmental Health Services
Don LaBelle, Director, Department of Public Works
ATTN: Joe Simmler, Manager, Surface Water Management Division
Rod Hansen, Manager, Solid Waste Division
Deborah Lambert, Planner
Steve Miller, Deputy Director, Department of Planning and Community Development
ATTN: Meredith Getches, SEPA Coordinator
Harold Robertson, Manager, Planning Division
ATTN: William C. Jolly, Chief, Resource Planning Section
Los Schwennesen, Chief, Community Planning Section
Bryan Glynn, Manager, Building and Land Development Division
ATTN: Ralph Colby, Supervisor, Plan Implementation Section
S. B. Aldrich, King County Conservation District

GAS BURNER

SECTION A-A



DETAIL-A
TYPICAL



Item No.	Total No.	Description	Specification (Note Number)
1	6	Gusset 1/4" x 3" x 4"	M.S.
2	4	Eyelet ½" x 1" eye	M.S.
3	1	24" x 5'-0"	C.M.P. 16 Gage (3)
4	1	6" x 15'-0" x 1'-6"	C.M.P. ELL 16 Gage (3)
5	1	Plate 1/4" x 24" ϕ	M.S.
6	1	Plate 1/4" x 12" x 24"	M.S.
7	4	Galvanized Aircraft Cable 3/16" x 26"	(1), (2)

NOTES:

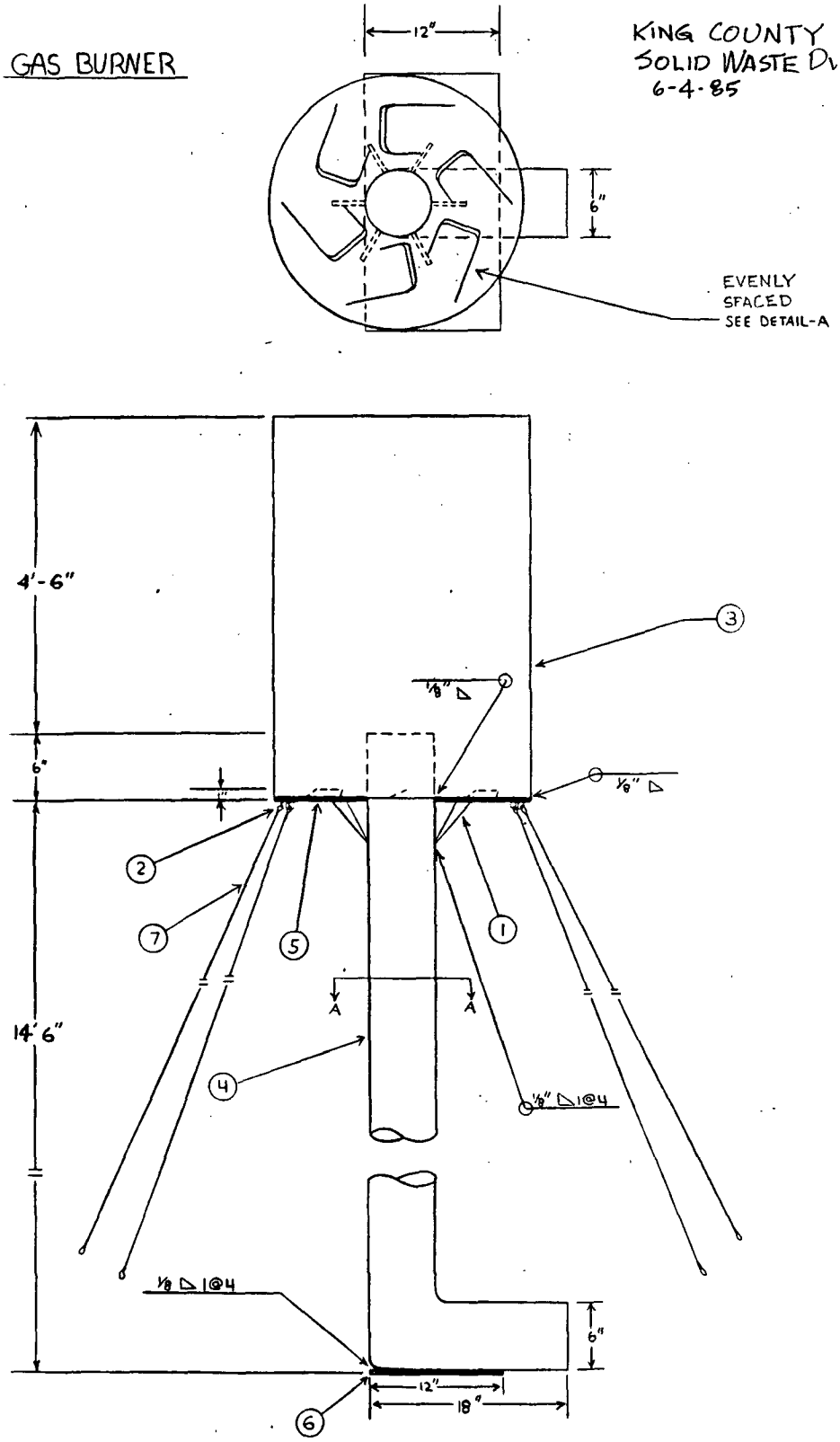
(1) Cables to terminate with a 4" ϕ loop (Typical)

(2) Units to be shipped with cables attached and wrapped around riser, and secured with fiber tape.

(3) Galvanized Steel Spiral Corrugated Pipe

GAS BURNER

KING COUNTY
SOLID WASTE DIV
6-4-85



RESPONSE TO LETTER NO. 9: KING COUNTY DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT

1. Comment noted. The "existing natural detention basin" is indeed a wetland and has been described as such in the Vegetation and Wildlife section on page II-50 of the DEIS. Figures I-5, I-6, I-8 and I-9 also show this area as a wetland. The text on page I-21, which is the first time the natural detention basin is mentioned in the DEIS, has been modified to reflect its wetland status.

2. The statement you refer to applies to the Off-Site Detention alternative in which about 6 acres of the wetland will be converted to a formal detention basin by clearing and dredging (see discussion of impacts on p. II-52 of the DEIS). Therefore, the heavy metal loading in this case would be to the receiving waters rather than to the wetland. Nonetheless, your point is well taken. The diversion of I-5 runoff to the detention basin would increase the heavy metal loading to receiving waters. However, because the volume of runoff diverted from I-5 is relatively small compared to the volume of runoff from Highway 99 that currently enters the wetland, the increase in heavy metal loading is not considered significant. The text on page II-36 of the DEIS has been revised accordingly (see Errata section of this FEIS).

3. The statement you refer to in this comment applies to the impacts on the wetland if an on-site detention basin is used and the wetland remains in its natural state. Under the On-site Detention Alternative, the rate of surface water flow through the wetland would be controlled so as not to exceed existing peak flow levels calculated for the 25-year storm event. In addition, as noted on page I-22 of the DEIS, improvements would be made to the existing drainage channel between Highway 99 and the wetland, as well as downstream of the wetland, to correct existing flooding problems. Therefore, this alternative would not aggravate existing flooding problems. Nonetheless, the total volume of water discharged to the wetland would increase due to the addition of surface water from the closed landfill and I-5. As a result, the period of time over which wetland soils are saturated would be extended, and some areas of standing water could develop.

   Potential changes in vegetation due to this alteration in the water regime are difficult to assess, both because water would be distributed throughout the wetland by a diffuser system, and because the water regime would be less affected during the drier growing season. Some trees may die and differences in understory vegetation could occur due either to the more open canopy or wetter soils. Areas of emergent wetland vegetation could also develop. The end result is likely to be a more diverse wetland with more types of wetland habitats present. The potential for a gradual change to a more diverse wetland area is not considered a significant adverse impact.

4. The statement you refer to in this comment applies to the Off-Site Detention Alternative in which a portion of the wetland is converted to a formal detention basin (see first sentence of response to Comment 2 above). Therefore, the terms "erosion, scouring, and sediment transport" apply to the receiving waters (North Fork of Smith Creek and Smith Creek) rather than to the wetland.

5. Under the On-Site Detention Alternative (not the Off-Site Detention Alternative as implied by the heading in your letter), sediments contaminated with heavy metals and other urban pollutants would accumulate in the wetland, resulting in a gradual increase in contamination, perhaps to the saturation point. The water quality in the wetland would be monitored during the post-closure maintenance period to ensure that no leachate contamination is occurring. The results of monitoring would also show increases in heavy metals and other toxicants if releases from accumulated sediments were occurring. Should these releases of toxicants become a problem, appropriate mitigation measures, such as the periodic removal of sediments, would be undertaken in consultation with the Washington State Department of Ecology and other agencies.

   It is worth pointing out again that Highway 99 runoff discharges to the wetland under existing conditions, and will remain the primary contributor of heavy metals to the wetland if the On-Site Detention Alternative is implemented. As discussed on page II-33 of the DEIS (first paragraph), surface water runoff from the closed landfill is expected to be comparatively free of pollutants.

6. The text on page II-52 and II-53 of the DEIS has been revised to reflect the fact that retention of natural vegetation around the perimeter of the basin is not mitigation. In addition, creation of an open water/island mosaic is added to page II-53 as potential mitigation if the Off-Site Detention Alternative is selected. (As discussed in Section I of this FEIS, off-site detention is not the preferred alternative). The potential use of grassy swales is already discussed on page II-39 of the DEIS as mitigation for impacts on surface water quality.

7. The proposed location for the on-site detention basin is on property adjacent to the north side of the landfill where there is no solid waste. The City will have to obtain the right to use this property. The liner and barrier will be designed to prevent migration of contaminated water into the basin.

8. As shown in Figure I-7 (page I-24 of the DEIS), the containment dike will be constructed above and below ground level in native soils. The foundation will be designed in a manner such that settlement of the waste in the adjacent landfill will not affect the stability of the dike. Therefore, the potential for failure of the containment dike would come primarily from a catastrophic event, such as an earthquake, although there are no geologic faults in the vicinity of the landfill. Should the containment dike fail, leachate from the landfill would still not enter the basin because the basin will have a separate membrane liner. If the membrane liner in the basin also failed, surface water would leak out into the ground near the landfill. This water could potentially contribute to increased leachate generation until repairs could be made. However, simultaneous failure of the containment dike and membrane liner in the basin is considered highly unlikely.

RESPONSE TO LETTER NO. 9: KING COUNTY DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT (CONTINUED)

9. Comment acknowledged. As discussed in Section I of this FEIS, Puget Sound discharge with no detention is not the preferred alternative.

10. Comment acknowledged. Under the No Detention Alternative, peak flows in Smith Creek would increase to some degree. In the North Fork between the proposed tightline discharge and the confluence of Smith Creek, peak flows following a 25-year storm would increase from an estimated 100 cfs under existing conditions to 114 cfs with the project. Peak 25-year flows in the mainstem of Smith Creek would increase from 339 cfs to 364 cfs, as shown in Figure I-8 of the DEIS. In years of average flow, the flow increases due to the No Detention Alternative would be smaller. However, this alternative would not improve the current "flashy" nature of the stream, and flood events can transport sediments affecting fish habitat. As discussed on page II-57 of the DEIS under No Detention Alternative, instream construction activities would be required to eliminate the potential for increased downstream flooding. Also, as noted on page II-60 of the DEIS under Mitigation, upstream detention facilities would be a desirable addition to this alternative.

11. Comment noted. The Flood Control Zone permit has been added to the list in Section D of the Fact Sheet, and the words "Shoreline Management" have been added before "Substantial Development Permit" (see Errata section of this FEIS).

12. See response to Letter No. 2, Comment 4. As discussed in Section I of this FEIS, the tightline to Puget Sound is not the preferred alternative.

13. See response to Comment 12 above. A requirement for landscaping and a 100-foot minimum undisturbed buffer zone adjacent to the creek has been added to page II-60 as potential mitigation if the tightline to Puget Sound is selected (see Errata section of this FEIS). Your concerns about this alternative are noted.

14. The majority of the Smith Creek drainage is classified as a Type 4 or Type 5 system by DNR (pg. II-54) indicating the system is currently limited with respect to high quality salmonid habitat. While Type 3 water and good quality salmonid habitat (primarily coho/chum salmon and steelhead/cutthroat trout habitat) does exist in the lower mainstem of Smith Creek, fish use of this system appears limited.

    The Washington Department of Fisheries does not survey Smith Creek and feels this system is not a big producer of salmon. Smith Creek has been planted with coho salmon by a local sportsmen's club. However, the drainage is an average or marginal producer of salmon when compared to similar systems (Tim Flint, WDF Biologist, personal communication, December 3, 1985). In an October 31, 1985 meeting, Dave Heiser (Environmental Coordinator, Washington State Parks and Recreation Commission) reported that WDF and WDG indicated fish use of Smith Creek was quite limited. The limited fish use of this system is related to the degree of development that has occurred within the basin (page II-54 to II-55 of the DEIS).

The intent of the surface water management plan for the landfill closure is to maintain the current water quality and flow characteristics of Smith Creek, thus avoiding adverse impacts to fishery resources.

15. "Two to three years of sediment loading" is an overstatement of what may occur. Depending on the specific location and type of construction activity, a variety of erosion and sedimentation control measures will be implemented to prevent sediment loading to nearby streams (see page II-7 of the DEIS under Mitigation Measures). The response to Letter No. 2, Comment 4 is also relevant.

16. As described in the DEIS, the water entering the detention basin would contain significant concentrations of heavy metals. The primary source of these metals will be runoff from Highway 99 and I-5, 84 percent of which enters the wetland under existing conditions. Consequently, the impact related directly to closure of the landfill represents a comparatively small increase in loading of heavy metals. As discussed in the EIS, the majority of the heavy metals will be in particulate form and therefore should settle out in the detention basin. It is possible that there will be no measurable difference in heavy metal concentrations in the North Fork of Smith Creek.

    A monitoring plan for post landfill closure will be developed and maintained by WDOE, USEPA and the King County Health Department. By sampling runoff water leaving the landfill site, the quality of the water entering the wetland could be monitored and mitigation measures could be put into action if a problem developed.

    This project will result in an increase in heavy metal loadings to Puget Sound. Again the large majority of this runoff has been entering the Sound under existing conditions. The increase represents a very small portion of the total metals contribution to this part of Puget Sound. The importance of non-point pollution sources such as highway runoff on Puget Sound water quality has recently become a topic of great interest but no decisions have been made or direction given as to what will be expected in the future for control of this pollutant source.

17. See responses to Comment 14 above and Letter No. 2, Comment 5. Since the current water quality and flow characteristics of Smith Creek would be maintained under any of the surface water management alternatives that discharge to the creek, no significant adverse impacts on fisheries resources would occur. Therefore, no fisheries enhancement measures are considered necessary.

18. As noted in the last paragraph on page I-33 of the DEIS, surface water quality will be monitored where it leaves the detention basin (for the On-Site and Off-Site Detention Alternatives or where it leaves the landfill site (for the Tightline and No Detention Alternatives). This will allow more rapid identification of any potential water quality problem associated with the landfill so that appropriate remedial actions can be taken

immediately. If contamination is detected, the surface water will be held on-site and transported to the Kent Highlands Landfill for treatment until the problem is corrected. At that time. it would also be appropriate to monitor upstream and downstream of the discharge to determine if there has been any effect on the receiving waters.

19. It is the intent of the closure plan facilities and the post-closure operation and maintenance to prevent the contamination of any surface waters leaving the landfill site. If remedial action techniques become necessary to ensure this in the future, a plan for aeration of the detention basin will be considered. While the potential for remedial action facilities in the future is recognized in the DEIS, no specific facilities are proposed at this time.

20. See response to Comment No. 18 above.

21. As discussed on page II-8 of the DEIS, groundwater level measurements by Golder Associates (1982 and 1985) indicate that the regional groundwater table is below the base of the landfill. Based on these measurements, the influx of groundwater into the landfill is not an issue of concern. However, since the exact configuration of the base of the landfill is not known, it is possible that the water table does intersect the landfill at certain locations. In addition, as pointed out in the DEIS, perched groundwater is known to exist at some locations within the landfill materials. Decomposing garbage in this perched groundwater will continue to generate leachate, but by preventing the infiltration of surface water into the landfill, the hydraulic gradient required to drive the perched groundwater out of the landfill and into the regional water table will be reduced.

    The groundwater regime in the vicinity of the landfill will be better characterized through additional studies described in the Work Plan for Ongoing Groundwater Investigations, included in Appendix M of this FEIS. Monitoring of the groundwater at the site consistent with the State of Washington Minimum Functional Standards (WAC 173-304) will determine if a corrective action program is warranted.

22. See the revised discussions of Groundwater Quality and Public Water Supplies in Section II of this FEIS, as well as the Work Plan for On-Going Groundwater Investigations (Appendix M) and the Beneficial Use Survey (Appendix N). Letter No. 1, Comments 2, 3, and 4 and their associated responses are also relevant. The groundwater monitoring program described in Appendix M will determine whether closure facilities are adequately protecting the area's groundwater.

23. The indicator parameters used are those specified in the State of Washington Minimum Functional Standards for Solid Waste Handling (WAC 173-304). The purpose of testing for indicator parameters is to allow the identification of groups of contaminants indicative of the presence of landfill leachate rather than to quantify the concentration of a particular constituent.

Background concentrations of constituents are established using the water quality data from well MW-1, which is hydraulically upgradient of the landfill.

24. The purpose of the cover system proposed for the Midway Landfill Closure is to maximize surface water runoff while minimizing infiltration of precipitation. This is essential in order to control the amount of leachate generated at the site, which has the potential to contaminate the groundwater. The barrier layer is the key to controlling the amount of infiltration, and will also control the movement of landfill gas from the landfill.

    Fibrous rooted grasses are the vegetation type which will probably be planted over the final cover. There are several reasons for this choice. One is the need to utilize a species that will stabilize the soil surface with a fibrous root system. Such a root system will flourish in a relatively shallow soil while not disrupting the barrier layer. A second reason is maintenance requirements. Trees or shrubs would make maintenance of the cover system very difficult. Maintenance requirements, including cover repair and regrading, are expected to be higher during the first 5 years after closure as the landfill settles.

    A final reason is the need to use a species which is tolerant of methane in the soil. Although the barrier layer will have a low permeability (about $1x10^{-7}$ cm/sec), it may still allow some methane movement through it. Some grass species have been found which are relatively tolerant of methane in soil, and have been used successfully on other landfills. Many species of trees and shrubs are lethally stressed by methane in soil. If necessary, the vegetative cover will be mechanically maintained to keep out weak species.

25. As discussed in the response to Comment 24 above, the key considerations for cover design are control of surface water runoff, migration of landfill gas, and maintenance of cover integrity. The use of any type of vegetation except shallow fibrous-rooted species would encourage disruption of the barrier layer, require far greater depths of topsoil, or make maintenance of the cover system extremely difficult.

26. These issues are discussed in Section II.B.2 of the DEIS, Risk of Explosion and Hazardous Emissions (page II-68). As noted in the response to Comment 27 below, this section has been revised and is included in Section II of this FEIS. Also, a review of public health issues was conducted for the FEIS and is included in Appendix O. The major conclusions of this review are summarized in the response to Letter No. 15, Comment 5.

27. Comment acknowledged. The statement you refer to in the 1982 study report reflected current data at the time it was written. Section II.B.2 of the DEIS, Risk of Explosion and Hazardous Emissions, has been revised to reflect recent data indicating more extensive gas migration (see Section II of this FEIS). Gas movement has been documented to the east, west, and south of the landfill, but not to the north.

RESPONSE TO LETTER NO. 9: KING COUNTY DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT (CONTINUED)

28. Comment acknowledged.

29. Comment acknowledged. Ambient gas collection pipes and attendant small flares will not be utilized after completion of the active migration and odor control system.

30. Comment acknowledged. The sub-basins are listed in Table II-2 only to show the characteristics of the drainage basins. Showing all sub-basins on Figure II-10 would have made the figure confusing, obscuring the overall drainage picture.

LETTER NO. 10

City of Seattle
Charles Royer, *Mayor*

King County
Randy Revelle, *Executive*

Seattle-King County Department of Public Health
Bud Nicola, M.D., M.H.S.A., *Director*

September 18, 1985

Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Municipal Building
600 Fourth Avenue
Seattle, WA 98104

RE: Review of Midway Landfill Closure Plan Draft E.I.S.

Dear Mr. Edens:

The following comments constitute the Health Department's response to the above indicated document:

1. Section 2.2.4 on Page 8.

(1) The first sentence should read: Based on the initial barhole testing conducted in 1981 by the Seattle-King County Department of Public Health the Seattle Engineering Department installed a series of 19 shallow gas sampling wells west of the landfill.

2. Section 4.4 on Page 28.

(2) The first sentence should read: Methane gas has been found to be migrating off-site along all sides of the landfill.

3. Section 5.1 on Page 36.

(3) Surface water sampling conducted at both the present time and after closure would be of immense value in determining both background levels and the adequacy of closure implementation.

Thank you for providing this opportunity for comment.

Sincerely,

Greg Bishop, Coordinator
Solid Waste Program

GB:mt

RESPONSE TO LETTER NO. 10: SEATTLE-KING COUNTY DEPARTMENT OF PUBLIC HEALTH

1. See response to Letter No. 9, Comment 28.

2. See response to Letter No. 9, Comment 27.

3. See response to Letter No. 9, Comment 18.

NOTE: Your comments were apparently incorporated verbatim in the comment letter from King County Department of Planning and Community Development (Letter No. 9).

LETTER NO. 11

CITY OF KENT

September 19, 1985

Mark Edens, Project Manager
Solid Waste Utility
Seattle Municipal Building, Room 606
600 Fourth Ave.
Seattle, Washington 98104

RE: City of Kent Comments to the Midway Landfill Closure Plan Draft EIS

Dear Mark:

The City of Kent offers the attached comments and recommendations regarding the Draft EIS for the Midway Landfill Closure Plan. The material include summary discussion of comments that were received at a recent City Council workshop session from West Hill residents, other concerned citizens, and the Kent City Council.

If any items are unclear please give Steve DiJulio or myself a call. Thank you for efforts in coordinating and presenting the public workshops and hearings.

Very truly yours,

Gary M Gill

Gary M. Gill
City Engineer

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GENERAL SITE CONDITIONS

(1) While the Midway Landfill was to be a site for construction rubble, demolition waste and non-putrescible wastes, it is not correct to state that the Landfill "was operated as a non-putrescible waste site." See I-1. The Landfill was in fact operated by Seattle as a waste site for all waste. The only waste stream not directed to Midway was Seattle's household waste. See DEIS, II-2: "Materials landfilled at the Midway site include municipal solid waste, demolition debris and wood waste."

NOISE

(2) Noise impacts from operation of the methane control/recovery system or other pollution control systems (e.g.: burners, pumps, blowers, fans, etc.) should be discussed at Section II.B.1.

LAND USE PLANS

(3) 3.a(3)(c) Relationship to Existing Land Use Plans, Policies and Controls -- City of Kent. A copy of the adopted West Hill Plan should be included in this section.

(4) Unavoidable Adverse Impacts. This section mentions that some of the presently forested land on the north side of the landfill will be cleared. What percentage will this represent of the total area?

(5) General Comment from Kent Planning Department: It appears that the minimum and intermediate grade alternatives would best comply with the goals and policies of the West Hill Plan that designates this area as commercial outside of the park ownership.

1465L-13L

GAS CONTROL PLAN

6 Impact of off-site migration of underground gas (e.g., at II-47) should be reviewed in light of most current test data. See II-47 re odor; II-68 re explosion/hazardous emissions.

7 The recommended gas control system is designed to prevent further off-site migration of combustible gas. It is unclear what is planned to control and vent the gases that have already migrated well beyond the landfill site.

TRANSPORTATION SYSTEMS

8 The truck haul route should be changed from the proposed EIS route for incoming loads to utilize southbound I-5 at the South 272nd Street off ramp. The route will then turn right at South 272nd Street continuing westbound to SR 99 and turn right. The route will continue northbound on SR 99 to South 252nd Street and turn right into the site entrance. The exiting trucks may turn right at SR 99 and South 252nd Street leading northbound to SR 516 and I-5.

9 Advance truck warning signs will be required on the northbound approach of SR 99 to South 252nd Street.

10 Additional mitigation should be provided (See II-99) as required by Kent City Code 4.07.28 which states in pertinent part:

> "(1) The [permit] applicant shall continuously keep the streets and storm drain system free from all debris attributed to the work performed under the . . . permit."

1465L-13L

COMMUNITY COMMENTS

Public hearings were conducted by the City of Seattle to receive comments on the DEIS. During the course of the Kent City Council consideration of the DEIS, a number of local residents appeared and addressed the Council. Bob Brown, Sharon Hoyt, Pat Cassidy, Greg Wingard and Karen Waalks appeared before the Kent City Council and also at the hearing in the Seattle Municipal Building on September 11, 1985. The Kent City Council also heard from Carl Rickets and Sarah Naslund.

(11) A principal concern expressed by concerned residents of the Kent West Hill and Midway area, and those interested in the area, is the lack of soil, groundwater, and surface water testing in the area west of Highway 99. From Saltwater State Park, Saltair Hills and north past the Parkside Elementary School neighborhood, the comments are uniform in the expression of concern for lack of information and test data for that area. Existing springs, wells, and increased seepage in residential neighborhoods have not been tested, or if tested, have not been reported. Uniform opinion, both from the Kent City Council and citizens, opposed the use of the Parkside Elementary School area for a storm water detention basin.

(12) Citizen comments also included a general expression favoring use of South 252nd, rather than South 250th, for routing of the storm drain system; reconsideration of the Green River as an alternative for storm water discharge; methane recovery (for energy) and organics recovery (for fertilizer); compensation for property damaged by operation of the Landfill; and City of Seattle site responsibility beyond the current legal minimum of 30 years. Prior misrepresentations by the Seattle Solid Waste Utility has further given rise to the community call for independent testing and analysis and citizen review of the spread of contaminates from the Midway Landfill.

GROUND WATER - LEACHATE MANAGEMENT PLAN

(13) In November, 1983 the City of Seattle Engineering Department Solid Waste Utility and its consultant Parametrix, Inc. published the MIDWAY AND KENT HIGHLANDS SANITARY LANDFILLS DESCRIPTION OF ALTERNATIVES FOR CLOSURE PLANS. This report, at 2-4, states that "(a) preliminary groundwater monitoring program indicates that leachate is being generated and is migrating off-site in a south and westerly direction." The report continues, at 3-18 to 3-20, to identify a detection monitoring program and contingency plan. The DEIS provides no environmental analysis, and only a repeat of the DESCRIPTION OF ALTERNATIVES approach that "(if) the monitoring program indicates the movement of contaminated ground or surface water off the site, some remedial actions will be necessary to correct the problem." DEIS I-35.

This statement is contradicted on page II-15, II-16, and II-20 where it clearly indicates that leachate <u>is</u> migrating off site. Given this information it appears that a more extensive deep groundwater monitoring program is warranted at this time. This will provide the necessary data to identify the extent and direction of off site migration and help provide the data that would be necessary to design a groundwater pumping and treatment system if warranted. If a groundwater pumping program is necessary, (page I-36), implementing it in a timely manner is most imperative. Extensive hydrogeological studies after the fact should be minimized as much as possible by developing an accurate groundwater model at this time. The contingency plan states that continued degradation of water quality and continued migration of the contaminated groundwater are unavoidable adverse impacts? (Page II-20) Is this true if groundwater pumping is implemented? Having admitted that leachate is migrating off-site, the DEIS should describe proposed remedial actions, and the environmental effect and impact of such actions.

(14) On page II-16 the data from Monitoring Well No. 1 is used as a background reference since it is upstream from the landfill site. Is there clear evidence that the chemicals that were found were not caused by off site sources such as Widing Transportation?

(15) On the same page (II-16) it is stated that "significant leachate contamination has not been found "in several of the groundwater monitoring wells. This should be defined in terms relative to drinking water standards.

(16) "Post closure plan and activities" at xxi identifies "inspections of the leachate collection and treatment system" as one of the post closure activities. It is unclear what system this is referring to.

(17) While there may be no significant impact to the Highlands Landfill plant, there may be significant impacts associated with the spread of leachate. At Table A "2. Groundwater resources.", contamination of groundwater is acknowledged as a continuing impact, yet no treatment plan is set forth.

USE OF KENT HIGHLANDS FOR LEACHATE TREATMENT

(18) The DEIS does not discuss alternatives to use of the Kent Highlands for Leachate treatment. Representative references to this point are found at xix, I-10, I-33 and II-18. See also correspondence dated September 1, 1985 to the Kent City Attorney from John C. O'Rourke, attorney for Kent Highlands, attached hereto.

SURFACE WATER MANAGEMENT

(19) <u>Permits</u> The City of Kent presently has an active Storm Drainage Utility. As such, review and approval of the storm drainage system by the Public Works Dept. is required. A drainage permit is required as part of the process when establishing a new utility account. (Add to page iii.)

(20) <u>Off Site Detention</u> Page xvii and I-21 discuss the off site detention system. The maximum ponding depth of five feet and the close proximity to Parkside Elementary School present an undesirable and dangerous situation for grade school children. (See Community Comments). If there are other off site alternatives, they should be discussed.

1465L-13L

(21) Monitoring — Provisions should be made for monitoring surface water upstream, on site, and downstream of the landfills, not just where it leaves the detention basin. (Page xix, I-33).

(22) On Site Detention — The on site detention alternatives all include diverting the storm drainage from SR 99 into the landfill. Because of the potential risk of contaminating the SR 99 stormwater, the City of Kent is opposed to combining the systems at the landfill site. Combining the systems off site using special control structures would be a more acceptable alternative.

LANDSCAPE BUFFER

(23) The On-Site Detention Alternative calls for destruction of the forested area bordering the northern boundary of the site. See II-52. Maintenance of some of the forested area should be provided as a mitigation measure to provide a landscape buffer for the trailer park and other development to the north of the Landfill. This is not specifically addressed at Section II.B.6.c., at II-89. See also Section II.B.4.b., at II-81.

LAW OFFICES OF
JOHN C. O'ROURKE
618 SOUTH 223RD, SUITE 6
P. O. BOX 98741
DES MOINES, WASHINGTON 98188
206-824-2802

COPY RECEIVED
SEP 4 1985
KENT CITY ATTORNEY

September 1, 1985

City of Kent
220 South Fourth Avenue
Kent, WA. 98032

Attn: Mr. P. Stephen DiJulio
City Attorney

RE: Discharge of Midway leachate into leachate collection system at Kent Highlands

Dear Steve:

I have recently reviewed the draft EIS and technical appendixes for the closure of Midway landfill. The proposals advanced for closure contemplate continued trucking of leachate from Midway into the City of Seattle leachate collection system adjacent to the Kent-Highlands landfill. This operation would carry on during the closure construction period (1-3 years) and substantial volumes are anticipated.

I note that the City of Seattle/City of Kent Agreement for Transport of Leachate Through The City of Kent, etc, which was approved by both municipalities prior to Seattle's acquisition and construction of the leachate treatment plant at Kent-Highlandls refers only to Kent-Highlands and that Section 7 of the agreement recites that "this agreement does not authorize use of said leachate sewer line for any purpose other than conveying leachate from the landfill (Kent-Highlands) to the Metro trunk".

Can you adivse as to whether this agreement has ever been amended?

Very truly yours,

John C. O'Rourke

JCO/nso
cc: Kentview Properties, Inc.

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SEP 23 1985
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RESPONSE TO LETTER NO. 11: CITY OF KENT

1. Comment acknowledged. The word "non-putrescible" has been deleted from the statement you refer to on page I-1 of the DEIS (see Errata section of this FEIS).

2. A discussion of noise impacts from operation of the permanent gas control system has been added to Section II.B.1 on page II-67 of the DEIS (see Errata section of this FEIS).

3. The sections of the West Hill Comprehensive Plan (City of Kent, 1984) which are pertinent to the Midway Landfill Closure Project are discussed on pages II-74 to II-79 of the DEIS. The West Hill Plan itself, which was previously published and distributed by the City of Kent, is incorporated by reference as encouraged by the SEPA rules (WAC 197-11-425(6)).

4. Approximately 9.5 acres of wooded land are located south of the mobile home park, west of Interstate 5, north of the Midway Landfill, and east of the commercial development along Pacific Highway South. The on-site storm water detention basin would require approximately 6 acres, or 63 percent, of this area. About 100 feet of wooded area would remain between the detention basin and the mobile home park.

5. Comment acknowledged.

6. Before activation of the migration control system, there was a very slow flow rate or velocity of methane gas away from the site. This contributes a relatively small flow of gas available to cause odors coming from the soil off-site, in comparison with on-site flow of gas through the surface and attendant odors. The text on page II-77 of the DEIS has revised slightly for clarification. In addition, the text on page II-68 has been revised to reflect recent data indicating more extensive gas migration (see Errata section of this FEIS).

7. The methane migration control system now in operation creates a pressure gradient in the soil off-site. This pressure gradient causes a flow of gas-contaminated air from off-site back toward the migration control system. This process will tend to cleanse the soil of methane gas over time. Earlier removal of gas from the soil in areas around structures with higher levels of methane will be accomplished with small diameter gas control wells and small motor-blowers.

8. An evaluation of your recommended truck haul route has been added to the Transportation Systems section of the DEIS (see Section II of this FEIS).

9. Comment acknowledged. A statement to that effect is included in the revised Transportation Systems section in Section II of this FEIS.

10. Comment acknowledged. A statement has been added to page II-99 indicating that the City of Seattle will abide by Kent City Code 4.07.28, which requires continuous maintenance of affected streets and storm drains (see Errata section of this FEIS).

RESPONSE TO LETTER NO. 11: CITY OF KENT (CONTINUED)

11. Comments acknowledged. Additional data will be gathered as part of ongoing studies (see Work Plan for On-Going Groundwater Investigations in Appendix M of this FEIS).

12. Each of the concerns mentioned in this comment are addressed below:

Surface Water Management: An alternative pipeline route along S. 252nd, rather than along S. 250th is presented in the revised Surface Water Management Plan section included in Section II of this Final EIS. Recent communication with King County's Surface Water Management Division has clarified the relationship between the Green River Management Agreement and other County surface water regulations with respect to the possible discharge of surface waters from the Midway Landfill into the Green River (Clark, letter dated December 5, 1985, Appendix P). The section on Green River Discharge Alternatives on page I-28 of the DEIS has been revised accordingly (see Section II of this FEIS). As discussed in the revised section, the Green River Management Agreement does not actually prohibit discharge from the site into the Green River. However, the conditions that would have to be met to avoid increased flooding potential in the river make this alternative technically infeasible. Furthermore, if King County Surface Water Runoff Policy were to apply, discharge to the Green River from the Midway Landfill would not be allowed because the site is not within the Green River Drainage Basin.

Methane Recovery: Methane recovery for energy use will be considered during the design phase of the proposed project, and will be implemented if feasible.

Property Value: In late 1985 the Seattle Engineering Department obtained data on home sales in areas directly east of Midway Landfill and in a similar area not affected by the landfill located about three miles south of the site. Property values of homes in both areas were compiled for the period covering from 1977 through the first half of 1985. A comparison of home values indicated that the area near the landfill had maintained property values at the same levels as the area located away from the landfill.

This comparison does not include information on property values near the landfill after mid-1985 when gas migration problems east of the site were discovered. Evacuations of residences and subsequent media attention to the problems created by gas migration may have had an impact on property sales near the landfill. To mitigate this impact the City of Seattle has established "Seattle - Kent Good Neighbor program" which will guarantee fair market value selling prices for residences located in the area near the landfill. Detailed information on the program may be obtained by visiting the Midway Information Office at 25030 Military Road in Kent, Washington, or by calling (206) 946-4458.

Site Responsibility: Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka Superfund), several parties may be responsible for the closure, maintenance and monitoring at the Midway

Landfill, including the site owner, landfill operator, waste haulers, and waste generators. The responsibility of each party will be decided at a later date by negotiation and/or litigation, and appropriate actions assigned to each. The need for maintenance beyond the mandated 30 years will also be determined.

Citizen Review: Comment acknowledged. Any studies and data collected as a result of on-going field investigations or monitoring will be made available for public review.

13. Comments acknowledged. See Letter No. 1, Comments 2, 4, 9, and 10 and their associated responses.

14. There is no evidence regarding the source of the chlorinated solvents identified in the groundwater samples obtained from well MW-1. The well is considered to represent the quality of groundwater as it moves towards the landfill. Background groundwater quality determinations made for the purpose of the DEIS and engineering studies must represent as accurately as possible the quality of the groundwater as it enters the sphere of influence of the landfill. In this case, data indicate that groundwater contamination by chlorinated solvents has occurred in the aquifer at some location upgradient of the landfill.

15. New data received on wells MW-4, MW-5, and MW-6 indicate that all drinking water standards are met except for those for iron and manganese. The concentrations of these two heavy metals are high, but they are a common naturally occurring constituent of groundwater supplies in the area.

16. Inspection of the leachate collection and treatment system refers to the toe seep collection system illustrated in Figure I-10 and the aeration pre-treatment facility at the Kent Highlands Landfill where leachate from the Midway Landfill would be disposed of. The toe seep collection system inspections would include cleaning of the pipes to remove any silt or biologic growth.

17. Comment acknowledged. See Letter No. 1, Comments 2, 4, 9, and 10 and their associated responses.

18. Based on the relatively small quantity of leachate to be treated and the need for compatibility of the treatment system with the leachate, no other alternative was deemed feasible, such as a totally new on-site treatment facility or use of an existing POTW in the vicinity. If legal interpretation of the Statutory Warranty Deed from Kent Highlands, Inc. to the City of Seattle, or the City of Seattle/City of Kent agreement for transport of leachate to Metro, precludes transport of leachate from Midway Landfill to Kent Highlands Landfill, the City will negotiate to amend or revise the deed and agreement as necessary.

19. Comment acknowledged. The required Drainage Permit has been added to the list provided in the Fact Sheet on page iii (see Errata section of this FEIS).

RESPONSE TO LETTER NO. 11: CITY OF KENT (CONTINUED)

20. The revised Surface Water Management Plan text included in Section II of this FEIS describes several new on-site detention alternatives that do not use the wetland area as a detention basin. No other off-site alternatives for a detention basin have been identified. However, off-site detention is not the preferred alternative at this time (see Section I of this FEIS).

21. See response to Letter No. 9, Comment 18.

22. Comment acknowledged. No off-site detention basin location other than the wetland area has been identified. The design of an on-site detention basin could investigate the feasibility of including a partition that would isolate Highway 99 runoff from landfill runoff in the basin. In this manner, the potential for contaminated Highway 99 stormwater would be reduced.

23. A paragraph has been added to Section II.B.6.c of the DEIS (page II-89) discussing the provision of a landscaped buffer north of the on-site detention basin (see Errata section of this FEIS).

LETTER NO. 12

City of Des Moines

THE "Waterland" CITY

DES MOINES, WASHINGTON, 98188

MI - Landfill Closures, Kent Highlands / Midway

September 13, 1985

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SEP 16 1985

SOLID WASTE UTILITY

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Cy to Doug Jewett

Mr. Richard Owings, Director
Seattle Solid Waste Utility
Seattle Engineering Department
Room 606, Seattle Municipal Building
Seattle, Washington 98104

RE: Midway Landfill Closure - Draft EIS

Dear Mr. Owings:

(1) The City of Des Moines City Council has reviewed the draft environmental impact statement for the proposed Midway Landfill Closure. As other affected communities, we are anxious that closure commence in a timely manner to remove existing problems; however, the City of Des Moines is concerned that the focus on cost effective remedial actions not result in long term environmental impacts to Des Moines residents. The closure plan focuses all storm water run-off to the west, Puget Sound and the City of Des Moines with little or no substantive assurance that leachate contamination of surface water will not result. Impact analyses must go beyond presentation of engineering prospecti. Health and recreational effects, while less quantifiable, cannot be overlooked. Costs of protecting surface and ground water should be borne now or correction later may result in greatly inflated costs in the future. Alternatives presented need to be expanded in the final EIS to provide decision makers with other options and impacts not addressed in the draft EIS. Additionall, an extension of the comment period is sought to enable more time to refine concerns and offer thoughtful responses. The Des Moines City Council finds that the comment period established inadequate to allow critical evaluation of the DEIS.

(2) The effects of leachate contamination on residential and recreational land uses has not been discussed, nor has there been adequate exploration of other alternatives. Mitigation measures cited for overcoming leachate contamination of surface water refer to an ongoing monitoring program in which periodic sampling would occur prior to discharge from the site. Should contamination be found, a contingency plan is recommended in the EIS. However, details of the contingency plan are not available. It is unclear from information provided how often "periodic sampling" would occur, and therefore, how long leachate might contaminate surface waters before detection. Health hazards associated with leachate contamination are not discussed, nor the extent to which land uses such as gardens would be affected.

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3 The DEIS states that no runoff historically left the Midway Landfill basin as surface water, indicating that there may be no confining layer. Percolating rainfall may seep deep into an underlying aquifer about which little is know. No wells have ben drilled west of SR 99 to establish continuity of ground water or determine the extent to which leachate is migrating to the west. Citizens to the west of SR 99 contend that springs ooze pollutants to the surface in the vicinity of Parkside Elementary School and the nearby residential zone. Chronic illness is claimed to be caused by surfacing leachate. References to closure features designed to remedy the leachate migration problem are poorly defined and appear to be excluded from alternatives presented.

4 On-site treatment of leachate should be assessed. No evaluation of providing leachate treatment on-site has been offered, although Kent Highlands landfill has such a facility. Given the statewide alarm over the water quality of Puget Sound, it is astounding that serious consideration is being given to introducing new untreated surface water with the possibility of leachate contamination that exists. Discharged water with all alternatives would flow directly into Puget Sound during high tides and discharge onto the beach during low tides. What effects may this have on park users, shellfish and bottom fish in the event of leachate contamination? Des Moines has an interest in protecting Puget Sound. Nearly two miles of shoreline lie within the City to the north of Smith Creek and the pipeline outfall under consideration. Over $500,000.00 has been invested to construct a public fishing pier and artificial reef. A significant number of bottom fish and crab are taken from the fishing pier annually. Given the ability of bottom fish to accumulate toxins, especially heavy metals, further impact assessment is requested.

5 Extending the proposed outfall (closed conduit alternatives) beyond the present bulkhead at Saltwater State Park to beyond the low tide line should be explored in detail. Saltwater State Park is the only major public access to Puget Sound beach within ten miles, serving South King County residents and tourists. Minimization of the potential for beach contamination and disruption of activities at the park is of critical importance. If in fact the greater dilution and dispersal capacity of the Sound will lessen water quality problems as has been asserted, such dispersal/dilution might be augmented by an underwater outfall.

6 The Green River discharge alternative was not addressed in any detail, cost estimates and engineering difficulties were not presented. If there are influences other than the political influences noted in the EIS, these should be clarified. What environmental factors argue against discharge into the Green River? Can runoff be discharged into the Metro sewage treatment network? Both alternatives must be evaluated in a thorough assessment in the final environmental document.

7 None of the alternatives are acceptable to the City of Des Moines. The wetland near Parkside Elementary School should be preserved and so there is less risk to adjacent property owners. Nor is a pipeline to Puget Sound an acceptable alternative without extensive pretreatment of runoff, on-site detention and/or constant monitoring of storm water. It is recommended, however, that a South 252nd Street pipeline alignment be evaluated in the final EIS. Fewer people reside adjacent to this route to be affected during construction or should difficulties arise.

8 The City of Seattle, as operator of the landfill and lead agency, must bear primary responsibility for assuring that local and regional resources are protected. Small local governments lack the financial means to assume the enormous risk exposure. An interlocal agreement holding the City of Des Moines harmless is warranted irrespective of the mode of closure selected. Under no circumstance will the City of Des Moines permit introduction of storm water run-off from the Midway Landfill into the existing storm water drainage system within the City. Any of the open drainage alternatives proposed are subject to issuance of an unclassified use permit, which will not be granted given potential for contamination and undermining of property values. Nor will drainage be permitted to enter the City by pipe unless an on-site detention basin and/or treatment facility is constructed and maintained with the ability to contain run-off flows in the event of leachate breakout.

9 The City of Des Moines urges extension of the comment period and response to the questions posed as well as development of new alternatives reflecting suggestions offered herein. Thank you for your cooperation.

Very truly yours,

Pat DeBlasio

Pat DeBlasio
Mayor

sb

RESPONSE TO LETTER NO. 12: CITY OF DES MOINES

1. Each of the concerns addressed in this comment are discussed below.

   Surface Water Management: As discussed in Section I of this FEIS, the preferred alternatives were selected primarily on the basis of their ability to achieve project objectives, not just on the basis of cost. The purpose of the cover system and surface water management plan is to reduce the amount of surface water infiltrating into the landfill and keep surface water separate from leachate. Thus, under normal circumstances, surface water will not be contaminated with leachate. Breakouts of leachate could occur infrequently on the landfill sideslopes, which could result in contamination of surface water. However, frequent visual inspections, as well as monitoring of the surface water quality before it leaves the site will minimize the potential for offsite contamination. As noted in the response to Letter No. 9, Comment 18, if contamination is detected, the surface water will be held on-site and transported to the Kent Highlands Landfill for treatment until the problem is corrected.

   Health and Recreational Effects: The proposed surface water monitoring described above and the groundwater monitoring program described in the Work Plan for Ongoing Groundwater Investigations (Appendix M), in combination with corrective action programs that would be undertaken if contamination is detected, are intended to minimize the potential for adverse health and recreational effects. Potential health effects of the landfill in a broader context are discussed in the Review of Public Health Issues in Appendix O of this FEIS. The major conclusions of this review are summarized in the response to Letter No. 15, Comment 5.

   Protection of Surface and Groundwater: All possible actions to protect surface and groundwater will be taken when the landfill is closed. Additional measures to protect groundwater quality beyond installation of the cover system cannot be undertaken until the effect of the cover system on the local groundwater regime is known. See Letter No. 1, Comments 2 and 4 and their associated responses.

   Additional Alternatives: Several additional alternatives for surface water management are described and evaluated in Section II of this FEIS.

   Comment Period: The City of Seattle extended the comment period for the EIS to 45 days due to the complexity of the proposed project. This is two weeks longer than the 30-day comment period mandated by SEPA.

2. See response to Comment 1 above. The frequency of groundwater monitoring is discussed in the Work Plan for Ongoing Groundwater Investigations in Appendix M, and will be in conformance with the state of Washington Minimum Functional Standards (WAC 173-304). These standards do not require surface water monitoring. However, the details of the surface water monitoring program will be coordinated with the Seattle-King County Health Department. For the first 6 months after the surface water management plan is implemented, it is anticipated that monitoring will be conducted on a monthly basis or more frequently if the data indicates this is advisable. Less frequent

monitoring will be necessary if no leachate contamination occurs during the initial period of operation. All surface water monitoring will be conducted during and after rainfall events.

3. The Washington Department of Ecology and Seattle-King County Department of Public Health have investigated reports of seepage discharge west of SR 99. In the process of doing so, they determined that raw sewage was being discharged west of SR 99 from a culvert that goes under the roadway. The source was traced to several failing septic systems in the mobile home park north of the landfill. Discharge from this culvert follows the natural drainage system through the wetland near Parkside Elementary School.

   Field testing of surface water in the wetland and drainage system in the vicinity of Parkside Elementary School shows somewhat elevated specific conductivity readings (450 to 550 umhos/cm), which is indicative of dissolved solids. However, these readings are well below the level that would indicate significant leachate contamination. (For comparison, specific conductivity for the background groundwater monitoring well (MW-1) is 245 umhos/cm, and the state drinking water standard for specific conductivity is 700 umhos/cm). It is not possible to distinguish the source of the low level of contamination in the surface water wetland area, but sanitary sewer discharge and runoff from Highway 99 are likely contributing factors. Limited testing of soils in the vicinity of Parkside Elementary School for heavy metals also showed no significant contamination that could be attributed to a particular source.

   Field testing of surface water at a number of other locations west of Highway 99, as well as tests on groundwater that has entered gas probes in this area, show only slightly elevated conductivity readings (100 to 300 umhos/cm). The Department of Ecology found no visual evidence of leachate contamination in the wetland or any of the other locations tested. (Peter Kmet, Washington Department of Ecology, telephone conversation on February 20, 1986. See supporting memoranda and test data in Appendix P of this FEIS).

   Groundwater seeps, springs and wells west of Highway 99 will be investigated in more detail during the continuing groundwater studies described in the Work Plan for On-Going Groundwater Investigations (Appendix M). Data from these studies will allow more definitive conclusions to be drawn regarding leachate contamination of groundwater.

4. See response to Letter No. 11, Comment 18. As discussed in response to Comment 1 above, if the monitoring program detects contamination of surface water leaving the site, the surface water will be held on site and transported to the Kent Highlands landfill for treatment until the problem is corrected. Therefore, no contamination of downstream waters is anticipated.

5. Comment acknowledged. If the closed conduit alternative is selected, the design phase would address the need for a submerged outfall instead of the beach discharge. The basis for this would be regulatory requirements and the need to protect public health and the marine environment. As discussed in Section I of this FEIS, the closed conduit alternative is not the preferred alternative at this time.

RESPONSE TO LETTER NO. 12: CITY OF DES MOINES (CONTINUED)

6. The political influences noted in the EIS reflect the significant environmental factor of potential for increased flooding in the Green River as a result of non-basin discharges. See response to Letter No. 11, Comment 12 under Surface Water Management. It is not a general policy of local sewage treatment agencies to accept surface water runoff into their sewage treatment networks from areas where separate storm drainage systems can be provided.

7. Comment acknowledged. The revised Surface Water Management Plan section included in Section II of this EIS describes a 252nd Street pipeline route, as well as others that bypass the wetland and school area. Note that the preferred alternative (Section I of the FEIS) does not include any surface water management facilities within the City of Des Moines.

8. Comment acknowledged. See response to Letter No. 11, Comment 12 under Site Responsibility; as well as the response to Comment 7 above.

9. See response to Comment 1 above.

HIGHLINE PUBLIC SCHOOLS

EDUCATIONAL RESOURCES and ADMINISTRATIVE CENTER
15675 Ambaum Boulevard S.W. ● Telephone 206/433-0111
Seattle, Washington ● 98166

LETTER NO. 13

85 SEP 18 A 9:21

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Kent D. Matheson, Superintendent
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Dean Hone, Assistant Superintendent, Business and Plant

September 13, 1985

MI-Landfill Closures, Kent Highline/Midway

Sc

Mr. Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

RECEIVED
SEP 18 1985
SOLID WASTE UTILITY

OCT 4 1985

RE: Midway Landfill Closure Plan
Draft Environmental Impact Statement

Dear Mr. Edens:

The Highline School District has reviewed the Draft Environmental Impact Statement with particular concern for the potential impact on Parkside Elementary School, which is located at 2104 South 247th Street.

1 The District has previously expressed its concerns with regard to increasing and/or polluting the surface waters which flow through the school grounds. (See attached letter dated March 23, 1984) We note that earlier considerations for easterly discharge of the runoff have been abandoned. All of the surface water discharge alternatives now flow westward. Two of those options are routed through the Parkside School grounds and ultimately discharge into the existing stream bed on the school grounds.

2 The Draft EIS also discussed a leachate management system which is intended to eliminate contamination of the runoff. However, the Contingency Plan, to be implemented in the event of a system failure, is unspecified and apparently would not be addressed until failure occurred.

3 These considerations leave the Highline School District with no alternative but to oppose any plan which would route the discharge to the Parkside School grounds. If the discharge must come westward, then it should be a closed conduit to Puget Sound and adequate safeguards for Saltwater State Park and Puget Sound water quality must be provided.

Sincerely,

Kent D. Matheson

KENT D. MATHESON
Superintendent

26873

KDM:vm
encl.

HIGHLINE PUBLIC SCHOOLS

EDUCATIONAL RESOURCES and ADMINISTRATIVE CENTER
15675 Ambaum Boulevard S.W. ● Telephone 206/433-0111
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Instruction and Curriculum
Dean Hone
Assistant Superintendent
Business and Plant

March 23, 1984

Richard D. Owings, Director
Solid Waste Utility
Seattle Engineering Department
Room 910, Seattle Municipal Bldg.
600 Fourth Ave.
Seattle, WA 98104

RE: Midway and Kent Highlands Landfill Closure Projects

Dear Mr. Owings:

The Highline School District is concerned with the potential impact of the Midway Landfill closure planning on one of its schools, Parkside Elementary School, located just west of the landfill at 2104 South 247th Street. This school site sits astride the drainage course for the basin which includes the landfill area. It receives both surface and subsurface waters from the basin area.

4 The district has studied the Descriptions of Alternatives for Closure Plans that were published in November 1983. It is noted that all three grading alternatives indicate storm drainage discharging to the west. It is also noted that two of the five drainage discharge alternatives are routed directly to the Parkside site. This gives the appearance of a predisposition to drain the landfill, Interstate 5, and adjacent easterly areas toward the school. The document also indicates that there is no westerly surface flow from this area at the present time. In fact, there was no westerly flow from this area for many years prior to the school site being acquired by the district.

5 Due to the potential for creating an unwholesome or unhealthy condition at Parkside the district requests that the Environmental Impact Statement for the Midway Landfill Closure address all aspects as specifically related to the school. This should include:

1. Surface water considerations such as volume and potential for contamination.

March 23, 1984

2. Potential for contamination of ground water which arises on the site in springs.

3. A designation of responsibility for the maintenance of any system that may impact the school.

4. A determination of whether or not any system that may be constructed for a westerly flow will accommodate future flow increases generated by development within the basin; ie, development of presently undeveloped areas and development in the landfill area such as commercial or multi-family dwellings.

Sincerely,

James E. Jennings

James E. Jennings, ED.D.
Director, Facilities & Planning

JEJ/dgb

RESPONSE TO LETTER NO. 13: HIGHLINE PUBLIC SCHOOLS

1. Comment acknowledged. Responses are provided below (4 and 5) to concerns expressed in your letter of March 23, 1984. Section II of the FEIS under Surface Water Management Plan discusses additional alternatives that bypass the school grounds.

2. See response to Letter No. 9, Comment 18.

3. Comment acknowledged.

4. Comment acknowledged. See last sentence of response to Comment 1 above.

5. Each numbered item in this comment is responded to below.

    1. The impacts of the various surface water management alternatives on surface water flow and quality are discussed in the DEIS beginning on page II-30. The responses to Letter No. 9, Comments 2 and 18 are also relevant. Under the Off-Site Detention Alternative, the wetland area would continue to receive about 17.3 million gallons per year of runoff from Highway 99 as it does under existing conditions. In addition, it would receive about 3.4 million gallons of runoff per year from I-5 and 24.3 million gallons per year from the closed landfill.

    2. See Letter No. 1, Comments 2 and 4 and their associated responses. The response to Letter No. 12, Comment 3 is also relevant.

    3. Maintenance of the storm water management facilities for the Midway Landfill will be the responsibility of the City of Seattle.

    4. Storm water management facilities for the Midway Landfill are intended to have adequate capacity for the surface water that must be removed from the landfill, as described in the Surface Water Management Plan section of the DEIS (page I-18). The design of the facilities will consider flow from both existing conditions and potential future development in the drainage basin tributary to the landfill.

LETTER NO. 14

(b)(6)
Environmental Chemist
(b)(6)
Silverdale, WA 98383
(b)(6)

Mark Edens, Project Manager
Seattle Solid Waste Utility
Room 606, Seattle Municipal Building
600 Fourth Avenue
Seattle, Washington 98104

RECEIVED
SEP 19 1985
SOLID WASTE UTILITY

Dear Mr. Edens:

I am submitting my comments on the Midway Landfill Closure Plan Draft EIS for your consideration for the final EIS. They are organized into four areas, The Grading Plan, Surface Water Management, Leachate Control and Ground Water Contamination, followed by the Gas and Odor Control Program.

Grading Plan:

1 I am in favor of the minimum grade alternative. The shorter construction time allows for the landfill to be covered sooner therefore generating the least amount of new leachate. A shorter construction time will also lessen the impacts (noise, dust, etc.) on an already over impacted neighborhood.

Surface Water Management:

2 The off-site detention alternative with a holding pond located next to Parkside Elementary School is unacceptable. A detention basin at this location would be an attractive nuisance to the elementary school students. A fence is not enough to keep children away from a pond.

3 An alternative I would like to propose is why not keep the runoff from I-5 and runoff from the east side of I-5 on the east side of I-5. Detention ponds could be located either on the east side of I-5 or possibly in the middle of I-5. These ponds would not have to be lined therefore creating the possibility for groundwater recharge in the area without adding to leachate waste.

Leachate Management and Groundwater Contamination:

4 The final cover and toe seep plans appear adequate but the plans for the additional 1.5 million gallons of leachate generated per year seem short sighted. Very little is mentioned about pumping the leachate out of the landfill for treatment at Kent Highlands (one paragraph). This remedial action should be pursued in more depth with additional options considered.

5 It is mentioned in this Draft EIS that the groundwater (and leachate) flow is to the south, yet data from well BH-8 (west of the landfill) indicates leachate pollution there. Background conductivity readings(Linda Heights Well) taken 2/82 show levels of 250 mho/cm,

whereas the conductivity readings for BH-8 were 1250 mho/cm. Conductivity readings taken in 1985 were from 245 to 320 umhos for background (Wells MW-1,MW-2 and MW-4) and 780 umhos for well BH-8. The 1985 data also indicate elevated levels above background for chlorides, sulfate, total organic carbon, iron, manganese, chloroethane, acetone, 1,1-Dichloroethane, trans-1,2-Dichloroethene, benzene, 2-Hexanone and chlorobenzene(Analytical Technologies, section F of Technical Appendicies). Review of this data indicates leachate pollution in well BH-8 and a corresponding groundwater (leachate) flow toward the west.

6 All of the 1985 monitoring well organic data is suspect. I have found deficiencies in Analytical Technologies sample handling and preservation procedures. The time between sampling and analysis is too long.

EPA guidelines per Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA-600/4-82-029, Sept. 1982, Section 12.6 Sample Preservation and Storage (32), p 309 for Method 624 Purgables (GC/MS) states "All samples must be analyzed within 14 days of collection." Analytical Technologies samples from the monitoring wells were taken on 5-16-85 and 5-17-85 with the samples analyzed on 6-25-85, 40 days later. On p 309 of the same reference for Method 625 Base/Neutrals, Acids and Pesticides (GC/MS) states "All samples must be extracted within seven days and completely analyzed within 40 days of extraction." Analytical Technologies samples from the monitoring wells were taken on 5-16-85 and 5-17-85 with the samples being extracted on 5-31-85, 14 and 15 days after the sample was taken.

The leachate samples analyzed by Analytical Technologies also have suspect data due to delays in analysis. Volitile organics (EPA Method 624) were analyzed 20 days after sampling not within 14 days as required by the EPA and the semi-volitile organics (EPA Method 625) were extracted 14 days after sampling not within the 7 days as required by the EPA.

All of the 1985 data on organics in water is inconsistant with EPA protocol. This, plus the fact that there is insufficient data on the groundwater in the area, points to a need for further testing now and as construction proceeds so there can be an adequate data base for informed decisions.

Gas and Odor Control Program:

7 The burning of landfill gas is insufficient to remove the pollutants present. Incineration of toxic organic chemicals should be at temperatures between 1200 and 1500 degrees centigrade (The Condensed Chemical Dictionary, G. Hawley). I do not believe that the flare proposed approaches these temperatures. Also the burning of carbon tetrachloride, 1,2-Dichloroethane and methylene chloride present in the landfill gas (Technical Appendices, Section G) can produce highly toxic phosgene (Dangerous Properties of Industrial Materials, Sax), and the burning of 1,1,1-Trichloroethane, 1,2-Dichloroethylene, 1,1-Dichloroethylene and 1,2-Dichloropropane also present in the landfill gas can produce highly toxic chloride fumes (Ibid, Sax).

8 A high temperature incinerator with scrubbers to remove toxic fumes could be a possible alternative to the proposed action.

I hope that the information enclosed will be of use to you in your preparation of the Final EIS. If I may be of any assistance please feel free to contact me at the above address and phone number.

Sincerely,

(b)(6)

copy to: Greg Wingard, TEAC
Robert Brown, CAML

RESPONSE TO LETTER NO. 14: (b)(6) ENVIRONMENTAL CHEMIST

1. Comment acknowledged.

2. Comment acknowledged. As discussed in Section I of this FEIS, the Off-Site Detention Alternative is not the preferred alternative.

3. As shown in Figures I-6, I-8, and I-9 of the DEIS, all Storm Water Management Plan alternatives include a detention basin on the east side of I-5 for runoff from I-5 and the area east of I-5. Because of the highly permeable soils, the basin must be lined to prevent infiltration into the ground. Infiltration could potentially add to the leachate generation at Midway Landfill or possibly affect the stability of the I-5 highway fill in the vicinity of the detention basin. The retention basin east of I-5 requires a discharge. In order to not transfer this runoff to a different drainage basin, the flow must be discharged west to the proposed facilities at Midway Landfill.

4. This comment appears to refer to the estimated 1.5 million gallons of leachate per year generated by rainfall infiltrating into the landfill. It is estimated that the proposed leachate management plan will prevent formation of 46.5 million of the 48 million gallons of leachate that presently are generated annually at the landfill. Preventing or removing the remaining 1.5 million gallons would be very difficult to accomplish. Regardless of the cover system, some infiltration will always occur, either because of its overall permeability or because of isolated defects. It is anticipated that once the substantially reduced volume of leachate is diluted by groundwater, the resulting concentration of contaminants will be very small. Groundwater pumping may become necessary in the future if the monitoring program indicates that the level of contamination exceeds that allowed by regulations. However, the proposed leachate management plan is expected to be effective in reducing groundwater contaminant levels and no plans for pumping leachate or contaminated groundwater out of the landfill are included in the proposed action at this time. The responses to Letter No. 1, Comments 4 and 9 are relevant.

5. Groundwater quality data does indicate that groundwater in well BH-8 has been contaminated by landfill leachate. This does not necessarily mean that groundwater flow is occurring to the west. Since the landfill is a groundwater recharge area (primarily due to the influx of stormwater drainage into the landfill) there will be an area of influence where local groundwater is flowing radially from the source of the influx. This area is commonly referred to as a "groundwater mound" due to the elevated groundwater levels in the immediate area of the influx. Groundwater flow directions are generally best determined by evaluation of the aquifer hydraulics rather than the aquifer chemistry.

6. The EPA Method 624 states that purgables must be analyzed within 14 days of collection. Analytic Technologies samples were analyzed 40 days later (from the day of collection). EPA Method 625 specifies that BNA compounds and pesticides must be extracted within 7 days and analyzed within 40 days. Analytic Technology did not extract these compounds until 14 to 15 days

after the sample was taken. Leachate samples to be analyzed for volatile and semi-volatile organics were also not analyzed within the specified time period. These delayed time periods prior to lab analysis are not in adherence to the standard EPA Methods.

Communication with the EPA Laboratory in Seattle (Muth, personal communication, 1985) indicated that they knew of no studies which indicated that lab results were affected by time delays in analysis. It was also discussed that it is possible that some volatile components are not analyzed in the full strength of what was present due to the time delays. With this reasoning the available data is not invalid in that it indicates minimum expected concentrations and indicates problem contaminants. If this data were to be used for an enforcement case or in defense of a violation it should not be used. However, it is reliable information if used only as an indication of what contaminants are present (assuming that all other EPA procedures for sampling and lab analysis were conducted correctly.)

Additional sampling and analysis of groundwater will be undertaken, as described in the Work Plan for On-Going Groundwater Investigations in Appendix M.

7. Comment acknowledged. The existing flares at the site will be replaced with permanent flares that will provide high temperature incineration of landfill gas. Information from the manufacturer indicates that the flare burning temperature will be approximately 2,400 degrees fahrenheit (1,315 degrees centigrade). As noted on page I-40 of the DEIS, emissions from the flares will be monitored to make sure the contaminants are destroyed and that no emissions occur which violate air quality standards.

8. Comment acknowledged. The monitoring discussed in Comment 7 above will indicate whether devices such as scrubbers are needed to remove toxic fumes.

LETTER NO. 15

RECEIVED

SEP 16 1985

SOLID WASTE UTILITY

Cy to:
Doug Jewett

MI-Landfill Closures - Kent Highlands/Sept 10, 1985
Midway Mr. Mark Edens:

In regards to Midway Landfill:
Our home is located one block west of the landfill.

1 D. It has come to our attention that there have been numerous pipes put in all along Hwy. 99 in order to handle any water problems they had with drainage - They piped it right under the highway - I've seen two of them myself.

2 A. We would like our soil tested for all toxic materials, including radiation.

3 B. We would like the City of Seattle, if necessary, to purchase our home for the current fair value - We are not able to sell our home.

4 C. City of Seattle should compensate all homeowners surrounding the landfill for the loss of value to their homes.

5 D. I would like the City of Seattle to be responsible for any health problems my family might encounter because of the landfill.

Thank You

26697

(b)(6)

Kent, Wn. 98032

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OCT 1 1985

35 SEP 13 A9:58

RESPONSE TO LETTER NO. 15: (b)(6)

1. Comment acknowledged. As discussed on page II-22 of the DEIS, there is currently no discharge of stormwater from the landfill. The culverts you refer to are designed to handle highway runoff. See response to Letter No. 21, Comment 10.

2. The presence of landfill gas is being tested for in the residential areas surrounding the landfill. Groundwater, which occurs at a great depth, is also being tested beneath the areas surrounding the landfill. No practices or conditions have occurred at the site that would indicate any concern for off-site soil contamination by hazardous or radioactive materials.

3. Comment acknowledged. See response to Letter No. 11, Comment 12 under Property Value.

4. See response to Comment 3 above.

5. Comment acknowledged. Studies to date have not identified any significant public health risks associated with the Midway Landfill.

   As discussed in Section II.A.4 of the DEIS (p. II-44), the University of Washington conducted an ambient air quality evaluation in 1985 that involved taking air samples immediately upwind and downwind of the landfill. The results indicated that the concentrations of toxic organic compounds at both the upwind and downwind sites were very low, at or below the detection limit for most compounds. Only four compounds - benzene, toluene, trichloroethylene and xylene - were observed at higher concentrations in the downwind versus upwind air samples.

   The maximum measured upwind/downwind concentration differences compared favorably with the values predicted by the University of Washington using a mathematical dispersion model (Table II-11 of the DEIS). Based on measured concentrations of toxic compounds in unlit flare gas, the model predicted potential worst case concentrations at the site boundaries. Benzene and hydrogen sulfide were the only compounds predicted to exceed regulatory guidelines in this worst case analysis, and this would occur only 2 percent of the time at the southern boundary of the site.

   Now that an active gas control system has been installed, most of the flares on site do not have enough gas to continue burning, and many have been removed and plugged. As discussed on P. I-42 of the DEIS, the permanent active gas collection system will include shielded flares that provide high temperature incineration of landfill gas. The flares will be monitored to ensure that the contaminants in the gas are destroyed and that there is no public health risk. Additional gas control technology will be implemented if any health risk is identified.

   More recently (April 1986), the University of Washington conducted a study of potential health effects associated with off-site gas extraction systems at the Midway Landfill (see Appendix O of this FEIS). This study concluded that, based on the limited data available to date, none of the gaseous emissions identified in the off-site extraction wells represent a

significant direct threat to public health, with the exception of methane. Although methane is not toxic, there is a risk of explosive accumulation in homes and businesses near the landfill (see Risk of Explosion and Hazardous Emissions in Section II of this FEIS).

There also appears to be no significant direct health risks associated with leachate contamination of ground and surface water. As discussed in the revised Groundwater Quality section in Section II of this FEIS, groundwater degradation by leachate has been verified in testing wells located on-site and immediately adjacent to the landfill boundaries. However, there is no evidence of leachate contamination in testing wells located further from the site, or in public water supply wells within 5 miles of the site. The proposed leachate management plan will substantially reduce the volume of leachate generated, and thus the potential for leachate contamination of groundwater. Furthermore, ongoing groundwater investigations, including those described in Appendix M and those to be conducted as part of the remedial investigation under CERCLA, will allow a better evaluation of the landfill's effect on groundwater.

As discussed in the response to Letter No. 12, Comment 3, there is no evidence in testing to date of leachate contamination of off-site surface waters. Surface water runoff from the closed landfill will be uncontaminated runoff comparable to that generated from any grassy urban area. Runoff will be monitored to ensure that there is no public health risk (see response to Letter No. 9, Comment 18).

A technical memorandum prepared for this Final EIS by Environmental and Occupational Health Associates and Ronald Fessenden, M.D. (May 1986) discusses the problems with determining whether the landfill may be causing some of the illnesses experienced by nearby residents. The memorandum, which is included in Appendix O, also evaluates the potential effects of odor and stress on health. Major conclusions reached are summarized below:

a. Based on results of a 1983 survey of 197 residents in the vicinity of the landfill, the Seattle-King County Department of Health concluded that the level of symptoms reported in the surveys and the confirmation of symptoms by personal physicians did not represent an unusual pattern of illness that could be directly attributable to the landfill. This does not necessarily mean that the landfill has had no influence on people's health, but only that the survey did not provide data that demonstrated a cause and effect relationship.

b. Given the small size of the at-risk population, and the lack of an unusual pattern of illness, it is likely that even the best-designed case study that included a control group population would produce inconclusive results. Therefore, the most effective effort with regard to public health issues would be continued monitoring of landfill gas, groundwater, and surface water to determine if there are known health risks associated with the landfill; and taking appropriate corrective action should health risks be identified.

RESPONSE TO LETTER NO. 15: CONTINUED

c. The odor associated with the landfill may affect healthy persons in a psychological manner which triggers a physiological response, such as nausea, and headaches, and interferes with normal patterns of breathing and relaxation.

d. Although methane gas is not toxic, the risk of potential explosive accumulations and the need to evacuate residents contributes to individual stress levels. In certain at-risk populations (persons with stress-induced illnesses such as allergies, asthma, and rashes), there could be a direct correlation between the onset of symptoms and personal or family disruptions.

Due to continued concern of nearby residents about potential health effects associated with the Midway Landfill, the Seattle King County Department of Public Health is planning to conduct a more extensive health survey of nearby residents. Additional information on the health survey may be obtained by contacting the Health Department at (206) 587-2722.

FILE

85 SEP 6 A 9: 57

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SEP 24 1985

LETTER NO. 16

Seattle, WA
Sept. 4, 1985

MI-Landfill Closures,
Kent Highlands/Midway

Dear Mr. Edens:

You probably assume that I live too far away from the Midway Landfill to be affected by it. Therefore, I felt I should make you aware that some people in my area suffer adverse effects from the landfill.

(1) I have severe allergies and respiratory problems, and there have been times when the landfill has aggravated these problems.

Granted, the wind was probably from a certain direction to bother this area, but if it isn't bothering my area, it is doubtless causing suffering in another area or areas.

Therefore, I heartily recommend closure of the Midway Landfill, and the sooner the better!

26504

Thank you!

(b)(6) [redacted]

Seattle, WA 98148

RECEIVED
SEP 6 1985
SOLID WASTE UTILITY

RESPONSE TO LETTER NO. 16: (b)(6)

1. Comment acknowledged. See response to Letter No. 15, Comment 5.

LETTER NO. 17

RECEIVED
SEP 20 1985
SOLID WASTE - EIS

September 17, 1985

Solid Waste Utility
Seattle Engineering Department
606 Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

Attention: Mark Edens, Project Manager

Subject: Midway Landfill Closure Plan - Draft EIS

Gentlemen:

1 The content of the Draft EIS is incomplete and inadequate. The Draft EIS indicates that the City is prepared to monitor the impacts of the landfill and the closure procedures for only 30 years.

2 In the early 60's I was involved in a concerted effort to prevent the creation of the Midway Landfill and the disposal of wastes adjacent to my property. At that time, I was assured that no decomposable garbage or hazardous wastes would be disposed at the facility. In fact, all wastes were to be "clean" materials.

The City of Seattle created the problem and the City along with the owners of the landfill site is responsible for all negative impacts on surrounding properties in perpetuity. The abuses of the City include:

* allowing disposal of decomposable wastes
* placing wastes below the water table in the ponds which were located in the pre-existing gravel pit
* lack of action or measures to control generation of leachate and to collect the leacate generated

Information in the Draft EIS does not adequately describe existing conditions of the natural environment (II-1 to II-20). ③ The discussion of the sediments at the site should include detailed descriptions including water and gas permeabilities. Qualified experts inform us that it is incorrect to assume that "advance lacustrine silt/clay" is extensive beneath the north end ④ of the site based on a limited number of test holes. Elevations of ground water levels shown in Figure II-5 do not agree with the regional water level contours shown in Figure II-3. A water level map showing more detail and 10 ft. contours intervals in the area of the Landfill should be prepared before finalizing any closure plan.

⑤ The proposed closure plan alternatives are noted to be acceptable methods for lined landfills. The Midway Landfill rests on permeable gravels and is not lined. Surely, the closure plan and methods required under these circumstances should be more extensive than those for a lined landfill.

⑥ If, as stated, the final cover system is capable of reducing leachate generation by 94%, then the leachate generated from infiltration will still be a significant 2 million gallons per year. The draft EIS does not address leachate generated from the placement of decomposable garbage below the water table. Leachate collection and disposal systems should be an integral part of the final closure plan.

⑦ The closure plan alternatives calling for "on-site" detention ponds depicted in Figures I-4 and I-6 show 21.7 acre ponds at the north end of the site. If my interpretation of the Figures is correct, the proposed ponds are on my property and should not be referenced as "on-site" unless or until the City purchases that and any other properties involved.

I appreciate the opportunity to offer these comments. I am very concerned about the risks that the City has created for me, my family, employees, customers and visitors to my property. The final closure plan must accurately address exiting conditions and develop appropriate measures and compensation for the long-term damages.

Sincerely,

(b)(6) [redacted]

Owner of Property located at: (b)(6) [redacted]
Midway, Washington

HJ/dlh

cc

RESPONSE TO LETTER NO. 17: (b)(6)

1. Although the Draft EIS indicates that the landfill will be maintained for the legally mandated 30 years, maintenance and monitoring of the site will be required until the Washington State Department of Ecology, U.S. Environmental Protection Agency, and Seattle-King County Department of Public Health determine that monitoring and maintenance is no longer necessary. The response to Letter No. 11, Comment 12 under Site Responsibility is also relevant.

2. Comment acknowledged. Please note that The City of Seattle is and has been collecting any leachate breaking out on the site and transporting it to the Kent Highlands Landfill for pretreatment, prior to discharge to the Metro sewer system for treatment and disposal.

3. Ongoing studies described in the Work Plan for On-Going Groundwater Investigations (Appendix M) will provide this information.

4. Since groundwater levels generally vary seasonally and over the years, it would not necessarily be expected that the recently measured groundwater levels in the wells would correspond to those levels reported by Luzier in 1969 (and collected in years prior to 1969). The regional map is intended to show regional gradients and trends in groundwater flow. Additional groundwater studies will be performed before finalizing the closure plan (see Work Plan for On-Going Groundwater Investigations, Appendix M).

5. It is unclear what section of the DEIS you are referring to. However, as discussed in the Leachate Management Plan section (page I-28), the minimum cover required by the state Minimum Functional Standards, which would be adequate for a lined bottom landfill, has been rejected because it does not provide adequate reduction of leachate generation to prevent groundwater contamination. The proposed multi-layer cover system is an example of a more extensive method required for the unlined Midway Landfill than would be required for a lined landfill.

6. See responses to Letter No. 9, Comment 21; and Letter No. 14, Comment 4.

7. Comment acknowledged. As stated on page I-22 of the DEIS, fourth paragraph, the so-called "on-site" detention basin would be approximately six acres in size. You are correct that this basin would be located on property north of the existing Midway Landfill. The City would have to obtain the right to construct the basin on this property from the owner(s).

LETTER NO. 18

MI-Landfill Closures
Kent Highlands/Midway

85 SEP 5 A10:27

Kent, Wash.
Sept. 3, 1985

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3x

SEP 23 1985

Dear Sir:

1 This is to inform you that I advocate closure of the Midway Landfill.

There are times (even on hot summer days) that I must remain indoors with the doors and windows closed due to the adverse effects of said landfill.

Therefore, I recommend closure of the Midway Landfill as soon as possible.

Thank you.

(b)(6)

(b)(6)

Kent, Wash. 98031

RECEIVED
SEP 5 1985
SOLID WASTE UTILITY

26488

RESPONSE TO LETTER NO. 18: (b)(6)

1. Comment acknowledged.

9120

MI-Landfill Closures
Kent Highlands/Midway

LETTER NO. 19

...LE ENG. DEPT.

85 SEP 20 A10: 03

Sept 19

Cleared 9-30-85 SC

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		LAW

OCT 8 1985

Eden Marks
Seattle Municipal Bldg.
Room 606
600 4th Ave
Seattle, Wash. 98104

Dear Sir:

(1) As concerned citizens of the West Hill of Kent we would like to add our voices to the rest of our neighbors in demanding some quick action be taken on the Midway Landfill.

In the event that we want to sell our house in the future, we do not want to take a loss because of circumstances that we had no part of and that has been handled so poorly.

Yours truly,

(b)(6)

Kent, Wash. 98032

RECEIVED
SEP 20 1985
SOLID WASTE UTILITY

26937

RESPONSE TO LETTER NO. 19: (b)(6) [redacted].

1. Comment acknowledged. See responses to Letter No. 11, Comment 12 under Site Responsibility, and Letter No. 15, Comment 3.

LETTER NO. 20

MI-Ya. Landfill Closure,
Des Moines/Midway

September 17, 1985

ROUTING	DATE	INITIAL
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JDO		
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Mark Edens, Project Manager
Solid Waste Utility
Seattle Engineering Department
606 Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

Re: Midway Landfill
Drainage Discharge

OCT 4 1985

RECEIVED
SEP 18 1985

Dear Sir:

1 As the property owner that seems to be most affected by your proposals, I would like to request that any information that is handed out to property owners be sent to me directly, since I do not reside at the property I own that is due east of Parkside School.

2 1. I have never been informed that my property is a protected "Wetlands".

I would not be in favor of declaring the property a "Wetland" or having your pipe run to it.

3 2. I would not be in favor of your proposal for a detention pond on my property.

4 3. I would however, be in favor of piping the Landfill Drainage into Puget Sound, if it is monitored carefully.

5 None of the proposals are ideal, and all will affect our environment more than the present system of disposal.

I would strongly suggest you come up with some alternative plans.

Very ~~truly~~ yours,

(b)(6) [redacted]

P.S. Please mail any further notices to:

(b)(6) [redacted]

Des Moines, WA 98188

85 SEP 18 A 9:12

26875

NJM:mlb

RESPONSE TO LETTER NO. 20: (b)(6)

1. Comment acknowledged. Your current address has been added to our mailing list.

2. Comment acknowledged. Not knowing the exact location of your property, it is not possible to determine if all or part of your property is a wetland. The existence of a wetland at the location shown in Figures I-6 and I-8 of the DEIS is clearly acknowledged by King County and the City of Des Moines (see Letter No. 9, Comment 1, and Letter No. 12, Comment 7). Field biologists from Parametrix, Inc., who are experienced in wetland identification and their legal definitions, agree with both agencies.

3. Comment acknowledged. The City of Seattle would have to obtain the right to construct a detention basin at that site from the property owner(s).

4. Comment acknowledged.

5. The City of Seattle does not agree that the closure of the landfill as proposed will affect the environment more than the existing condition. Discharge of uncontaminated surface water to Smith Creek or Puget Sound is a more environmentally sound practice than allowing surface water to continue to infiltrate into the landfill, resulting in leachate generation and groundwater contamination. Additional alternatives for surface water management are discussed in Section II of this FEIS.

LETTER NO. 21

(b)(6)
Federal Way, WA 98003

MI- Landfill Closures - Kent Highlands/ Midway

September 14,1985

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RDO	att	
MHG		

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OCT 3 1985

Mark Edens, Project Manager
Solid Waste Utility
Seattle Engineering Department
606 Seattle Municipal Building
600 Fourth Ave.
Seattle, WA 98104

Re: Midway Landfill Closure Plan Community Forum held at Marcus Whitman Presbyterian Church on September 5, 1985.

1 Attached is a list of questions we heard at the neighborhood forum held September 5, 1985 at Marcus Whitman Church. The questions are paraphrased as the tape recording was not clear enough to pick up the exact wording. Also we did not ask anyone to identify themselves as we wished to keep this forum as informal as possible.

In addition, the tape ran out long before the questions did. We believe that most people in attendence planned to write their own letters to you regarding the landfill. We hope what we have here will help.

Thank you again for your cooperation in providing us with Mr. Richard Dunlap to help make the answering of the community's questions a lot easier.

Shalom,

(b)(6)

RECEIVED
SEP 17 1985
SOLID WASTE UTILITY

attachments.

26831

Community Forum at Marcus Whitman Presbyterian Church September 5, 1985

2 What about collecting the water from I-5, east and west of I-5 and sending it further south? (question unclear)

3 It was stated that the amount of discharge from landfill into Smith Creek would be no greater than what occurs now, does that mean everyday or during a specific time frame?

4 How can you keep contaminated water from flowing underground?

5 The water table flows to the south but streams underground flow south and west. Experience shows water from the pond behind the day care on Pacific Hwy. flows out on the west side of Pacific Hwy. There must be a major leachate problem to the west of Pacific Hwy. and if not now, it will occur in the future.

6 Who will maintain the ground water system after 20 or 30 years as state in the E.I.S.? (refers to the storm water system)

7 Does the landfill act like a well, collecting water from all around?

8 Explain the location of leachate that has already been discovered.

9 Why are there no test wells for leachate to the west of the landfill?

10 Is there a pipe running due west from the landfill that opens out near the Chinese Midway Restaurant that wasn't closed off when the landfill was constructed?

11 Will water need to be trucked off for treatment for ever and ever?

12 Exactly where would the off-site detention basin be located?

13 How will we know that surface water after the capping will not be contaminated?

14 Is it possible that the leachate in the landfill will flow up and out through the cap?

15 What direction does the ground water flow? Is there a possibility of leachate in the public water systems?

16 How will the City of Seattle keep the leachate out of the aquifer? and protect the local fish runs also?

17 Not all the water falling onto the landfill will be run off--what happens to rest, approximately 6%?

18 Who will fund this whole project?

19 Who will monitor the activities at the landfill?

20 The cap is a solid barrier. What happens during settlement, won't the barrier crack or can it stretch enough to cover the settling?

21 With any of the alternatives, will all the water be treated before being discharged?

22. Can any organization guarantee the quality of the water entering the wetland area or Salt Water Park?

23. Why not use the Green River for discharge?

24. Is there any voting procedure for citizens to respond to this issue?

25. What will all the water do to Smith Creek?

26. What about the manner it is discharged into Puget Sound from Salt Water Park, how will this be done?

RESPONSE TO LETTER NO. 21: (b)(6)

1. Comment acknowledged. Responses to the questions are provided below.

2. It would be technically feasible to collect water from along I-5 and the area east of I-5 and direct it to a natural drainage course south of the landfill. The discharge for such an alternative would be along the west side of I-5 approximately 500 feet south of the Midway Landfill. Because of topography, pumping would be required. The storm water would flow south along I-5 to S. 260th Street and then into a large wetland area between Highway 99 and I-5 south of S. 260th Street. From here it would eventually discharge to the South Fork of Smith Creek. A major obstacle to such an alternative would be that it redirects runoff into a different drainage basin. Because of this, it would not be able to comply with King County Code, Chapter 20.50, Surface Water Runoff Policy, which requires the peak discharge from the property for the design frequency storm not to be increased because of the proposed development. Because there is no discharge from the landfill to the south presently, and runoff from the Midway Landfill site would not flow in this direction if an outlet was provided at the lowest possible point on the landfill, no alternative of discharging to the south could meet this code requirement.

3. With the proposed landfill closure plan, the peak discharge to Smith Creek from the 25-year storm would not be increased because of the proposed development. The peak discharge is an instantaneous or very short-term occurrence. Although the peak discharge would not be increased, the total quantity of water discharged would increase. Thus, the length of time to discharge the water would also increase. See response to Letter No. 2, Comment 5.

4. A number of remedial measures have been used at sites around the country where groundwater contamination has occurred. Generally, the methods include removal of the source of contamination of groundwater, in-place treatment of groundwater, removal of the contaminated groundwater (by pumping), or physical isolation of the contaminated groundwater from areas of concern. Remedial measures for any groundwater clean-up must be tailored to the specific conditions and objectives desired at a particular site. Available options at the Midway Landfill site are discussed on page I-36 of the DEIS. The responses to Letter No. 1, Comment 4, and Letter No. 7, Comment 5 are also relevant.

5. See response to Letter No. 9, Comment 21.

6. See response to Letter No. 17, Comment 1.

7. No. The landfill is a groundwater recharge area in which surface water which infiltrates into the landfill is discharged to surrounding groundwater aquifers.

8. See response to Letter No. 1, Comment 2.

RESPONSE TO LETTER NO. 21: CONTINUED

9. One of the existing groundwater monitoring wells (MW-5) is located southwest of the landfill (see Figure II-2 in the DEIS). Additional groundwater monitoring wells will be installed on the west side of the site as part of on-going groundwater studies described in the Work Plan for Ongoing Groundwater Investigations in Appendix M of this FEIS.

10. Recent field investigations by several entities have not disclosed the existence of any pipe running from Midway Landfill westerly to near the Midway Chinese Restaurant, which is on the west side of Highway 99 opposite the landfill. Furthermore, there are no known records that would indicate the existence of such a pipe.

11. After construction of the closure facilities for the Midway Landfill, surface waters are not expected to be contaminated and will not be trucked from the site. Leachate that is collected in the perimeter toe seep collection system will need to be removed from the site for treatment for as long as the contaminant levels in the leachate are greater than those allowed by regulation. It is anticipated that after the cover system is in place, generation of leachate will be minimized. Although an estimated 500,000 gallons annually could be collected in the toe seep system, this amount could be reduced in the future as the amount of residual leachate in the landfill declines. Eventually, as quality improves and quantity decreases, it may not be necessary to remove leachate from the landfill. The determination of this will be made in the future based on results of the monitoring program and regulatory requirements in effect at that time.

12. The location of the off-site detention basin proposed in the Puget Sound Discharge With Off-Site Detention Alternative is the existing wetland area north of S. 248th Street and east of Parkside Elementary School as shown in Figure I-5 of the DEIS (page I-19).

13. See response to Letter No. 9, Comment 18.

14. The potential exists for leachate in the landfill to seep through the cap at the base of steep slopes where a hydraulic gradient can form in the landfill. To counter against this possibility, the leachate management plan includes a toe seep collection system to intercept these potential breakouts and direct them to collection sumps for removal and treatment (see page I-33 of the DEIS).

15. Data collected to date indicates a southerly gradient for groundwater flow. Additional studies will be performed to provide a better understanding of the groundwater system in the landfill vicinity. See response to Letter No. 9, Comment 21.

RESPONSE TO LETTER NO. 21: CONTINUED

16. The Surface Water Management Plan and Leachate Management Plan discussed in Section I of the DEIS (pages I-18 and I-28 respectively) are designed to minimize leachate generation from the landfill. As discussed on page I-35 of the DEIS, both surface water and groundwater will be monitored to determine whether leachate contamination is occurring. If necessary, appropriate remedial actions such as those described on page I-36 of the DEIS will be implemented. See Letter No. 1, Comments 1, 4 and 9 and their associated responses; as well as the response to Letter No. 9, Comment 18.

17. The estimated six percent of the water that is not runoff from the landfill will infiltrate into the waste. Some of it will be collected in the toe seep collection system. The remainder will percolate through the waste and into the groundwater.

18. See response to Letter No. 11, Comment 12 under Site Responsibility.

19. See response to Comment 18 above.

20. See responses to Letter No. 1, Comments 5 and 7.

21. All of the Storm Water Management Plan alternatives include treatment for erosion and sedimentation control and oil pollution control as required by King County Code, Chapter 20.50, Surface Water Runoff Policy. No further treatment of storm water discharges is proposed.

22. One of the primary purposes of the landfill cover system is to prevent surface water generated on the landfill site from coming in contact with solid waste. Periodic inspections of the cover system will help ensure that leachate breakouts are not occurring and contaminating surface water. In addition, surface water will be monitored for signs of leachate contamination. Although no one can absolutely guarantee that escapement of leachate from the site won't occur, these safeguards will help prevent this from happening. If contaminated surface water did leave the site, the duration of escapement would be short due to the monitoring and maintenance program.

23. See response to Letter No. 12, Comment 6.

24. No rating procedure is anticipated. Opportunity for citizen response is provided by the environmental review process.

25. See responses to Letter No. 2, Comment 5 and Letter No. 9, Comment 10.

26. For all Storm Water Management Plan alternatives, except the tightline to Puget Sound, the storm water will be discharged to Puget Sound via Smith Creek along with other flows in the creek. With the Tightline to Puget Sound Alternative, the flow would be discharged from the pipe onto the beach near the outlet of Smith Creek and flow directly into Puget Sound (see page I-25 of the DEIS for a discussion of this alternative).

SE. TLE ENG. DEPT.

LETTER NO. 22

3c

85 SEP 6 A9:58

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SEP 24 1985

September 3, 1985

MI- Landfill Closures,
Kent Highlands/Midway

(b)(6)

Kent, Wa. 98032

(b)(6)

Mark Edens, Project Mgr.
Solid Waste Utility
Seattle Engineering Dept.
606 Seattle Municipal Bldg.
600 Fourth Avenue
Seattle, Wa. 98104

I am writing to you concerning the Midway Landfill. I have a few questions I would like to submit and have answered.

1. I have had my house for sale for awhile now and not
(1) having much luck in selling it. I have been asked by people looking at the house about the landfill and now with all of the publicity there aren't any lookers. My real estate agent has made the comment that I probably won't be able to give it away. I would like to know if anything will be done in such cases and what the procedure will be?

RECEIVED
SEP 6 1985
SOLID WASTE UTILITY

26503

Seattle Engineering Dept.

2. My daughter is living with me and she is
② pregnant. I would like to know if there is
methane gas under my house if this poses
a health risk for pregnant women?

3. We have several cats & they sleep in the crawl
③ space under the house. Can the methane gas
harm animals?

Very Truly Yours,

(b)(6)

RESPONSE TO LETTER NO. 22: (b)(6)

1. See response to Letter No. 15, Comment 3.

2. Methane gas itself is not toxic. As discussed in Section II.A.4 of the DEIS (page II-41), landfill gas contains trace quantities of other gases that can cause adverse human health impacts if present at high enough concentrations. However, testing of landfill gas at residential locations by the City of Seattle, Seattle-King County Department of Public Health, and Washington Department of Ecology has not detected any of these other gases at high enough levels to pose a health risk. See response to Letter No. 15, Comment 5.

3. See response to Comment 2 above.

LETTER NO. 23

MIDWAY HISTORICAL SOCIETY

(b)(6) [redacted]

P.O. BOX (b)(6) [redacted]

KENT, WA. 98032

(b)(6) [redacted]

MI-Landfill Closure-
Sea. + Highlands/Midway

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SEP 19 1985

RECEIVED
SEP 3 1985
SOLID WASTE UTILITY

85 SEP 3 A9:13

Seattle Engineering
910 Municipal Bldg.
Seattle, WA. 98104

Gentlemen;

① THANK you SO much For the Long over Due clousure of THE MIDWAY Day care. Due TO PROBABLE Permanent Respiratory Gilments IN THose Helpless Babies, THAT Day care SHOULD Have Been Closed a Long Time ago, & anyone who disagrees almost SHOULD Have Thier mouths washed-

26401

out with soap. We in our House do feel the owner of day care should be compensated some by the authorities to help her move, or for the loss of her business, but again, thank you for it's closure.

I was accidentally misquoted in the paper also, about health problems around the landfill that I asked last night.

② What I'd appreciate having answered is: Will people

WITH DOCUMENTED HEALTH PROBLEMS THAT ARE PRETTY PLAINLY DUMP RELATED BE HELPED BY THE AUTHORITIES TO PAY THIER MEDICAL COSTS, OR WILL THEY HAVE TO DEPEND SOLELY ON THIER OWN INSURANCE & WHAT-EVER PITIFUL SAVINGS THEY MAY OR MAY NOT HAVE? CAN YOU PLEASE ANSWER THAT FOR ME?

NATURALLY DIABETIS, & CERTAIN DISEASES WOULD NOT BE "DUMP & POLLUTION RELATED," BUT I'M QUITE SURE YOU KNOW WHAT I MEAN.

Respectfully -

(b)(6) [redacted]

RESPONSE TO LETTER NO. 23: (b)(6)

1. Comment acknowledged. See responses to Letter No. 15, Comments 3 and 5.

2. See response to Comment 1 above.

(b)(6) [redacted]

LETTER NO. 24

Kent Wa 98032

Mark Edens, Project Manager
Solid Waste Utility, Seattle Engr. Dept.
606 Municipal Bldg
600 4th Ave
Seattle Wa 98104

Dear Mr Edens:

① I'd like to express my opposition to converting the wetlands east of Parkside into a detention pond to receive the "runoff" from the Midway Land Fill. I do not want your crap deposited in my neighborhood any more than you would if we sent our residue and runoff to your back yard

② I assume that if this option is pursued that Seattle accepts full legal and moral responsibility for any damage to our quality of life. The legal responsibility will be considered in the courts for many years to come, but how do you accept the moral responsibility if something happens to just one child at Parkside Elementary School?

Sincerely,

(b)(6) [redacted]

RESPONSE TO LETTER NO. 24: (b)(6)

1. Comment acknowledged.

2. Comment acknowledged. With regard to legal responsibility, see response to Letter No. 11, Comment 12 under Site Responsibility, as well as the response to Letter No. 15, Comment 3.

LETTER NO. 25

September 18, 1985

(b)(6)

Kent, WA 98032

RECEIVED

SEP 18 1985

SOLID WASTE UTILITY

Mark Adams
Solid Waste Utility
Seattle Municipal Bldg., Room 606
600 Fourth Ave.
Seattle, WA 98104

Subject: Environment Impact Statement (EIS) on Midway Landfill Plan

Dear Mr. Adams:

After attending several meetings in which public comments were accepted on the plan for capping the Midway Landfill, I have concluded that a major issue regarding environmental impact has not been addressed sufficiently in the EIS. This issue is the impact of years of leaching that has already taken place and the months - probably years - before the proposed cap and run-off plan can be completed.

1 The EIS estimate is that 90,000,000 gallons of water enters the landfill area each year, and it appears to attack the problem as if it were only one of stopping this flow with an impermeable cap and rerouting the uncontaminated run-off to Puget Sound. I find no plan for dealing with the problem caused by 15-20 years of leaching of the 90,000,000 gallons per year on the surrounding properties.

2 There has been testimony at the meetings that leachate from the landfill has been observed for several years on properties directly west of the landfill and Pacific Highway South. However, spokesman for the firm that provided the EIS have stated that no evidence of leachate or methane gas has been indicated in this area. This could be attributed to 1) adequate tests were negative, or 2) no tests were made. All indications are that 2) is a more likely basis for their statements.

3 The EIS statement and proposed plans appear adequate only if there has been no contamination of properties by leachate in the past. This assumption has not been adequately supported by tests or analysis. Several years ago, 60 Minutes had a documentary segment on Love Canal. Do we have another potential environment disaster? Present evidence is inadequate to answer this question. However, unless people and private property are excluded form the "environment" by definition or apathy, this question must be answered and solutions sought before any EIS is complete and acceptable.

Sincerely,

(b)(6)

RESPONSE TO LETTER NO. 25: (b)(6) [redacted].

1. The DEIS estimates that a total of 48 million gallons of leachate percolate into the groundwater annually under present conditions (see page I-28). Once the closure facilities are constructed, the annual percolation of leachate into the groundwater will be an estimated 1.5 million gallons. Further discussion is provided in the response to Letter No. 14, Comment 4. Also, see response to Comment 3 below.

2. See responses to Letter No. 12, Comment 3, and Letter No. 9, Comment 27. Although no evidence of leachate contamination has been observed on properties west of Pacific Highway South, methane gas has been detected in this area (see revised Figure II-13 in Errata section of this FEIS).

3. Leachate contamination of groundwater is documented in the wells immediately adjacent to the landfill. Further studies will be performed to determine the full extent of groundwater contamination (see Work Plan for On-going Groundwater Investigations in Appendix M). There is no evidence of the discharge of leachate-contaminated groundwater to residences via surface seeps, springs or streams. The responses to Letter No. 1, Comments 2 and 4; Letter No. 9, Comment 18; and Letter No. 12, Comment 3 are relevant.

LETTER NO. 26

19 September 1985

TO: City of Seattle, Solid Waste Utility

FROM: (b)(6) [redacted]

Seattle, WA
98117

RECEIVED
SEP 19 1985
SOLID WASTE UTILITY

RE: Midway landfill closure plan, draft environmental impact statement.

I. AS A PLANNING STUDENT WRITING A MASTER'S THESIS ON SOLID WASTE PLANNING, I AM CONCERNED ABOUT THE INTEGRATION OF THE MIDWAY LANDFILL CLOSURE PLAN WITH THE REST OF THE CITY'S SOLID WASTE PLANNING.

① IN PARTICULAR, SINCE THE UTILITY IS IN THE THROES OF CHANGING ITS SOLID WASTE MANAGEMENT SYSTEM, AND EVIDENTLY AN IMPORTANT ROLE FOR THE FUTURE UTILITY WILL BE THE MONITORING OF BOTH MIDWAY AND KENT-HIGHLANDS, THE MIDWAY CLOSURE PLAN SHOULD INCLUDE SOME MENTION OF FUTURE PERSONNEL, EQUIPMENT, AND ACTIVITIES IN NUMERICAL TERMS. (SEE WAC 197-11-440 (6)(e), "Discussion of significant impacts

shall include the cost of and effects on public services, such as utilities ...")

II. According to Figure I-13 on page
② I-40 THERE ARE SOME 84 WELLS PROPOSED FOR THE GAS MIGRATION AND ODOR CONTROL SYSTEMS.

WHAT IS THE APPROXIMATE CUBIC YARDAGE OF SOIL REMOVED FROM THESE WELL BORES, IS IT CONSIDERED HAZARDOUS MATERIAL, AND IF SO, HOW IS IT TO BE DISPOSED OF?

III. IS THERE ANY IMPACT ON PUGET
③ SOUND WATER QUALITY FROM THE PROPOSED TIGHTLINE ALTERNATIVE (E.G. FROM THE INTRODUCTION OF FRESH WATER IN A MARINE ENVIRONMENT)?)

IV. I FEEL THAT MORE EMPHASIS
④ SHOULD BE PLACED ON THE POSSIBILITY OF PUMPING AND TREATING THE 98 MILLION GALLONS

more

(b)(6) [redacted] comments, p. 3

OF LEACHATE SITING IN THE PERCHED GROUNDWATER ZONE. (see pp. II-19 and I-36).

A. SINCE THIS MAY BE NECESSARY LATER, THE UTILITY SHOULD BE PREPARED FOR IT NOW.

B. THIS IS PART OF CLEANING UP THE DUMP, AND IS ALMOST MANDATORY TO PREVENT GROUND-WATER POLLUTION.

C. A PILOT BIORECLAMATION PROGRAM, ESTABLISHED NOW, WILL PROVIDE IMPORTANT INFORMATION IN CASE A REMEDIAL GROUND-WATER PUMPING PROGRAM BECOMES NECESSARY. (see p. I-36)

THANK YOU FOR THIS OPPORTUNITY TO COMMENT ON THE LANDFILL CLOSURE PLAN EIS. YOU HAVE A TOUGH JOB AHEAD OF YOU. GOOD LUCK.

(b)(6) [redacted]

RESPONSE TO LETTER NO. 26: (b)(6)

1. See response to Letter No. 35, Comment 1.

2. Approximately 560 cubic yards of refuse/soil will be removed from the 84 wells. This material is not considered hazardous and will be buried on the site each day.

3. Although there would be no detention basin under the Tightline to Puget Sound Alternative to allow settling out of particulates and associated heavy metals, runoff from Highway 99 would not be included in the surface water discharged from the site. The net result would be a reduced discharge of heavy metals to Puget Sound compared to other alternatives. The estimated quality of water leaving the discharge pipe is shown in Table II-9 of the DEIS (page II-38). The water would be high in nutrients and some heavy metals, but typical of much of the non-point pollution currently entering the Sound. Since freshwater has always entered Puget Sound and is responsible for its estuarine nature, no impacts from the addition of freshwater will occur.

4. The City of Seattle is prepared at this time for the possibility of pumping the leachate in the perched groundwater zone, but until the actual effectiveness of the proposed closure facilities can be verified in the field, no specific action is proposed for any such additional remedial action. Data obtained by monitoring the site after completion of the proposed closure facilities will provide the most useful information as to the effectiveness of the facilities and what, if any, additional studies and remedial action are necessary. See responses to Letter No. 1, Comments 4 and 9; and Letter No. 7, Comment 5.

September 10, 1985 **LETTER NO. 27**

MIDWAY CLOSURE PLAN - EIS
I - Landfill Closures, Kent Highlands / Midway

(1) Although this is referred to as the Midway & Kent Highlands Closure Plans I find nothing involving Kent Highlands in my copy of the draft EIS. These are two very different landfills and I feel they should be dealt with separately.

Cy to: Mayor Dwyer

Landfill Gas Control

For years CAML has told anyone that would listen that we were located on a gravel pit type area filled with underground springs. The city and experts showed no concern and now we are faced with gases escaping the landfill. Seattle even ignored test results showing high concentrations of methane until CAML brought them to the attention of the DOE and EPA. These happenings make it difficult for the residents to have alot of faith in what those running the show spew out as fact!

An active system is a must for the gases but still questions (2) remain. 1. What gases besides methane will be drawn from these wells and burned? What effect will they have on the environment and persons living in this area?

(3) 2. Does the changing of hydrogen sulfide to sulfur dioxide by burning make it safer? You are stating "short term PSAPCA standards". The residents occupancy of the area is not on a "short term" basis.

(4) Methane should be used as an energy resource is possible.

(5) Not only are we concerned with the odor that will be coming from the site for many years but odorless gases and their health effects. The health of the residents has not been fully addressed in the EIS and it should be. No individual testing has ever been done for the residents. All we keep hearing is that old familiar phrase "no imment health hazard".

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Surface Water and Leachate

(6) Any holding ponds near a school are unacceptable. Haven't you done enough damage in this area already without compounding it?

(7) Most alternatives are dealing with running the water to Puget Sound. We have no guarantee that this runoff will be 100% safe and see no reason to further pollute Puget Sound. I feel there are other groups that also feel strongly on this subject.

(8) Flooding and erosion could well be a problem in all but the tight-line alternative.

(9) A Leachate collection system is a must. WE need a guarantee that leachate will not be allowed off-site as the methane gas is now doing. Water supplies in the area need to be checked frequently.

RECEIVED
SEP 16 1985
SOLID WASTE UTILITY

Final Grades

(10) The Black Lagoon must be filled. It is still emitting noxious odors.

(11) What will happen to the T-5 dirt that is still on site?

(12) The experts seems to feel that the maximum plan is the best. I think they need to be listened to.

(13) Maintenance is mentioned frequently throughout the EIS. The length of time varies from 10 to 30 years. I was under the impression that maintenance was required for 30 years by law. My feeling is that even that is not long enough. There is also still no answer to the question as to who will maintain the site. Owner? Seattle? Health Department? This needs to be made clear for the residents and money set aside each year so that maintenance can be funded without delay when needed.

26755

14 Extending and enlarging Kent Highlands is not acceptable. The City of Seattle needs to move forward with plans for their own waste and not keep dumping it on other communities.

15 TAble 11-16 gives a false sense on the median value of residences - Not only was it dated back to 1980 - before the truth about Midway came out but at this point houses near the landfill virtually can not be given away! Any recent appraisal will even state that the houses are de-valued because of proximity to Midway.

DO IT RIGHT - Cost and time are not the problem. You took 20 years to create this mess, don't expect it to be cleaned up in a year. It seems rather ironic with all the experts available that the Mayor and City Council are again allowed to make uninformed decisions conerneing our lives and our homes!

Sincerely,
(b)(6)

(b)(6)
Citizens Against Midway Landfill
(b)(6)

Downey, CA 90242
(b)(6)

CC
Bob Brown, CAML

RESPONSE TO LETTER NO. 27: (b)(6)

1. The original report describing the closure plan for the landfill did include both the Midway and Kent Highlands Landfills. However, two separate EISs are being prepared for the projects. While the Midway Closure Plan Draft EIS was issued in August 1985, the Kent Highlands Draft EIS is not expected to be issued until spring of 1986.

2. Gases withdrawn and flared by the methane control system will include all those listed in Table II-10 of the DEIS (page II-43). See response to Letter No. 14, Comment 7.

3. Yes. Short-term air quality standards refer to the time lapse of a monitoring period, such as 1-hour or 8-hour standards. Short-term standards are generally more stringent than a long-term standard, such as a 24-hour standard. Any applicable new PSAPCA standards would be included in flare exhaust testing and cleanup technology.

4. Comment acknowledged. This possibility will be considered after completion of the methane control system.

5. See responses to Letter No. 14, Comment 7; and Letter No. 15, Comment 5.

6. Comment acknowledged. See responses to Letter No. 2, Comment 2; and Letter No. 24, Comment 1.

7. Comment acknowledged. See responses to Letter No. 2, Comment 3; Letter No. 9, Comment 18; and Letter No. 26, Comment 3.

8. See response to Letter No. 2, Comment 5. As required by King County Code, Chapter 20.50, Surface Water Runoff Policy, an erosion/sedimentation control plan will be prepared during design of the facilities and submitted for agency approval. The drainage course downstream of the discharge point will be evaluated for its capacity to pass the flow, including any need for erosion control improvements.

9. Comment acknowledged. A toe seep collection system is planned, as described on page I-33 of the DEIS. See responses to Letter No. 14, Comment 4; Letter No. 9, Comment 18; and Letter No. 25, Comment 3.

10. Final grading of the site includes filling of the "Black Lagoon."

11. The Terminal 5 dirt at the Midway landfill has been tested and determined to be not hazardous or dangerous waste . Therefore, it will be capped as part of final closure and remain on the site.

12. As discussed in Section I of this FEIS, the intermediate grade alternative is the preferred alternative at this time. The maximum grade alternative would not offer a significant advantage in terms of leachate control. See response to Letter No. 35, Comment 4.

13. The closed Midway Landfill will be maintained for at least the legally-mandated 30 years. See response to Letter No. 17, Comment 1.

RESPONSE TO LETTER NO. 27, CONTINUED

14. Comment acknowledged.

15. Comment acknowledged. The information in Table II-16 is from the 1980 U.S. Census and is the most recent reliable data on the median value of housing in these census tracts. Whereas existing conditions at the Midway site do appear to be affecting property values, the proposed closure of the site should be beneficial to the long-term growth and development of the area. See response to Letter No. 11, Comment 12 under Property Value.

LETTER NO. 28

9-10-85

City of Des Moines
Seattle Engineering Dept
To whom it May Concern:

1 There is already Leachate coming under Highway 99 and into the creek that runs around Parkside and into the Sound. We do not want a holding
2 pond near to us. We already get enough Odor from the dumps as it is. It seems to be particularly bad at Night. I have waken out of sound sleep coughing from the Odor when the wind is in the right direction. Since the Odor has been so bad I have had to start taking theo-dur (which is used for Asthma Control

(b)(6) [redacted]

RESPONSE TO LETTER NO. 28: (b)(6)

1. See response to Letter No. 12, Comment 3.

2. Comment acknowledged. The purpose of the holding pond you refer to is to retain relatively clean surface water runoff from the closed landfill, I-5, and Highway 99. While it will contain some contaminants from the roadways such as heavy metal, oil and grease, it will not contain leachate from the landfill. Such a detention basin is not expected to have an odor.

LETTER NO. 29

85 SEP 18 AM: 40

September 16, 1985

MI-Landfill Closures,
Kent Highlands / Midway

(b)(6)

Kent, Washington 9803

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Mark Edens, Project Manager
Solid Waste Utility
Seattle Municipal Building
Room 606
600 Fourth Ave.
Seattle, Washington 98104

RECEIVED
SEP 18 1985
SOLID WASTE UTILITY

OCT 4 1985

Dear Mr. Edens

1 The plan Parametrics designed for a methane control system appears to be acceptable, however, I do recommend regular testing of homes and businesses to assure a low level or non-existant level of methane in surrounding neighborhoods. We need air monitoring stations on the west side of Hwy 99 also.

2 In my opinion, the methods for handling run off water and leachette are not acceptable. I would recommend an on-sight filtering plant or a transfer of both ground, (leachette) water and run off to be piped parallel to I5 to the Renton Sewage Treatment Plant. Another possibility would be to use this same route for the leachette with the run off water going to the Green River.

3 If these are not possible, I would recommend the best of your plans being the tight line to Puget Sound, following 252nd St. to Smith Creek and all of the way to the Sound, possibly using the Sylva Pines sewer pipe to discharge the water further out in the Sound. This plan would need an on-sight retention basin where run off water would be thoroughly tested before being released into the pipe. The maximum grade alternative plan regarding amount of soil for the cover, et cetera, would be my choice.

4 I still suggest that you send the I5 run off to the Green River. Also, rather than trucking the leachette to the Kent Highlands to be sent to the Renton Sewage Plant, I think it should go to the Kent Highlands in pipes which would be a cleaner and more permanent method of transport. I would advise closing the many pipes now in existance which are transferring water under Hwy 99, and route the East 99 run off to the on sight retention basin. It was suggested by Mr. Dunlap that I ask my question regarding a pipe, (not of the regular drainage system), running from approximately the dump's middle pond, under Hwy 99, and coming up approximately mid way in the business district due West of the weighing station, which was never closed off. Is there such a pipe?

5 The I5 dirt should be removed from the landfill. If there is

26862

a way to flush out the streams with a solution which would deactivate some of the chemicals which are already in our streams, I would recommend it be done.

6 None of the costs of the this project should be passed on to the Kent or Des Moines tax payers. Medical treatment for those who have health problems due to exposure to the landfill, should be covered by the City of Seattle. I would suggest the purchasing of homes of any one who has been inconvenienced by this problem, whether it be because of physical ailments, emotional stress, lack of saleability of their homes, or lowered property value in a certain radius.

7 There should be a moratorium on the giving of building permits in the said area until we have a clearer picture of the extent of the soil and water contamination. I would like to see an on going program for the monitoring and handling of associated problems,exist, not just for twenty to thirty years, but until the problems are remedied, which could be up to one hundred years. I feel very strongly that there should be neighborhood involvement on the Board, which would be the overseers of the monitoring and testing. This would help build public confidence.

8 It is imperative to do extensive testing of the soil, run off, and leachette water west of Hwy 99, from 240th St. South, to approximately 258th, and due west to the Sound, as soon as possible! Some good testing spots, in my opinion, would be (1) behind the businesses up from 250th St. (2) sight behind Evergreen Hot Tubs, (3) further down streams due west of Evergreen, (4) the wetlands, (5) Harvey Grows Pond, (6) different stops on Smith Creek, (7) Puget Sound at Saltwater State Park, (8) Parkside school yard, (9) due west of condominiums off 248th St. The tests should be for the 129 toxins, nuclear waste, bacteria, methane, or other harmful gases, and anything else dangerous to plant and animal life. Water tables should be checked, also ground and artesion wells. Yards where these streams surface should be checked. Vegetables and fruit grown in neighboring yards, should be analyzed if the people desire it. Periodic or on sight testing must be continued, and a close eye must be kept on the cap. Homeowners who have plastic pipes should have their water tested to see if the pipes have absorbed toxins and pollutants, which could be transferred to their water.

Sincerely,

(b)(6)

(b)(6)
Member of C.A.M.L.

RESPONSE TO LETTER NO. 29: (b)(6)

1. The City of Seattle, Washington Department of Ecology, and Seattle-King County Department of Public Health are conducting an extensive program of regular testing of methane levels at homes and businesses in the site vicinity (see revised Risk of Explosion and Hazardous Emissions section in Section II of this FEIS). Air monitoring stations west of Highway 99 would be upwind of the prevailing winds at the landfill and would therefore not reflect the maximum concentrations of constituents that may result from the landfill. The location of the upwind and downwind station in the EIS were carefully selected so that the upwind station served as a control station unaffected by the landfill, while the downwind station would reflect the full effect of the landfill.

2. Comment acknowledged. The revised Surface Water Management Plan section discusses new alternatives for routing the discharge line west of the Midway Landfill (see Section II of this FEIS). Collected leachate from the toe seep system that is transported to Kent Highlands for pretreatment will be discharged to the Metro system and then to Renton Treatment Plant for final treatment. The response to Letter No. 11, Comment 18 is relevant to your comment on on-site treatment. With regard to the possibility of discharge to the Green River, see response to Letter No. 11, Comment 12 under Surface Water Management.

3. Comment acknowledged. See revised Surface Water Management Plan section in Section II of this FEIS for a description of a S. 252nd Street pipeline route with on-site detention. Meetings with Mr. Jim Henry, Manager of the Des Moines Sewer District, confirmed the existence of an old sewer pipe from the present location of the 16th Avenue Pump Station through Salt Water State Park and out into Puget Sound. However, nearly the entire length of this sewer, except the portion in Puget Sound, is still being used for conveyance of sanitary sewage from the state park buildings to the west end of the park where it is pumped back to the 16th Avenue Pump Station. Furthermore, this entire line is only eight inches in diameter. Because the line is still used as a sanitary sewer and its eight-inch size provides only a very small capacity, it is not feasible to consider it for conveyance of surface water runoff from the Midway Landfill. With regard to the maximum grade alternative, see response to Letter No. 27, Comment 12.

4. With regard to the possibility of discharge to the Green River, see response to Letter No. 11, Comment 12 under Surface Water Management. Based on the estimated leachate quantity to be transported (500,000 gallons annually), a pump station and pipeline alternative to Kent Highlands Landfill for leachate pretreatment is not economically viable when compared to truck haul. All surface water management alternatives that use an on-site detention basin include routing flows from the east side of Highway 99 into the on-site basin. The storm drainage pipes under Highway 99 that presently carry the runoff from Highway 99 would be closed off as necessary to re-route these flows. As discussed in the response to Letter No. 21, Comment 10, there is no evidence of a pipe running from the Midway Landfill to the west side of Highway 99.

RESPONSE TO LETTER NO. 29, CONTINUED

5. Comment acknowledged. It is assumed that you are referring to T-5 dirt rather than I-5 dirt. See response to Letter No. 27, Comment 11. There is no known method for removing the chemicals that are already in the streams.

6. See responses to Letter No. 11, Comment 12 under Site Responsibility; and Letter No. 15, Comments 3 and 5.

7. Comment acknowledged. A copy of your letter with this comment highlighted has been sent to the Kent and Des Moines City Councils for their consideration. Those municipalities are responsible for issuing building permits in the vicinity of the Midway Landfill. With regard to maintenance and monitoring at the landfill site, see response to Letter No. 17, Comment 1. At present, there are no plans for a citizen review board to oversee closure and long-term maintenance and monitoring activities at the landfill. However, the City of Seattle will continue to provide active citizen participation during future site investigations and during closure construction activities.

8. Comment acknowledged. With regard to potential leachate contamination of groundwater, see Letter No. 1, Comment 4 and its associated response. With regard to surface water monitoring, see responses to Letter No. 9, Comment 18; and Letter No. 12, Comment 3.

LETTER NO. 30

Mark Edens, Project Manager
Solid Waste Utility
Seattle Municipal Building
600 Fourth Avenue
Seattle, Washington 98104

MI-Landfill Closures, Kent

re: Midway Landfill Closure Plan

Highlands/Midway

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SEP 23 1985

9/3/85

85 SEP 5 AM

Mr. Edens:

1 (b)(6) and (b) month-old son live at (b)(6), Kent, Washington, an area of unincorporated King County (b)(6) south of the Midway landfill. We are currently building another home elsewhere and expect it to be completed in November. Our present home was listed for sale a few weeks before the latest bad news about the landfill. Several potential buyers, and quite a few agents had viewed our home prior to the revelations about methane migration from the landfill, but since the news has been in the media we have not had a single agent show the home.

We understand from discussions with our agent and others that agents will not show the home for fear of liability should a new owner experience further problems with the landfill. Obviously any knowledgeable buyer would not consider buying in the area unless the house was pratically given away.

When the Midway landfill was just an occasional nuisance it was still possible to sell a home in the area if the price was reasonable. Now that the landfill is known by the general public to be a health and safety hazard it may be impossible to sell a home at any price. As we near completion of our new home our situation becomes more and more difficult, since our equity in our present home is (or was) considerable and the proceeds from its sale were counted on to help finance construction of our new home.

There seems to be no question that the government agencies and officials of several jurisdictions were aware of the potential hazards long before this knowledge became public. In particular, the City of Seattle has taken advantage of the fact that the families and businesses threatened by the Midway landfill have no representation with the city. What compensation does the City of Seattle plan to make to homeowners near the landfill for their lost property values and equity? Is there any plan to purchase houses adjacent to the landfill? Clearly the current situation is intolerable, both in terms of the health and safety of those who will continue to live near the landfill, and the financial hardships for those who wish to (or must) move from the area.

RECEIVED
SEP 5 1985
SOLID WASTE UTILITY

26475

Your Response Will be Appreciated,

(b)(6)

Kent, Washington 98032

(b)(6) (home)

(b)(6) (work)

cc: Charles Royer, Mayor
George E. Benson, Councilperson
Michael Hildt, Councilperson
Paul Kraabel, Councilperson
Virginia Galle, Councilperson
Norm Rice, Councilperson
Jim Street, Councilperson
Dolores Sibonga, Councilperson
Sam Smith, Councilperson
Jeanette Williams, Councilperson
Eugene V. Avery, Director of Engineering

RESPONSE TO LETTER NO. 30: (b)(6)

1. See response to Letter No. 15, Comment 3.

(b)(6) [redacted]

Kent, Washington 98032

September 16, 1985

LETTER NO. 31

ROUTING | DATE

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FILE

INFORMATION

OCT 4 1985

RECEIVED

SEP 18 1985

SOLID WASTE UTILITY

05 SEP 18 A10:06

To; Mark Edens, Project Manager
Solid Waste Utility
Seattle Engineering Department
606 Seattle Municipal Building
600 Fourth Ave.
Seattle, Washington 98104

Re: Midway Landfill Closure Plan

1 Our concern has been over the negligence of officials connected with the management and the lack of monitoring; the rat problems, health hazards, toxic waste, home depreciation; the Port of Seattle dumping contaminated soil (252nd and Pacific Highway South; Widing Transport,(not knowing who is monitoring them or how)

We have lived in this area since 1953. There were several swamp areas as well as springs and a artesian well, after walking through these areas again, we are frightened of the change.

2 We had a small spring running through our back yard when we first bought our house. This sisappeared when the house was later (b)(6) [redacted]. We believe this spring still exists, but is underground. A corner of our yard is always spongy, and part of the flower bed disappears each year, if we dig down 2½ to 3 feet it quickly fills with foul smelling water. Last year this bed was first filled with a layer of rocks before adding the usual fresh soil, so far the plants haven't died as they did the last 3 years. We would appreciate having this soil tested for the various toxic wastes that were dumped into the landfill; with the way the springs and water table have altered, and the fact that methane gas has been found west of Pacific Highway greatly concerns us and it would make us rest easier to have all monitoring continued.

3 We are approaching retirement and are concerned with all these things creating a health hazard, maybe sometime in the future to our now grown children or to ourself. This has most certainly already caused us to lose monetarily because of our home being devalued.

4 I feel Kent should allow the water from I 5 to go to the Green River, due to the seriousness of avoiding other unplanned accidents. Since we have been told there is a law against this and the expense too great, the Maximum grade alternative and the Tightline to Puget Sound with an on-site detention basin would be the lesser of four evils with the least possible accidents, which would be better for our area and with the least possible side effects. This however concerns me because of the lack of monitoring in the past; but hope and pray will be maintained in the future. I think the pipeline should be layed down from Pacific Highway down 252nd to 16th Ave, South, running beside Smith Creek to Puget Sound. 250th is a heavily traveled road with much more homes to disrupt than the 252nd route.

Thank you for the chance to voice our concerns. We would appreciate an answer as to when we might expect to have you test the soil.

Sincerely,

(b)(6) [redacted]

26866

(b)(6) [redacted]

RESPONSE TO LETTER NO. 31: (b)(6)

1. Comment acknowledged. With regard to Port of Seattle Terminal 5 soil, see response to Letter No. 27, Comment 11. The location of responses to your other specific concerns are provided below.

2. Comment acknowledged. See responses to Letter No. 12, Comment 3; Letter No. 9, Comment 18; Letter No. 15, Comment 2; and Letter No. 29, Comment 1.

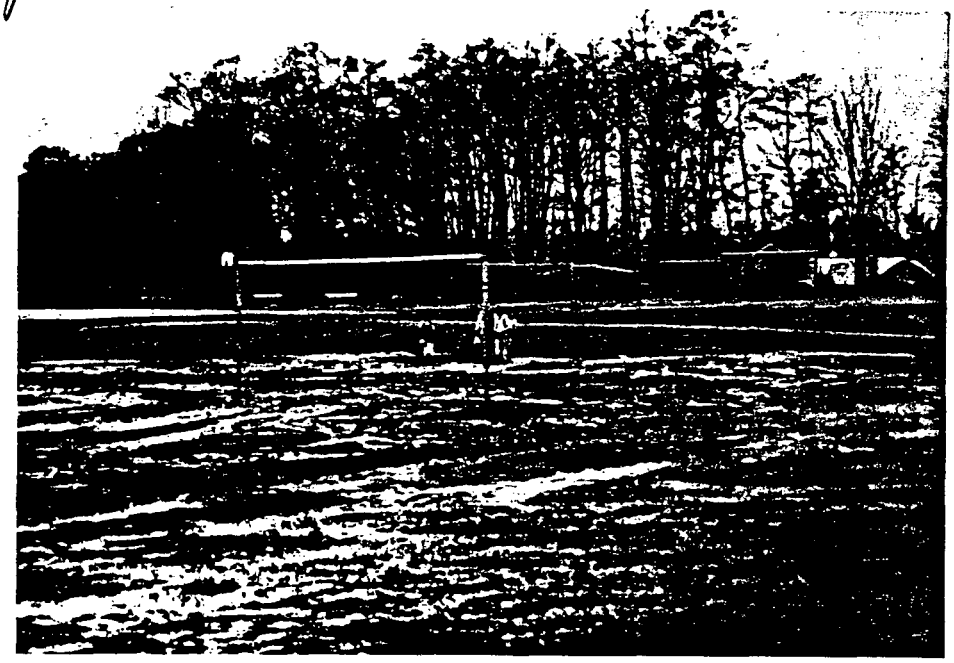
3. Comment acknowledged. See responses to Letter No. 15, Comments 3 and 5.

4. Comment acknowledged. See responses to Letter No. 11, Comment 12 under Surface Water Management; and Letter No. 27, Comment 12.

LETTER NO. 32

Sept 9, 1985

To Seattle Engineering Department regarding Midway Landfill Closure-Runoff Proposal.



PARKSIDE ELEMENTARY SCHOOL PLAYGROUND
SPRING 1984

(1) As one can see by the above photo, the storm drainage system surrounding Smith Creek is not under control. It is logical to me that since the dump was established in 1966, contaminated run-off and leachate from underground springs has been polluting our school grounds and playfield.

To my knowledge no one has ever tested, although requested, for <u>existing leachate</u>! in the drainage basin, school grounds, or surrounding land ~~[illegible]~~.

(2) We hear how the City of Seattle is going to keep future leachate under control but what about the leachate that's already infiltrated the "pristine wetland", known as Smith Creek?

(3) The Seattle proposal to make a cesspool out of a "pristine wetland" is without conscience. During the summer it will partially dry up leaving breeding grounds for bugs, stench from stagnant water, basically a serious health problem - spinal meningitis, etc.

(4) The City of Des Moines is currently in violation of a King County Ordinance which states that runoff water cannot be increased. Due to installation of streets, sidewalks and storm drains on 26th Ave east of basin, the City of Des Moines is not only failing to correct an existing problem (see photo) but defiantly proceeding with making a cesspool of their own and increased flooding of the land.

ADVERTISEMENT FROM HIGHLINE TIMES/DES MOINES NEWS
JULY, '85

DES MOINES
ADVERTISEMENT
FOR BIDS
L.I.D. NO. 1-85-4
STREET
IMPROVEMENTS

SEALED BIDS will be received by the City Clerk of the City of Des Moines, Washington for constructing Street Improvements in L.I.D. No. 1-85-4 until 2:00 PM Pacific Daylight Savings Time, on the 22nd day of August, 1985 at the City Hall 21630 11th Avenue South, at which time all bids will be publicly opened and read aloud.

Work to be done includes:

Construction of storm sewer system, asphaltic concrete pavement, concrete curb and gutter and concrete sidewalk on 26th Place South from S. 240th St. to So. 246th St. All in L.I.D. No. 1-85-4.

All bids shall be in accordance with the Plans and Specifications which may be obtained at the offices of George J. Lindsay, P. E., 31218 Pacific Highway So., Suite F, Federal Way, WA 98003 by depositing $10.00 for each set. This deposit will be refunded to those who submit proposals, if the plans and specifications are returned in good condition within ten (10) days after the bid opening. Bidders who do not return the plans and specifications within ten (10) days after the bid opening or who do not submit a bid will forfeit the deposit.

All bids shall be accompanied by a certified check or cashier's check or bid bond in the amount of not less than five percent (5%) of the total amount bid. Bid bonds shall be in a form satisfactory to the City Attorney.

The right is reserved to reject any or all bids and to waive informalities in the bidding.

No bidder may withdraw his bid for a period of thirty (30) days after the date set for the bid opening.

By order of the City Council of the City of Des Moines.

By:
Denis Olsen
City Clerk
City of
Des Moines

Published in the Highline Times/ Des Moines News Aug. 7 and 14, 1985.

This proposed storm sewer will end at 246th Street, dumping directly into the Smith Creek Basin. City of Des Moines will deliberately cause more flooding of the "pristine wetland" and surrounding areas by this project.

⑤ It is my belief that the only way to solve our run-off problems safely is to be able to control run-off through tight piping. If worse comes to worse, as it seems to, with Seattle's Dump, at least this water, contaminated or not will be available through piping, to be treated.

⑥ As we all know even run-off into the sound will have to be treated someday. This piping system should, above all, have capability to collect run-off excess from Des Moines storm sewers thus insuring our wetlands; our environment is not made uninhabitable. The ecology department won't let this water into the Green River. Certainly the City of Seattle doesn't expect us to allow it in our backyards!!

C

(b)(6)

(b)(6)

RESPONSE TO LETTER NO. 32: (b)(6)

1. See response to Letter No. 12, Comment 3 regarding testing for leachate west of Midway Landfill.

2. See response to Letter No. 12, Comment 3. No evidence of leachate in Smith Creek has been detected in testing done to date.

3. Comment acknowledged. See responses to Letter No. 24, Comments 1 & 2.

4. Comment acknowledged. It is recommended that you request a response to your concerns from the City of Des Moines. Also, see response to Letter No. 12, Comment 14.

5. Comment acknowledged.

6. Comment acknowledged. The proposed action is to control the surface water runoff from the Midway Landfill. There is no proposal to oversize the pipeline to accommodate runoff from the area west of the landfill site. It would be technically feasible to do this, however, if all municipalities involved agreed to do so.

TO WHOM IT MAY CONCERN: LETTER NO. 33 September 11, 1985

PETITION TO OBJECT TO PROPOSED MIDWAY LANDFILL DRAINAGE PROPOSAL

MI- Landfill Closures, Kent Highlands/Midway,

1 We the undersigned object absolutely to the proposed destruction and waste of the natural, pristine wetland area to be used for the drainoff of the Midway Landfill. We object to the lack of notification and to the lack of information made available to local concerned citizens.

Cy to: Mayor Doug Jewett

We the undersigned feel that the chemical and waste runoff water will

1) Endanger the health of our families,
2) Jeopardize students attending Parkside Elemantary School,
3) Flood our property,
4) Reduce the value of our properties and homes,
5) Destruction of natural wildlife habitat ,
6) Destruction and pollution of Smith Creek Basin .

6c

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85 SEP 16 AM 10:12

We the undersigned are outraged and disappointed at the lack of concern, lack of testing for existing leachate problems, existing flooding of wetland and surrounding areas. We deeply resent the pollution of our neighborhood, Smith Creek and ultimately Puget Sound.

RECEIVED SEP 16 1985 SOLID WASTE UTILITY

26761

Name Address Phone

(b)(6)

 Petition To Object To Proposed Midway Landfill Drainage Proposal

Name	Address	Phone
Art Eliason	24414-24 Ave So	824-3948
Lori Dean	24414-24 Ave So	824-3948
Gary P. Beard	24437 25 So	824-4824
Ann L Beard	24437-25 So.	824-4824
Ed Newell	24335 24th Ave S	824-2274
Nancy Mayer	2420 So. 244	8781934
Jim Mayer	2420 So 244	8781934
Cindy Sheppard	24007 25 Ave So	878-1628
* Jared Zeuner	24443 244th	878-2774
Gene Corpine	25311 29th Ave	941-2923
Joyce F. Newell	24335-24 Ave S.	824-2274
Scott R. Newell	24335 24 Ave S.	824-2274
Kathyanne R Larson	2415-So 242nd	824-6069
Tom Larson	2415 So. 242nd	824-6069
Roy L Harvey	24425 25th Ave S	824-1789
Lora L Harvey	24425-25th Ave S.	824-1789
Linda Simpier	24445 24th S.	941-7535
Don Barnes	2907 So 244th Kent	878-4298
McGowan, Marjorie	2025 South 244th Place, Kent	824-74[illegible]

RESPONSE TO LETTER NO. 33: PETITION SIGNED BY 27 PERSONS

1. Comments acknowledged. As discussed in Section I of this FEIS, the preferred alternative for detention of surface water runoff from the landfill is the on-site detention basin. Under this alternative, the existing wetland would remain in its natural state, although changes in vegetation could occur due to the alteration of the water regime. With regard to potential contaminants in surface water runoff, see responses to Letter No. 9, Comments 5 and 18. The location of responses to each of your other concerns is provided below:

    1. See response to Letter No. 15, Comment 5.

    2. See response to Letter No. 24, Comment 1.

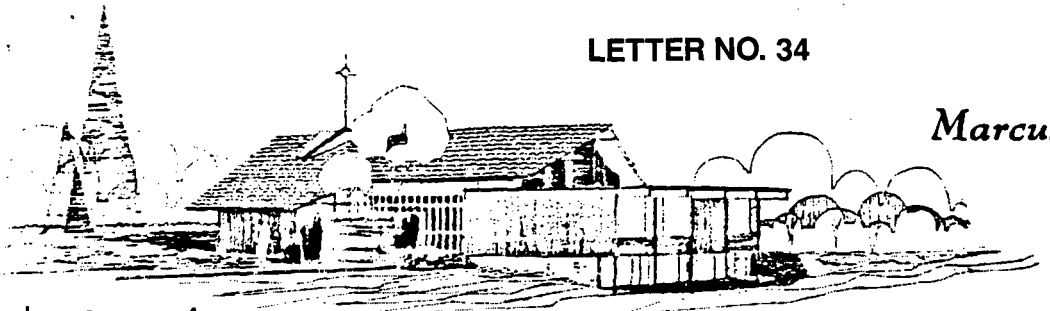
    3. See response to Letter No. 9, Comment 3.

    4. See response to Letter No. 15, Comment 3; and Letter No. 27, Comment 2.

    5. See response to Comment 1 above.

    6. See responses to Letter No. 2, Comment 5; and Letter No. 9, Comments 16-18.

LETTER NO. 34



Marcus Whitman Church

THE UNITED PRESBYTERIAN CHURCH
IN THE UNITED STATES OF AMERICA

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OCT 3 1985

MI - Landfill Closures - Kent Highlands/ Midway

September 11, 1985

5C

Copy to Doug Quinett

To: Mark Edens, Project Manager
Solid Waste Utility
Sea. Engineering Department
606 Seattle Municipal Building
600 Fourth Avenue
Seattle, WA 98104

RECEIVED
SEP 17 1985
SOLID WASTE UTILITY

Re: Midway Landfill Closure Plan

(1) The closure of the Midway Landfill is of great concern to Marcus Whitman Presbyterian Church. We are part of the community that will be affected by any of the four proposed alternatives of surface water management. We are writing this letter to share our views with you regarding the Draft Environmental Impact Statement. We urge the City of Seattle to adopt the maximum grade alternative and the Tightline to Puget Sound with an on-site detention basin. This alternative would be the least disruptive to the surrounding neighborhood and environment because it maximizes the gas, leachate, and surface water controls with minimum possible side effects.

(2) The maximum grade alternative provides the best drainage of surface water and leachate on the landfill. The Tightline with on-site detention is by far the best alternative to adequately provide for proper control of water quality and quantity leaving the landfill. However, we strongly believe, in order to protect the community, this project must be properly maintained by the City of Seattle for the length of time the pipeline and detention basin are in existence. We request a budget and a plan for maintenance be provided in the final E.I.S.

(3) An additional concern we have is the Tightline is routed to be along S. 250th and S. 251st Streets. This is the major access route through the Salt Air Hills development. We propose instead that the pipeline be laid from Pacific Highway down S. 252nd ST. to 16th Ave. S., enter Salt Water Park and run parallel to Smith Creek to Puget Sound. Our reasons for this choice are that approximately one half of this road is an undeveloped dirt road and has only thirteen houses along it. On the other hand, S. 250th has forty homes along it and is the school bus pickup route for elementary and secondary schools in the area. We believe the best alternative should be chosen, regardless of expense.

(4) If the Tightline alternative is chosen, we believe it necessary during the construction period to require that when the trenches for the pipe are dug, the pipe must be immediately laid and re-covered to increase the safety of the surrounding area. In addition, alternative traffic routes must be clearly marked and any school bus pickup points be safely accessible.

26822

2130 SOUTH 248TH KENT, WASHINGTON 98032 (206) 878-2013

(5) There are potential problems or breakdowns with all of the alternatives. In the final E.I.S., it is imperative that a contingency plan be outlined for the recommended alternative. Monitoring systems of leachate, methane gas, and surface water quality need to be fully defined in the final E.I.S. Public concern will not be alleviated until we are assured that the problems that created the need for the closure will not be repeated. It is a key issue to regain public confidence.

We thank you for your time in reading our letter. We request your comments regarding this letter be made directly to the Session and included in the final E.I.S., as required by law. Thank you for your time, support, and concern in the public meetings and for your help in the community forum held at our facility on September 5.

Respectfully Submitted,
by order of the Session,
Marcus Whitman Church

(b)(6) [redacted]

Moderator of Session

(b)(6) [redacted]

Clerk of Session

ACH:bas

cc: Marsha Huebner, City Planner, City of Des Moines
Dean Hone, Assistant Superintendent, Highline Public Schools
Grechen Schreiber

RESPONSE TO LETTER NO. 34: MARCUS WHITMAN CHURCH

1. Your preference for the tightline to Puget Sound with an on-site detention basin and maximum grade alternative are noted. As discussed in Section I of this FEIS, neither of these alternatives is the City's preferred alternative at this time. Also, see response to Letter No. 35, Comment 4.

2. Comment acknowledged. The need for maintenance and monitoring of the landfill is addressed in the response to Letter No. 17, Comment 1. It is not feasible to provide a detailed plan and budget for the maintenance of the facilities at the EIS phase of the project. Maintenance requirements are very specific, depending on the final design of the facilities. The Washington State Department of Ecology Minimum Functional Standards require submittal of a closure plan that identifies operation and maintenance plans. With the completion of the EIS and selection of a preferred alternative, the City will prepare a final closure plan document and submit it to the Department of Ecology and the Seattle-King County Department of Public Health for approval.

3. Comment acknowledged. An alternative pipeline route along S. 252nd, rather than along S. 250th, is presented in the revised Surface Water Management Plan section included in Section II of this FEIS.

4. Comment acknowledged. Construction contract documents for the storm

LETTER NO. 35

COPPLE, FERM & WADE
ATTORNEYS AT LAW
SUITE 510, MARKET PLACE ONE
2001 WESTERN AVENUE
SEATTLE, WASHINGTON 98121
(206) 625-9400

DWAYNE E. COPPLE
DANIEL W. FERM
JULIE G. WADE

September 19, 1985

Mr. Richard Owings
Director, City of Seattle
Solid Waste Utility
600 4th Avenue
Seattle, WA 98104

Re: Midway Sand & Gravel v. City, et al
Draft EIS

Dear Mr. Owings:

Enclosed is a copy of a letter for SCS, with attachments containing comments of Midway Sand & Gravel on the DEIS concerning closure at the Midway landfill.

Very truly yours,

COPPLE, FERM & WADE

Julie G. Wade

Julie G. Wade

JGW:bmm
Enc.

RECEIVED
SEP 19 1985
SOLID WASTE UTILITY

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.

1008 140th AVENUE N.E.
BELLEVUE, WASHINGTON 98005
(206) 643-5800

ROBERT P. STEARNS, PE
E.T. CONRAD, PE

Roderick A. Carr
Miles J. Haven
Michael W. McLaughlin
Gary L. Mitchell, PE
David E. Ross, PE
William L. Schubert
James J. Walsh, PE

September 19, 1985
File No. 48209

RECEIVED
SEP 19 1985
SOLID WASTE UTILITY

Mr. Richard Owings
Director, City of Seattle
Solid Waste Utility
600 4th Avenue
Seattle, WA 98104

SUBJ: Draft Environmental Impact Statement, Midway Closure Plan

Dear Mr. Owings,

At the request of our client, Midway Sand and Gravel Company, we have reviewed the subject document. We have also retained the services of Landau Associates, Inc., to review hydrogeological aspects of the document. Their comments have been incorporated into this document with a report on the hydrogeologic aspects of the DEIS enclosed as attachment 1.

The following presents our comments on the Midway Landfill Closure Plan Draft Environmental Impact Statement (DEIS) dated August, 1985. The comments are in two parts. These are:

- Remaining issues previously outlined in a letter dated March 19, 1984, from J. E. McCourt to R. Owings, Subject: Landfill Owner's Comments for Draft Environmental Impact Statement (DEIS) Process.

- Comments on contents of the DEIS document.

I. Unresolved Issues

The unresolved issues from the DEIS scoping process (refer to our correspondence dated March 19, 1984) include the following:

1 - 1st Unresolved Scoping Issue - "The owner's position is that responsibility for post closure maintenance and care resides with the generators of in place solid waste such as the City of Seattle. Anything less than full disclosure of these costs and liabilities in DEIS will not represent the actual costs of the closure process."

The DEIS presents ranges in capital costs for the minimum grade, intermediate and maximum grade alternatives on page I-15. No annual operating and maintenance costs are reported as these costs were described in the August 22, 1985 workshop as comparable or similar. We believe that this simplification lacks validity. To illustrate our view, compare the minimum grade and maximum grade with regard to maintenance costs arising from differential settlement. The minimum alternative would be completed one to three years before the maximum grade alternative, and would be accruing operation and maintenance costs during the period. The maximum grade alternative would provide more cover soil to allow regrading for differential settlement. Order of magnitude operating and maintenance cost estimates for each alternative should be prepared.

2 • 2nd Unresolved Scoping Issue - "The disposition of Terminal 5 materials at Midway Landfill must be discussed as part of the closure process."

The Terminal 5 materials are still at the landfill. The DEIS does not enumerate the quantities or describe the characteristics of this material. The DEIS should identify the disposition of Terminal 5 materials in the landfill closure process.

3 • 3rd Unresolved Scoping Issue - "Leachate migration off-site has been reported at Midway Landfill ... The owners see the correction of existing operational problems and potential future off-site (leachate) migration problems as matters for closure plan development and contingency plans therein."

We observe the following regarding leachate:

"Draft Report Geotechnical and Hydrological Investigations for the Midway and Kent Highlands Landfill Closures." Prepared by Golder Associates June, 1982.

p. 36 Section 5.2 Ground Water 5.2.1 Regulatory Requirements. "The WDOE has developed minimum functional standards for solid waste sites. The standards basically require that landfills do not pollute ground water."

p. 46-47 Conclusion and Recommendations "4.... As a minimum, we recommend that off-site surface water be rerouted around the landfill, the landfill be graded to allow adequate on-site surface water runoff and a low permeability soil cover be placed over the landfill. This will reduce the amount of leachate entering the ground water...."

p. 47 Conclusion and Recommendations "7....It is recommended that the extent of the existing plume should be determined and monitored."

DEIS Midway Landfill Closure Plan

p. II-16 2. Ground Water a. Existing Conditions "....Monitoring wells 2 and 4 are similar to MW-1. The iron and manganese concentrations are notably greater in the down gradient wells which may be an indication of leachate movement off-site...."

p. I-9 A. Description of the Proposed Project 3. Development of Project Alternatives 4. Leachate Management

"Leachate production should be minimized and leachate migration controlled."

p. xx 1. Minimum Grade Alternative C. Leachate Management 2. Contingency Plan

"If the monitoring program indicates the movement of contaminated ground or surface water off the site, some remedial action measures will be necessary to correct the problem...."

The DEIS and hydrogeological investigations acknowledge that ground water has been contaminated off-site. The extent of off-site migration of landfill leachate is not known. However, the summary of the DEIS states that contingency plans may require more sampling from the existing wells before contingency plans can be formulated to correct the problem. We find this interpretation of the investigation to date deficient because the criteria for remedial action has been met without these actions incorporated in to DEIS.

4 • 4th Unresolved Scoping Issue: "There is a high probability that the clay membrane will rupture due to the following:

- Cracks due to differential settlement of the landfill....

The owners feel there should be contingency plans for identifying and mitigating membrane ruptures."

We observed the following with regard to differential settlement:

"Draft Report Geotechnical and Hydrological Investigations for the Midway and Kent Highlands Landfill Closures." Golder Associates June 1982.

p. 44 ".... It is not possible to predict the amount of settlement. However, it is useful to monitor settlement in order to mitigate adverse affects (such as altered surface drainage, cracking of cover material) and to project long term trends."

DEIS Midway Landfill Closure Plan

C. <u>DESCRIPTION OF CLOSURE PLAN ALTERNATIVES</u> 1. <u>Minimum Grade Alternative</u>

p. I-16 "....These grades are designed to permit drainage during the settlement of the fill which may be as great as 15 percent...."

We interpret these observations to indicate the landfill may settle as much as 10 to 20 feet, and that the settlement will not be uniform.

The 5 layer capping of the site is impractical and unlikely to mitigate potential leachate problems for the following reasons:

- We question the viability of the proposed final cover system from a maintenance standpoint.Differential settlement will produce random sink holes and other depressions. The DEIS does not describe how the final cover can be repaired to preserve its effectiveness as a barrier. Without these repairs, the depressions would likely concentrate water which may then, drain into the refuse. This system could reasonably be expected to generate much more than 2 million gallons per year of leachate.

- The maximum grade alternative could be superior for control of leachate to the minimum grade alternative. An extra depth of relatively impermeable soil would provide greater flexibility in regrading and possibly a more effective cover. Although the theoretical water balance calculations may refute this statement, the long term non-uniform differential settlement will destroy the effectiveness of the 5 layer system.

- The maintenance of the odor control gas collection system will require periodic excavations through the 5 layer system in many places. Again repairs to the 5 layer system need consideration for practicality and effectiveness.

II. Comments on the DEIS Document.

5 The DEIS presents chemical data and discussion indicating that leachate contamination from the Midway Landfill has migrated off-site in at least the southern direction. The contingency plan described on Page I-35 of the DEIS indicates that some remedial action measures will be necessary if contaminated ground water is shown to be moving off-site. Therefore, the DEIS implies that action is appropriate at this time to develop remedial measures to address the movement of contaminated ground water off-site. The measures should be included as a part of the closure plan and should be described in the FEIS. We suggest pumping of leachate to be a part of the closure plan.

6 The DEIS estimates 98 million gallons of leachate are currently in the site. No contingency plan is provided for the pumping of this leachate. While this leachate is presently beneath many feet of refuse, a dewatering scheme is possible with deep wells. Extracted leachate should be trucked or piped to Kent Highlands Leachate Ponds or METRO.

7 Due to the importance of protecting the ground water and since off-site contamination has already been documented, the EIS should include an alternative plan that would remove existing contamination and eliminate additional ground water contamination. Parts of this plan have been developed in the DEIS as remedial action options (pg. II-36) to be considered "if the monitoring program indicates movement of contaminated ground or surface water off the site." The evidence presented in the EIS has already established that contamination has moved off-site. In our opinion the next step should be to characterize the extent of the contamination through 5 to 10 additional monitoring wells and to present alternatives for cleaning up or mitigating the effects of the contamination. The current system of monitoring wells is not adequate to assess the full extent of off-site contamination. The closure plan and DEIS should be addressing the problem of existing ground water contamination, how to deal with, and how to prevent further degradation of ground water quality in the future.

8 The hydrogeological data described in the DEIS consists of existing information and field information developed by the City of Seattle and its consultants on three different occasions. In the opinion of Landau Associates, Inc., this information affords a preliminary understanding of the hydrogeological conditions in the vicinity of the Midway Landfill, but additional information is needed to thoroughly characterize the area. While public and private water supplies are not reported in the DEIS to be in immediate danger from leachate from the landfill, the hydrogeological conditions must be thoroughly characterized in order to predict potential future effects from the continued leachate generation. Ground water in the vicinity of the landfill is used for water supply. The landfill's effect on potential future use of ground water in the area must be evaluated.

9 The existing information indicates that conditions beneath and in the immediate vicinity of the landfill appear to be very important to the hydrogeological setting. For example, perched ground water and leachate are apparently present directly beneath the landfill. The perched ground water is localized in extent and possibly is perched on residual silt deposits from gravel washing operations prior to landfill operations at the site and on relatively low permeability peat deposits. The existing

information also indicates the presence of another water-bearing zone beneath the perched ground water; hence, at least two water-bearing zones are present in the immediate vicinity of the landfill. The DEIS does not clearly differentiate between these two zones, and, in fact, presents information on each zone together without differentiation. The difficulty expressed in the DEIS of interpreting the hydrogeological conditions results partly from mixing the data on the two water - bearing zones. In the opinion of Landau Associates, Inc., the inter-relationship between these two zones requires further study to properly evaluate the potential effects of continued leachate generation on regional ground water.

10 Additional hydrogeological studies should include both field investigations and further evaluation of existing available data. The purpose of the additional field investigations would be to delineate the following:

- The extent of the existing ground water contamination attributable to the landfill.
- Perform hydrogeological testing (such as slug or piezometer tests).
- Evaluate vertical gradients between different water-bearing zones.
- Evaluate the relationship between on-site surface water and ground water beneath the landfill. In the opinion of Landau Associates, Inc., additional field studies could require an additional five to ten monitoring points.

11 The leachate management system estimates that the generation of leachate by the landfill will be reduced to approximately two million gallons per year. The DEIS does not evaluate the potential effect of this leachate quantity other than by indicating that continued degradation of ground water will occur. The primary issue is not whether the quantity of leachate generation is reduced to two million gallons per year, but whether this amount of leachate would result in adverse impacts to nearby receptors, such as water supply wells or off-site surface water bodies. Such an evaluation should be accomplished and results described in the FEIS.

This evaluation will involve additional hydrogeological information. As a part of the evaluation, the cost effectiveness of other landfill cover designs and other aspects of the leachate management system should be studied with respect to the potential effects of continued leachate generation and migration.

(12) Maintenance of the landfill cover will be important to reduce the amount of future leachate generation. On Page II-6 it is stated that periodic maintenance will be necessary; however, the practical aspects of providing this maintenance are not clearly conveyed. With the considerable amount of differential settlement anticipated, numerous cracks are likely to develop in the cover. The 4-inch bentonite amended soil barrier layer is the primary component of the cover. This soil barrier layer reduces infiltration of precipitation into the landfill and would require repairs if breached by cracking associated with differential settlement. The practical aspects of providing these repairs (considering that the barrier layer is buried beneath a drainage layer, filter layer, and topsoil) needs to be reconsidered with respect to the cost-effectiveness of providing a different cover design. These evaluations should be described in the final EIS.

(13) The potential for ground water contamination by leachate from this landfill has important implications in regards to the recommended closure plan. As mentioned on page I-4 this site received a high Hazardous Ranking System (HRS) Score "based primarily on the potential of ground water contamination."

The ground water in this area is a documented drinking water source and at least one domestic water supply well has been identified within one mile of the landfill (Figure II-7). Figure II-3 shows numerous other wells and boreholes within a one mile radius. The regional ground water contours shown on Figure II-3 also indicate that the domestic water supply wells shown on Figure II-7 may be down gradient from the landfill.

Leachate contamination of the ground water off-site has been documented including contamination with a number of priority pollutants (Table A-3). Specific conductivity, total dissolved solids, iron, lead and manganese concentrations in borehole 6 all exceed drinking water standards (Table A-2). This seems to contradict the statement made on page I-1 that the level of contamination has not exceeded regulatory agency requirements.

(14) The DEIS has overlooked the regulatory requirements of the State Water Pollution Control Act (RCW 90.48) which establishes a non-degradation policy for ground waters of the state. In the absence of any specific regulatory requirements governing ground water protection at solid waste sites, the Washington State Department of Ecology (WDOE) has relied on RCW 90.48 as the regulatory mechanism for protection of ground water from contamination at solid waste disposal sites. The DEIS should address the requirements for ground water protection as specified in RCW 90.48 and show how this closure plan will comply with these requirements.

(15) Figure II-3 shows well and borehole locations but does not indicate which ones are public or domestic waters supplies. This information would be useful in assessing the potential impacts of ground water contamination.

(16) Page II-15 and II-16 seem to contradict each other. On II-15 the DEIS states that "BH-1B is the only (well) that might be considered uncontaminated" Page II-16 states that "as expected MW-1, the background well, is uncontaminated by leachate" and "Monitoring wells 2 and 4 are similar to MW-1. Is BH-1B the only uncontaminated well or are MW-1, MW-2 and MW-4 also uncontaminated? Which wells are considered contaminated with leachate and which ones are not?

(17) The Linda Heights well is not shown on Figure II-2 as mentioned on page II-8.

(18) The statement that "no health effects are expected to occur" [as a result of ground water contamination by leachate] is not supported by the existing data. The extent and nature of the existing leachate plume is unknown. Some of the contaminants present in the leachate (Tables A-2 and A-3) are known to affect human health. At least one domestic water supply well is down gradient and within one mile of the landfill. Evidence of contaminant attenuation or more detailed information on local ground water conditions must be provided to demonstrate the lack of potential health effects from ground water contamination.

Final Cover/Grading Alternatives:

(19) There are no details regarding landscaping of the site. Will the landscaping adversely impact the barrier layer? What measures will be taken to prevent volunteer seeding of undesirable deep rooted plants and trees in the remainder of the site that will not be a city park?

20 On page xxii, the maximum grade alternative is described as having the same leachate management, gas and odor control attributes as other alternatives. This statement understates the advantages of the maximum grade alternative. A deep layer of relatively impermeable soil may be a much preferred solution. The maximum grade alternative would provide extra depth of fill with greater flexibility in regrading and in landfill odor control system repairs caused by differential settlement.

21 The maximum grade is alluded to as expensive and possibly economically unfeasible. No analysis is provided as to the trade off between more capital expense at the front end and less operating and maintenance cost later. This analysis provides added justification for estimating operating and maintenance costs associated with the alternatives. A modified maximum grade or thicker depth of low permeability soil alternatives with active gas and leachate control systems may be both operationally and economically better than any of the proposed grade alternatives with a 5 layer capping system.

Surface Water Management Plan:

22 The DEIS does not adequately address the potential effects of surface water contamination and increased heavy metal loading on the marine environment. Is there a potential impact on shell fisheries near the outfall at Saltwater State Park? Dilution in the marine environment may not be sufficient to overcome the increased loading of heavy metals. The data presented in the EIS is not sufficient to support the conclusion that the alternatives will not result in a significant degradation of water quality.

23 On page xvi, the surface water management system is based on a 25 year storm. This design criteria meets minimum regulatory requirements, however more intense storms can be expected during the "life" of the closed landfill. The DEIS should address the consequences of a more intense storm on the landfill and surface water control facilities.

Landfill Gas Management Plan

24 The DEIS acknowledges on page I-40 that condensate will be generated in the landfill gas collection system. How much condensate will be generated? What are the chemical characteristics of this condensate? Is it a hazardous waste? Will reintroduction of this condensate into the landfill aggravate the leachate production and ground water contamination problem?

Considering the need to minimize moisture addition to this landfill, condensate should not be returned to the landfill (excluding the relatively minor amount which condense out in the collection system header pipes). In addition, the Federal government's RCRA amendments of November, 1984 may preclude this option at Midway.

25 There will be maintenance and operational problems arising from the high water levels existing in the refuse. If landfill dewatering occurs, the LFG extraction wells will have to be extended in order to provide effective control of gas generated in the lower portions of the landfill. More likely, perched water layers in the refuse will occur on a near random basis. Control of gas generated from below these layers can be difficult, and may require relocation of the extraction wells to natural ground on the landfill perimeter.

Long Term Maintenance and Operation:

26 The DEIS points out that long term maintenance of the site will be required to maintain surface contours, the barrier layer, the ground water/leachate monitoring system, and the landfill gas and odor control system. The party or parties responsible for this long term maintenance are not specified. The responsible parties should be identified in the DEIS.

27 On page xxi, Post Closure Plan and Activities. Annual reports are to be submitted until the site has been "stabilized". What is meant by "stabilized". A definition is needed for this term.

28 On page I-43, little mention is made of the ultimate use of the landfill site exclusive of the City of Kent Park portion. Some discussion needs to be included in the DEIS on the post closure maintenance impacts on final land use. What constraints will exist on future land use of the closed landfill or surrounding properties?

We appreciated the opportunity to review and comment on the DEIS. If you have questions on any of our comments, please contact me at 643-5800, or the letterhead address. We look forward to further participation in the preparation of a FEIS that addresses the concern outlined in this letter.

Sincerely,

James E. McCourt

James E. Mickey McCourt, P.E.
Project Manager
SCS ENGINEERS

JEM:PB

cc: L. Romano
D. Copple
R. Stearns
W. Enkeboll

ATTACHMENT NO. 1

Hydrogeologic Review Comments
Letter From W. Enkeboll, Landau Associates, Inc.
to
J. E. McCourt, SCS Engineers, Inc.

September 17, 1985

LANDAU ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING AND HYDROLOGY
P.O. BOX 694
EDMONDS, WASHINGTON 98020
—
(206) 778-0907

17 September 1985

SCS Engineers
1008 140th Ave. N.E.
Bellevue, WA 98005

Attention: Mr. J. E. McCourt

Gentlemen:

Introduction

This letter summarizes our hydrogeologic review comments on the Draft Environmental Impact Statement (DEIS) Midway Landfill Closure Plan prepared by the City of Seattle. Our services were authorized by your subcontract dated 16 August 1985. Our scope consisted of reviewing the hydrogeologic aspects of the DEIS and focused on the following issues:

a. Offsite Contamination

b. The usefulness of the hydrogeologic data described in the DEIS.

c. The effect of the proposed leachate management system on future offsite contaminant migration.

d. The need for additional monitoring, if any, to evaluate past leachate migration.

Offsite Contamination

The DEIS presents chemical data and discussion indicating that contamination from the Midway Landfill has migrated offsite

in at least the southern direction. The ground water and surface water chemistry data presented in the DEIS indicate chemical contamination consistent with municipal landfills. Only a few organic contaminants are present in generally low concentrations, although some heavy metals are present in high concentrations. Drinking water criteria for several parameters in offsite wells are exceeded.

The contingency plan described on Page I-35 of the DEIS, indicates that some remedial action measures will be necessary if contaminated ground water is shown to be moving offsite. Therefore, it appears that it is appropriate at this time to develop remedial measures to address the movement of contaminated ground water offsite. These measures should be included as a part of the closure plan and should be described in the final EIS.

Hydrogeologic Data

The hydrogeologic data described in he DEIS consists of information developed by evaluating existing information and field information developed by the City of Seattle and its consultants on three different occasions. In our opinion, this information affords a preliminary understanding of the hydrogeologic conditions in the vicinity of the Midway Landfill, but additional information is needed to thoroughly characterize the area. While public and private water supplies or nearby water courses are not reported in the DEIS to be in immediate danger from leachate from the landfill, the hydrogeologic conditions must be thoroughly characterized in order to predict potential future effects from the continued leachate generation. Ground

water in the vicinity of the landfill is used for water supply and evaluations of the landfill's effect on potential future use of ground water in the area must be evaluated.

The existing information indicates that conditions beneath and in the immediate vicinity of the landfill appear to be very important to the hydrogeologic setting. For example, perched ground water is apparently present directly beneath the landfill. This perched ground water is localized in extent and possibly is perched on residual silt deposits from gravel washing operations prior to landfilling the site and on relatively low permeability peat deposits. The existing information also indicates the presence of another water-bearing zone beneath the perched ground water; hence, at least two water-bearing zones are present in the immediate vicinity of the landfill. The DEIS does not clearly differentiate between these two zones, and, in fact, presents information on each zone together without differentiation. The difficulty expressed in the DEIS of interpreting the hydrogeologic conditions results partly from mixing the data on the two water-bearing zones. In our opinion, the inter-relationship between these two zones requires further study to better evaluate the potential effects of continued leachate generation on regional ground water.

Additional hydrogeologic studies should include field investigations to:

- Delineate the extent of the existing ground water contamination attributable to the landfill

- Perform hydrogeologic testing (such as slug or piezometer tests)
- Evaluate vertical gradients between different water-bearing zones
- Evaluate the relationship between on-site surface water and ground water beneath the landfill

In our opinion, five to ten additional monitoring points would be appropriate.

Evaluations of existing published information relative to the additional field studies should be accomplished and should include a correlation of local well logs to the conditions found at the monitoring points. Aerial photographs and other information regarding site conditions just prior to the beginning of landfill material placement should be studied to identify how the gravel pit operations might have affected local hydrogeologic conditions.

Leachate Management

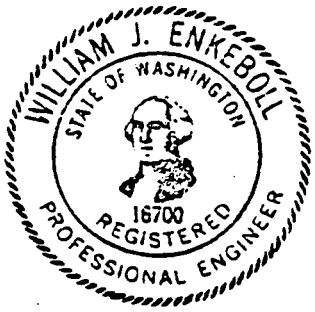
The DEIS describes a leachate management system and indicates that the generation of leachate by the landfill will be reduced to approximately two million gallons per year. The draft EIS does not evaluate the potential effect of this leachate quantity other than by indicating that continued degradation of ground water will occur. The primary issue is not whether the quantity of leachate generation is reduced to two million gallons per year, but whether this amount of leachate would result in adverse impacts to nearby receptors, such as water supply wells

or offsite surface water bodies. Such an evaluation should be accomplished and should be described in the final EIS.

This evaluation would involve the additional hydrogeologic information described previously. As a part of the evaluation the cost effectiveness of other landfill cover designs and other aspects of the leachate management system should be studied with respect to the potential effects of continued leachate generation and migration.

As described in the DEIS, maintaining the integrity of the landfill cover will be important to reduce the amount of future generation of leachate. On Page II-6 it is stated that periodic maintenance will be necessary; however, the practical aspects of providing this maintenance are not clearly conveyed. With the considerable amount of differential settlement anticipated, numerous cracks are likely to develop in the cover. The 4-inch bentonite amended soil barrier layer is the primary component of the cover for reducing infiltration of precipitation into the landfill and would require repairs if breached by cracking associated with differential settlement. In our opinion, the practical aspects of providing these repairs, considering that the barrier layer is buried beneath a drainage layer, filter layer, and topsoil, needs to be reconsidered with respect to the cost-effectiveness of providing a different cover design. These evaluations should be described in the final EIS.

We trust that these review comments satisfy your present needs. If you have any questions or desire further information, please contact us.



Yours very truly,

LANDAU ASSOCIATES, INC.

By:

William J. Enkeboll

William J. Enkeboll, P.E.

WJE/sg

RESPONSE TO LETTER NO. 35: COPPLE, FERM & WADE (SCS ENGINEERS)

1. Because of the ongoing Superfund investigation by the Washington State Department of Ecology and U.S. Environmental Protection Agency, the costs and responsibilities involved in closure of the Midway Landfill cannot be determined at this time. See response to Letter No. 11, Comment 12 under Site Responsibility.

2. See response to Letter No. 27, Comment 11.

3. See Letter No. 1, Comments 2 and 4 and their associated responses.

4. With regard to settlement of the landfill and repair of the 5-layer cover system, see responses to Letter No. 1, Comments 5 and 7.

   Your comment on the maximum grade alternative is acknowledged. Rainfall excess and evapotranspiration are functions of near-surface physical features, such as interception storage, depression storage, rate of infiltration, and depth of plant roots. These features are controlled primarily by conditions within the first two to three feet of the surface. Although greater soil depth may increase soil moisture storage capacity it would not significantly effect the amount of precipitation that infiltrates through the surface or the amount that is evapotranspirated. Ultimately the infiltrated water would percolate through the soil cover and into the refuse. The analysis of final cover efficiency is based on theoretical analysis and modeling results. Physical models are planned to verify the conclusions derived from the mathematical models.

5. See Letter No. 1, Comments 2 and 4 and their associated responses. The responses to Letter No. 1, Comment 9, and Letter No. 7, Comment 5 are also relevant.

6. See responses to Letter No. 1, Comment 9; and Letter No. 7, Comment 5.

7. See Letter No. 1, Comment 4 and its associated response.

8. The on-going groundwater investigations described in Appendix M of this FEIS will more thoroughly characterize hydrogeologic conditions in the vicinity of the Midway landfill, and allow an evaluation of the landfill's effect on potential future use of groundwater. Additional information on groundwater will be provided by the remedial investigation to be conducted under CERCLA.

9. The DEIS (page II-12) does differentiate between the perched groundwater zone and the underlying regional water table in the outwash layer. See response to Comment 8 above.

10. See the Work Plan for On-going Groundwater Investigations in Appendix M of this FEIS.

11. The effect of the estimated two million gallons of leachate on groundwater will be evaluated as part of the groundwater monitoring program once leachate management facilities, including the final cover system, are in place (see Work Plan for On-going Groundwater Investigations in Appendix M). Such an evaluation cannot be accomplished in time to report results in the FEIS.

RESPONSE TO LETTER NO. 35: COPPLE, FERM & WADE (SCS ENGINEERS) (CONTINUED)

12. See responses to Letter No. 1, Comments 5 and 7.

13. See Letter No. 1, Comments 1, 3, and 4 and their associated responses. The statement on page I-1 of the DEIS indicates that "at that time [1982] the level of contamination had not exceeded regulatory agency requirements." Tables A-1 through A-3 are based on more recent data (see revised tables in Appendix A of this FEIS).

14. The regulatory requirements of the State Water Pollution Control Act are reflected in the State Minimum Functional Standards for Solid Waste Handling (WAC 173-304). The closure plan will fully comply with the Minimum Functional Standards (MFS) including groundwater monitoring requirements (WAC 173-304-490). If the groundwater performance standard specified in the MFS is exceeded, the Seattle-King County Health Department has the authority to require a corrective action program.

15. Figure II-7 on page II-17 of the DEIS shows the locations of public water supply wells. The Public Water Supplies section of the DEIS, including Figure II-7, has been revised and is included in Section II of this FEIS. Revisions are based on a beneficial use survey included in Appendix N.

16. The revised Groundwater Quality section included in Section II of this FEIS clarifies which wells are considered contaminated and which are not.

17. The Linda Heights well is shown in Figure II-6 rather than II-2. The parenthetical reference on page II-8 of the DEIS has been revised accordingly. (See Errata section of this FEIS).

18. Comment acknowledged. More detailed information on local groundwater conditions will be gathered as part of the Work Plan for On-going Groundwater Investigations (Appendix M). The response to Comment 11 above is also relevant. Based on monitoring to date, there is no reason to expect public health effects (see Review of Public Health Issues in Appendix O of this FEIS, and the response to Letter No. 15, Comment 5).

19. The final cover will be hydroseeded with a mixture of grasses which experience has shown grow effectively in this type of environment. The growth of deep rooted volunteer vegetation would be monitored to determine if it were significantly disrupting the barrier layer of the final cover. See responses to Letter No. 9, Comments 24 and 25.

20. Comment acknowledged. See response to Comment 4 above. As discussed in Section I of this FEIS, the maximum grade alternative would significantly increase construction time and cost with only minimal performance improvements.

21. Comment acknowledged. See responses to comment 4 and 20 above.

22. See responses to Letter No. 9, Comments 2 and 16.

23. Surface Water Management Plan facilities will be designed to accommodate the 25-year storm. A 25-year storm means a storm of a particular duration and of such intensity that it has a four percent (1/25) probability of being equalled or exceeded each year. By comparison, the 100-year storm has a one percent (1/100) probability of being equalled or exceeded each year. In the Puget Sound area, precipitation intensity for a 100-year storm is about 30 percent higher than for a 25-year storm for durations up to 24 hours long. The consequences of a more intense storm on the landfill and surface water control facilities may or may not be noticeable, depending on the duration of the more intense storm. A more intense storm will tend to cause increased erosion of the landfill surface. The erosion potential will be greater if the vegetative cover has not been fully established. The longer the duration of the more intense storm, the greater the potential for erosion of the landfill cover; thus the greater the potential need for corrective maintenance. Until the duration of the more intense storm is long enough to result in more total runoff than occurs from the 25-year storm, the surface water control facilities will continue to function as planned. Local ponding may occur in ditches and at inlets to the drainage facilities on the landfill.

    The basin would be equipped with an overflow so that runoff from storms greater than the 25-year storm could be discharged from the basin to the pipeline without over-topping the detention basin. If the duration of the more intense storm is long enough to fill the detention basin, overflow out of the basin will occur. This will result in increased flows downstream of the basin. These increased flows could contribute to additional erosion and flooding in the downstream section of the creek. Once the detention basin is full, the longer the duration of the more intense storm, the greater the potential for erosion and flooding and thus the greater the potential need for corrective maintenance.

24. See response to Letter No. 1, Comment 13. It is not expected that this condensate will be a hazardous waste, nor that the flow rate will be significant to the production of leachate. In addition, the main condensate traps, located above ground at the motor blowers, will discharge into a storage tank. The condensate will be removed from the tank periodically for treatment if necessary and disposal at an approved discharge point.

25. During the installation of the migration control wells, drilling was extended to the total depth of refuse in almost all of the 34 wells completed. Many of the wells were bottomed out into the top of a silty clay soil zone. No upper perched water zones were encountered.

26. See response to Comment 1 above.

27. "Stabilized" means that the closed landfill is no longer subject to significant settlement, producing significant quantities of landfill gas, or causing significant contamination of surface or groundwater. This implies that biological degradation of the disposed waste is complete.

RESPONSE TO LETTER NO. 35: COPPLE, FERM & WADE (SCS ENGINEERS) (CONTINUED)

28. Potential future uses of the closed landfill are discussed on pages II-82 and II-83 of the DEIS under Post Closure Impacts. This section has been revised to omit reference to the City of Kent park, since it is unclear whether the City of Kent plans to develop a park on the site (see Errata section of this FEIS).

LETTER NO. 36

LAW OFFICES OF
JOHN C. O'ROURKE
618 SOUTH 223RD, SUITE 6
P. O. BOX 98741
DES MOINES, WASHINGTON 98188

206-824-2802

September 10, 1985

City of Seattle
Solid Waste Utility
Seattle Engineering Department
606 Seattle Municipal Building
600 Fourth Avenue
Seattle, Washington 98104

Attn: Mr. Mark Edens/Project Manager

RE: Draft EIS/ Midway Landfill Closure Plan

Dear Mr. Edens:

I represent Kentview Properties, Inc. Kentview Properties, Inc. is successor to Kent Highlands, Inc. and is owner of the lands subject to the landfill lease running to the City of Seatle at the Kent Highlands site.

1 The draft EIS referenced above calls for drainage of substantial volumes of leachate from Midway (at least during the closure construction period) by trucking said leachate to the Kent Highlands landfill and introducing the leachate into the lagoon and leachate treatment plant owned and maintained by the City of Seattle at Kent Highlands.

In this connection, please note the following:

(1) The Statutory Warranty Deed from Kent Highlands to the City of Seattle by which Seattle obtained its R/W and permanent easements for the leachate treatment plant defines and limits leachate to be treated there as being from the Kent Highlands site; and

(2) The City of Seattle/City of Kent agreement for transport of leachate to Metro provides (Section 7) that "this agreement does not authorize use of said leachate sewer line for any purpose other than conveying leachate from the landfill (Kent Highlands) to the Metro trunk".

Accordingly, please be advised that the continued discharge of Midway leachate into the Kent Highlands lagoon and treatment plant cannot continue without the agreement of my client and without the amendment of the City of Seattle/City of Kent agreement - neither of which have been solicited, to date.

RECEIVED
SEP 19 1985
SOLID WASTE UTILITY

City of Seattle
Attn: Mr. Mark Edens
Project Manager

RE: Draft EIS/Midway Landfill Closure Plan

The draft EIS is incorrect to the extent that it assumes consent or authorization for such discharge.

~~Respectfully submitted,~~

6

John C. O'Rourke
Attorney for Kentview Properties, Inc.

JCO/bda

4-14-77:rc

STATUTORY WARRANTY DEED

THE GRANTOR, KENT HIGHLANDS, INC., a Washington Corporation, for

and in consideration of SIXTY THOUSAND AND NO/100 ($60,000.00) DOLLARS, in hand paid; the covenants of the Grantee herein contained; does hereby convey and warrant to the City of Seattle, a Municipal Corporation of the State of Washington, to be used for the collection, treatment and transportation of contaminated runoff waters, hereinafter referred to as "leachate", which are generated within the adjacent sanitary landfill, the following described real estate, situate in the City of Kent, County of King, State of Washington:

PARCEL "1" (Fee)

That portion of Enos Cooper Donation Land Claim No. 38 in Section 15, Township 22 North, Range 4 East, W.M., described as follows: Beginning at the east quarter corner of said Section 15; thence north 77°40'46" east 798.36 feet to the intersection of Russell Road and South 228th Street; thence north 88°42'31" west 278.00 feet; thence north 83°52'50" west 435.14 feet; thence north 51°34'56" west 765.99 feet; thence north 24°02'33" west 24.11 feet; thence south 84°17'44" west 321.39 feet; thence south 24°34'13" west 97.14 feet; thence south 31°39'56" west 265.86 feet; thence south 29°34'22" west 92.15 feet; thence south 18°21'47" west 92.15 feet; thence south 10°35'43" west 92.15 feet; thence south 0°36'52" east 92.15 feet; thence south 2°42'24" east 347.00 feet; thence south 9°02'05" east 96.57 feet; thence south 12°50'00" west a distance of 214.00 feet; thence south 2°56'46" east a distance of 481.06 feet; thence north 56°15'27" west 7.50 feet to the true point of beginning; thence south 33°44'33" west 60.00 feet; thence south 56°15'27" east 558.00 feet; thence north 33°44'33" east 135.00 feet; thence north 56°15'27" west 280.00 feet; thence south 33°44'33" west 75.00 feet; thence north 56°15'27" west 278.00 feet to the true point of beginning

TOGETHER WITH a perpetual easement over and across the following described real property: for the construction, repair, replacement, betterment and/or the removal of a leachate sewer and appurtenances and for access for ingress and egress to Parcels "1"and "7":

PARCEL "2" (Easement)

That portion of Enos Cooper Donation Land Claim described as follows:

A strip of land 15 feet in width, lying 7.5 feet on each side of the following described line: Beginning at the east quarter corner of said Section 15: thence north 77°40'46" east 798.36 feet to the intersection of Russell Road and South 228th Street; thence north 88°42'31" west 278.00 feet; thence north 83°52'50" west 435.14 feet; thence north 51°34'56" west 765.99 feet; thence north 24°02'33" west 24.11 feet to a point, said point hereinafter referred to as Point "A"; thence south 84°17'44" west 213 feet more or less to the true point of beginning on the westerly line of ordinary high water of the Green River; thence continuing south 84°17'44" west 108 feet, more or less, to a point hereinafter referred to as Point "B", which lies south 84°17'44" west 321.39 feet from Point "A"; thence south 24°34'13" west 97.14 feet; thence south 31°39'56" west 265.86 feet; thence south 29°34'22" west 92.15 feet; thence south 18°21'47" west 92.15 feet; thence south 10°35'43" west 92.15 feet; thence south 0°36'52" east 92.15 feet; thence south 2°42'24" east 347.00 feet; thence south 9°02'05" east 96.57 feet to the terminus, hereinafter referred to as Point "C"; EXCEPT therefrom that portion lying within and easterly of Frager Road, ALSO,

PARCEL "3" (Easement)

That portion of Enos Cooper Donation Land Claim described as follows:

a strip of land 20 feet in width lying between said Parcels "1" and "2" and lying between lines and lines extended, said lines being 12.5 feet easterly of and parallel to and 7.5 feet westerly of and parallel to the following described line: Beginning at said Point "C"; thence south 12°50'00" west a distance of 214.00 feet; thence south 2°56'46" east a distance of 481.06 feet to the terminus, hereinafter referred to as point "D",

TOGETHER WITH a temporary easement over and across the following described real property for the construction of a leachate sewer and appurtenances within Parcels "2" and "3":

PARCEL "4" (Temporary Easement)

That portion of said Enos Cooper Donation Land Claim described as follows:

A strip of land 10 feet in width lying between the westerly line of said easement between Points "B" and "C" and a line 10 feet westerly of and parallel with said westerly line, ALSO

PARCEL "5" (Temporary Easement)

That portion of said Enos Cooper Donation Land Claim described as follows:

A strip of land 10 feet in width lying between the easterly line of said easement between Points "C" and "D" and a line 10 feet easterly of and parallel with said easterly line,

TOGETHER WITH a perpetual easement for the repair, replacement, betterment and/or removal of a leachate sewer emergency overflow and appurtenances over and across the following described real property:

PARCEL "6" (Easement)

That portion of said Enos Cooper Donation Land Claim described as follows:

A strip of land 15 feet in width lying 7.5 feet on each side of the following described line: Beginning at Point "D"; thence north 56°15'27" west 7.50 feet; thence south 33°44'33" west 60.00 feet; thence south 56°15'27" east 558.00 feet; thence north 33°44'33" east 7.5 feet to the true point of beginning; thence south 56°15'27" east 155 feet more or less to the terminus on the westerly line of ordinary high water of the Green River,

TOGETHER WITH a perpetual easement for the construction, repair, replacement, betterment and/or removal of a leachate collection system with appurtenances and for the construction, repair, replacement and betterment of a toe stabilization buttress over and across the following described real property:

PARCEL "7" (Easement)

That portion of said Enos Cooper Donation Land Claim described as follows:

Beginning at Point "D"; thence north 56°15'27" west 7.50 feet; thence south 33°44'33" west 10.08 feet to the true point of beginning; thence west 195.44 feet; thence south 340.00 feet; thence south 20°00'00" west 160.00 feet; thence south 70°00'00" east 170.00 feet; thence north 20°00'00" east 189.98 feet; thence north 284.98 feet; thence north 55°31'08" east 37.57 feet; thence north 56°15'27" west 40.00 feet; thence north 33°44'33" east 49.93 feet to the point of beginning,

provided only such rights shall be acquired and utilized in the easement lands above described as shall be necessary for the construction, repair, replacement, betterment, and/or removal of said Leachate Sewer, Leachate Sewer Emergency Overflow, and Leachate Collection System and appurtenances, and for the construction, repair, replacement and betterment of a Toe Stabilization Buttress, reserving unto the Grantor, property owner, the right to use the servient estate (i.e. property) in any way and for any purpose not inconsistent with the easement rights herein granted.

The foregoing conveyance and the easement rights herein granted are by agreement of the parties made subject to the following terms, covenants and conditions:

1. The City shall have the right without prior institution of any suit or proceeding at law, at such times as may be necessary, to enter upon said easement lands for the purposes herein described without incurring any legal obligation or liability therefor;

2. Whenever, according to Federal and State water quality standards, the need to collect, treat and dispose of the leachate no longer exists, and the Grantee, City of Seattle, has been so notified by the appropriate Federal and/or State water quality control agencies having legal jurisdiction, Seattle shall have the right to bargain, sell, convey, abandon, transfer or otherwise dispose of any or all of the leachate collection, treatment and transport facilities and any or all right, title, and/or interest to the property and property rights therefor, except that Kent Highlands or its successors and assigns reserves the right of first refusal to any or all of said personal or real property rights, excepting therefrom any of said rights within Frager Road;

3. No building or buildings or other permanent structures shall be constructed or permitted within the boundaries of said easement lands without written permission of the City Engineer;

4. The City shall allow Kent Highlands to use any excess capacity available in the leachate sewer after the physical requirements of the City have been met. The conditions governing such use will be subject to a subsequent agreement to be entered into between the City and Kent Highlands, and provided that Kent Highlands shall secure all other required approvals; and

5. The temporary easements are to be in full force and effect for a period of six (6) months from the date the City first enters upon the property to begin construction of the leachate facilities and shall terminate one year from the date of this instrument without any further required action upon the part of the Grantor, its successors or assigns, or of the Grantee.

The above consideration consists of:

Land and Easements	$ 15,000
Damages to Remainder	$ 45,000
Total Considerations	$ 60,000

4-14-77
Deed from
Kent Highlands, Inc.
to City of Seattle

Dated this 28th day of April - 1977

KENT HIGHLANDS, INC.

P. D. KOON - VICE PRESIDENT

STATE OF WASHINGTON)
) ss.
COUNTY OF King)

On this 28TH day of APRIL before me personnally appeared P.D. Koon and

to me known to be the Vice President and
respectively, of the corporation that executed the foregoing instrument, and acknowledged said intrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that He is authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

Given under my hand and official seal the day and year last above written.

Notary Public in and for the
State of Washington, residing at Seattle

CITY OF SEATTLE - CITY OF KENT

AGREEMENT FOR TRANSPORT OF LEACHATE

THROUGH THE CITY OF KENT TO METRO'S WEST VALLEY INTERCEPTOR SANITARY SEWER SYSTEM

THIS AGREEMENT dated this _____ day of _____, 1977, between the CITY OF KENT, a municipal corporation of the State of Washington, hereinafter called "Kent," and the CITY OF SEATTLE, a municipal corporation of the State of Washington, hereinafter called "Seattle."

WITNESSETH:

WHEREAS, Seattle's Solid Waste Utility has been operating a sanitary landfill in Kent on the hillside west of the Green River, between Frager Road and Military Road, northeasterly of the Kent-Des Moines Road (SR 516), and

WHEREAS, the operation of said landfill has resulted in the generation of contaminated runoff waters from the landfill site hereinafter called "leachate," and

WHEREAS, said waters presently drain or are deposited into the Green River, a vital part of the eco-system of Kent and the area known as the Green River Valley, and

WHEREAS, Seattle has been directed by the State of Washington Department of Ecology (DOE) to eliminate discharge of leachate into the Green River in a timely manner, and

WHEREAS, Seattle has agreed with the DOE that the most effective way of accomplishing the elimination of the discharge of leachate to the Green River is to construct a facility to collect said leachate at the site of the landfill and transport said leachate directly to the Municipality of Metropolitan Seattle's (METRO) West Valley Interceptor, and

WHEREAS, METRO, under the terms of an existing local agreement with Seattle, will bill all charges for sewer services and high strength waste discharge directly to Seattle, and will hold Seattle responsible for any further pre-treatment necessary to meet Federal and State requirements, and

WHEREAS, it will be necessary for Seattle to construct a leachate sewer line from the landfill site to the METRO West Valley Interceptor, said construction to occur within Kent's corporate limits and street rights-of-way, and

WHEREAS, Seattle's Solid Waste Utility or its successor shall be responsible for continued maintenance of said leachate collection and transport facilities

for so long as the leachate sewer line remains in operation, and

WHEREAS, the planning for said leachate facilities requires continued cooperation between Seattle and Kent in terms of compiling engineering data, feasibility studies, environmental impact assessments, public hearings, shoreline management permits, river crossing permits, and construction permits for the construction, operation and maintenance of the leachate sewer facilities, and

WHEREAS, under the terms of an existing agreement between METRO and Kent, direct discharge to the METRO System must meet Kent's approval and be so documented;

NOW THEREFORE, in consideration of the mutual benefits to be derived from development of the project, and in consideration of the terms, conditions, covenants and performances contained herein, Seattle and Kent agree as follows:

Section 1. General Provisions

a) Kent hereby approves Seattle's proposal to collect leachate flowing from the sanitary landfill and to transport the leachate through a leachate sewer line from the landfill site to the Municipality of Metropolitan Seattle (METRO) West Valley Interceptor located at South 228th Street and the West Valley Road.

b) Kent hereby authorizes Seattle to construct, operate, maintain, repair and replace said leachate sewer line and required appurtenant facilities within the rights of way of Frager Road, Russell Road, Taylor Road and South 228th Street, all within the corporate limits of Kent, subject to the terms and conditions set forth herein.

c) Seattle will prepare all plans, specifications and estimates; acquire all necessary rights of way; obtain all permits required by law; prepare funding applications to the State of Washington Department of Ecology (DOE), and the United States Environmental Protection Agency (EPA), in accordance with EPA/DOE Grant requirements; and obtain all necessary approvals from METRO.

Section 2. Construction of Leachate Sewer Line. Seattle agrees that it will design the facilities and will administer and inspect the construction of the leachate facilities generally described in Exhibit A attached hereto.

The engineering plans and specifications for such facilities shall be approved by Kent in writing prior to their submittal to DOE. The contract for construction of such facilities shall be let by Seattle and the inspection of construction shall be performed by Seattle. Seattle will pay all construction, right of way and engineering costs.

Kent will review said plans and specifications in a timely manner so as to enable construction of the leachate sewer line in accordance with Order Docket No. DE 76-199 from the DOE, attached hereto as Exhibit C.

Prior to commencing any construction work Seattle shall obtain all necessary permits from Kent and other agencies having jurisdiction and shall comply with the terms and conditions of those permits. Kent shall have the right to inspect and regulate the construction and shall keep a record of the permit and the work done thereunder. Seattle shall pay to Kent such amounts as are reasonably necessary to investigate and process any application for construction work, to inspect such work, and to plat such locations on the permanent records of Kent. Upon completion of construction, Seattle shall supply Kent with complete "As-Built" drawings of the leachate sewer line.

Section 3. Connection to METRO Sewerage System. Upon completion of construction of the leachate sewer line shown on Exhibit B, Seattle shall connect same to the METRO Interceptor at the connection point designated on Exhibit B. Such connection shall be accomplished at the expense of Seattle and in accordance with the rules and regulations of METRO.

Kent and Seattle agree that the facilities described on Exhibit A and Exhibit B shall be completed, connected and ready for operation by January 31, 1978, provided that such date may be extended by any time consumed in excess of two months in obtaining necessary approvals by the Environmental Protection Agency, the Department of Ecology, the City of Kent, or other governmental agencies, or by any time consumed hereafter by acts of God, strikes, material shortages beyond the control of Seattle, its contractors, or in litigation or in legal procedure required as the result of litigation, which actually delays the authorization or construction of said facilities, or in litigation required to acquire the right of way therefor.

Section 4. Operation, Maintenance, Use of Leachate Facilities. Immediately upon connection to the METRO Interceptor, Seattle shall have the sole duty and obligation to operate, maintain, repair and replace the leachate sewer facilities

and shall have the exclusive right to use said leachate sewer line for the transportation of leachate collected from Seattle's landfill site. Maintenance shall be understood to include inspection, cleaning and repair. Seattle shall exercise reasonable care, diligence and judgment in performing the work and shall in particular undertake preventative maintenance precautions wherever practicable. Seattle shall give Kent 24-hour prior notice of intent to perform any maintenance, repair, improvement or replacement work on the leachate sewer line or required appurtenant facilities located in Kent street rights of way, except that in emergency conditions Seattle shall take immediate appropriate action, and notice of action taken shall be given to Kent as soon as practicable considering the seriousness of the emergency.

The terms and conditions of the use and occupancy of the rights of way of Frager Road, Russell Road, Taylor Road and South 228th Street in the City of Kent by Seattle under authority of this agreement shall be as follows:

1. Seattle shall have the right to enter upon and occupy said street rights of way for the purposes of constructing, maintaining, improving, repairing and reconstructing the leachate sewer line or appurtenant facilities and for placing any temporary leachate detour sewer line that may be required during maintenance, repair or reconstruction work, provided that:

   a) Seattle shall give Kent prior notification of the intent to use said streets, except in emergency conditions as provided for elsewhere in this agreement;

   b) Seattle shall first obtain all permits as may be required for any construction or reconstruction work; except in emergency conditions when Seattle shall take immediate appropriate action and obtain the necessary permits therefor as soon as practicable considering the seriousness of the emergency;

   c) Seattle shall, to the extent possible, keep said streets open to vehicular and pedestrian travel, access, ingress and egress;

   d) Seattle shall provide all necessary detours, flagmen, temporary traffic controls and other devices for pedestrian and vehicular safety in accordance with the U. S. Department of Transportation Manual on Uniform Traffic Control Devices for Streets and Highways, pursuant to Title 23, United States Code, and

   e) Seattle shall restore said street rights of way to at least their condition at the time of any of the construction or other

activities contemplated in this section.

2. Kent shall notify Seattle of any construction work to be performed or authorized by kent in said street rights of way.

3. Any new street or utility improvement performed or authorized by Kent in said street rights of way shall be designed, located and constructed so as to minimize, to the greatest extent possible, any need to relocate or otherwise disrupt the operation of any part of the leachate sewer facility. If at any time during the term of this agreement it becomes necessary to relocate the leachate sewer line, Seattle or its agent shall perform all relocation work. If the relocation work is required to accommodate a street, sanitary sewer, water, or storm drainage improvement, all costs directly associated with said relocation shall be borne by Seattle. If relocation of the leachate sewer facility is required to accommodate construction of any other utility facility or improvement all costs directly associated with the leachate sewer relocation work shall be borne by the utility, agency, company or party creating the need for relocation.

Section 5. Fees, Service Charges and Costs. Seattle shall be responsible for the delivery to the Metropolitan Sewerage System of leachate collected from the landfill site, for the construction, maintenance and operation of the leachate collection, required pretreatment and transport facilities, and for the payment of all costs incidental to the collection of such leachate and its transport to the Metropolitan Sewerage System, except as provided in Section 10, herein.

All connection charges, user fees and/or service charges as required by METRO shall be paid by Seattle directly to METRO and Kent shall not impose any additional user fees or service charges of any kind on Seattle for the transport of leachate to the METRO Interceptor line.

This liability and responsibility for the payment of all METRO charges by Seattle shall continue until such time as the line is abandoned or transferred pursuant to Section 9, herein, and shall remain an obligation of Seattle regardless of whether or not Seattle has ceased landfill operations on the site.

Section 6. Successors and Assigns. This agreement and each and all of the terms, conditions, provisions and covenants hereof shall be binding upon the parties hereto and upon their respective successors and assigns, except that Seattle shall not have the right to assign this Agreement or any of its

rights and obligations hereunder by voluntary agreement without the written consent of Kent and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party. This agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto.

In the event that the responsibilities and obligations of Seattle's Solid Waste Utility for operating the Kent-Highlands landfill and the leachate collection and transport facilities are assumed by or transferred to another entity pursuant to law, then all responsibilities, obligations, privileges, liabilities and authorities as contained herein shall be assigned to that entity without the approval of Kent.

Section 7. Use of Sewer Line for Conveyance of Leachate. This agreement does not authorize use of said leachate sewer line for any purpose other than conveying leachate from the landfill to the METRO trunk. Seattle shall not use said leachate sewer line to accept and/or transport sewage or waste from any person, firm, private corporation, water district or sewer district without amendment to this agreement and the written consent of METRO.

Section 8. Street Vacation. If, during the term of this agreement, Kent determines to vacate any portion of the rights of way of Frager Road, Russell Road, Taylor Road and/or South 228th Street, which are covered by this agreement, Kent shall, prior to the legal vacation of the right of way, provide Seattle with easements conveying a 20-foot wide right of way for the purpose of operating, maintaining, repairing and reconstructing the leachate sewer facilities.

Section 9. Abandonment or Transfer. At such future time as the leachate flow from the sanitary landfill becomes of such quality that it no longer represents a pollution problem according to Federal and State water quality standards, Seattle, upon approval from the appropriate water quality control agency and METRO, may cease collection of the leachate flow, and subject to such approvals, shall have the right to abandon, transfer or otherwise dispose of the leachate sewer line and appurtenant facilities, except, that Seattle shall not transfer ownership or convey any legal interest to said leachate line to any person, firm, corporation or utility without written consent from Kent and METRO.

Seattle agrees to provide Kent with at least six months' advance notice of any intention to abandon, transfer or otherwise dispose of the said leachate

sewer line, with the City of Kent having right of first refusal for purchase of said leachate sewer line.

Section 10. Indemnity. Kent shall indemnify and hold harmless Seattle from and against all claims, costs, demands, expense and liability for any injury or death or for any damage, loss or destruction of property, resulting from any damage to, or disruption of the leachate sewer facilities caused by the negligence of any employee or agent of Kent, and except as provided for in Section 4 (3) of this Agreement.

Seattle shall indemnify and hold harmless Kent from and against all claims, costs, demands, expense and liability which may result directly from construction, repair, maintenance or operation of the leachate sewer facility.

Seattle shall indemnify and hold harmless Kent from any liability or responsibility for non-compliance with Federal, State and METRO regulations and standards for quality of the discharge from said leachate sewer line.

Seattle shall comply with all laws and lawful regulations of Federal and State authorities regarding the collection, transport, discharge and treatment of leachate from the sanitary landfill site, including applicable regulations of METRO. Following construction of the leachate facilities, Seattle shall indemnify and hold harmless Kent against and from all fines and penalties, liability, loss, damage, claims, costs and expenses which may arise out of any failure by Seattle to comply with said laws and lawful regulations.

Section 11. Waiver. No waiver by either party of any term or condition of this agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach whether of the same or a different provision of this agreement.

Section 12. Entirety. This agreement merges and supersedes all prior negotiations, representations and agreements between the parties hereto relating to the subject matter hereof and constitutes the entire contract between the parties. This agreement shall remain in full force and effect until Seattle has abandoned, transferred, assigned or otherwise disposed of said leachate sewer line as provided for herein.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the day and year first above written.

CITY OF KENT

By _____
Mayor

ATTEST:

_____
City Clerk

CITY OF SEATTLE

By _____
Mayor

ATTEST:

_____
City Comptroller

RESPONSE TO LETTER NO. 36: KENTVIEW PROPERTIES, INC.

1. Comment acknowledged. See response to Letter No. 11, Comment 18.

LETTER NO. 37

WASHINGTON Wildlife Heritage FOUNDATION

RECEIVED NOV 07 1985

(b)(6)
Chairman-Seattle
(b)(6)
Vice Chairman-Ephrata
(b)(6)
Director-Edmonds
(b)(6)
Managing Director-Federal Way

October 22, 1985

Mr. Mark Edens, Project Manager
Solid Waste Utility
Seattle Municipal Building
Room 606
Seattle, WA 98104

Dear Mr. Edens:

1 The Foundation has been involved with a large acquisition and enhancement project in Eastern Washington and did not realize the status of the Midway Landfill closure. The Foundation is encouraged to hear that the City of Seattle is planning to improve this area, and as we understand it, will enhance the wetlands. If done properly, this will improve the quality of humans, wildlife, birds, and plantlife.

2 Prior to receiving this land last year, the Foundation understood that:

A) The property now owned by the Foundation was logged and/or cleared after the wetlands designation, as the previous owner was not aware of the designation, which has changed the vegetation and wildlife on the property.

B) The property was recently annexed into the City of Des Moines, who indicated they do not have a wetland ordinance and would consider development of the property.

A Non-Profit, Tax-Exempt Organization
32610 Pacific Highway South
Federal Way, WA 98003
(206) 824-1579

C) On the northern portion of the wetland, a sewer line was or is in the process of being put in.

D) The property that we recieved has been appraised at $150,000 by a registered MIA appraiser.

Please let the Foundation know of any further developments.

Sincerely,

(b)(6)

Managing Director

RESPONSE TO LETTER NO. 37: WASHINGTON WILDLIFE HERITAGE FOUNDATION

1. Under the Off-Site Detention alternative, approximately 6 acres of the wetland would be excavated to form a detention basin. If that alternative were selected (see Section I of this FEIS), the City would undertake mitigation to compensate for this loss. See response to Letter No. 9, Comment 6.

2. Comment acknowledged.

V. PUBLIC HEARING TRANSCRIPTS AND RESPONSES

This section contains copies of the transcripts from the two public hearings on the DEIS. The first hearing was held on August 29, 1985 in the City of Kent Council Chambers, and the second on September 11, 1985 in the Fourth Floor Conference Room of the Seattle Municipal Building. Following each transcript are the responses to comments in that transcript. Responses are keyed to numbers on the left side of the transcripts.

A total of 18 people spoke at the first public hearing, and 22 at the second. The index on page 2 of each transcript lists the names of the speakers in the order in which they spoke. Responses to comments are provided in the same order.

TRANSCRIPT NO. 1

P U B L I C H E A R I N G

MIDWAY LANDFILL CLOSURE PROJECT

City of Kent Council Chambers

August 29, 1985

7:00 o'clock p.m.

I N D E X

	PAGE
Introduction	3
Consultant Presentation	5
Public Comment and Questions	
List of Speakers	
1 (b)(6)	24
2	25
3	27
4	28
5	32
6	34
7	35
8	37
9	38
10	39
11	40
12	42
13	43
14	44
15	49
16	49
17	51
18	55

P R O C E E D I N G S

MR. EDENS: Good evening, and welcome to the public hearing for the Midway Landfill Closure Plan Draft Environmental Impact Statement. If you were at the workshop last time, I'd like to let you know that this is going to be quite a bit different than the workshop.

The main purpose of the public hearing is for you to make comments on the Draft Environmental Impact Statement, other information that you think should be added, questions that you think should be answered in the final Environmental Impact Statement. We're not really here to debate with you the pros and cons of what are in. Plainly what we need is information, additional information from you, and examples of that would be if you have a water well located near the site that's not included in the Draft Environmental Impact Statement. That would be very important information to us.

Outside, we have copies of the Draft Environmental Impact Statement available for

you to look through. They are just reference copies. If you want additional copies, they are available for sale at the City of Seattle, downtown, on the 9th floor at the information window there. They are also available at the Kent and Des Moines and Federal Way Public Libraries on reference there. You should be able to go there and sign them out and look through them or make copies of them if you wish.

The agenda for tonight, at first we'll have a consultant presentation. That will be about 20 minutes long, by a representative of Parametrix; and then we'll take a short break and tear down the projector and the screen, and we'll bring a podium up here, and start taking comments. I'll be moderating you as we take comments.

In order to let everyone speak, we would like to limit your time to five minutes for the first go around. It sort of depends on how many people sign up to speak. Right now, I see only three names out there. I expect there will be many more before we're through here.

So unless there are any questions on the public hearing, I would like to go ahead and start with the consultant presentation.

Okay, a representative of Parametrix will now make a presentation on the Draft Environmental Impact Statement, and I'd like him to come and introduce himself and begin.

CONSULTANT PRESENTATION

MR. WALKER: Thank you, Mark.

My name is Jim Walker. I'm a senior engineer with the consulting firm, Parametrix, Incorporated, the city's consultants on the Midway Landfill EIS Project.

The principal objectives of the closure plan for the Midway Landfill are to eliminate or significantly reduce lateral migration and generation of gas and leachate at the Midway site. There are the engineering features that have been developed to accomplish these objectives, and are broken into four major elements: A grading plan, a surface water management plan, leachate management plan, and gas control plan. Two of these elements, the leachate control plan and

the gas control plan essentially are remedial action elements and have no alternatives. Two of the other elements, the site grading plans and the surface water management plans do offer alternatives for these elements of closure plan. All elements are interrelated, and all are dependent on the other one.

For the leachate control plan and the gas control plan to be effective, both a grading plan and a surface water management alternative must be implemented. All elements must be implemented, including long-term post-closure care and monitoring of the site.

Decomposition of waste and landfill will continue for an indefinite period, maybe as much as 30 years. Monitoring of that site, and the operation and maintenance of all facilities will continue for that 30-year period to insure that the objectives of the closure plan are being met.

As I've said, the gas control plan is one of those elements that offer no real alternatives. At one time it was thought that a passive system consisting of a series of trench around the landfill and vents that

would vent the gas naturally would control the gas at the site. Studies that have gone on during the environmental work have indicated that gas has migrated beyond the limits of the site already, and that only an active system is going to be effective in correcting that situation.

The objectives of a gas control system are to limit the migration of gas, lateral migration of gas, such that it does not extend beyond the boundaries of the solid waste, and to control odors associated with the gas from escaping from the Midway site. An active system has been identified as being necessary for the lateral gas migration control. It is shown here in this figure; and if that's not visible to everyone in the back of the room, feel free to come forward and look a little closer.

Generally, the active control system for the lateral gas migration system consists of a series of deep wells, these small symbols around the perimeter of the site, connected by a piping system that leads to a central blower flare area. Gas will be pumped from the wells

through the piping system to the central blower flare area where it will be combusted to a degree such that the emissions from the flares will be in conformance with the requirements of Puget Sound Air Pollution Control Authority.

Similar to the lateral gas migration control system, the odor control system at the landfill will be an active system. The difference is that the active gas system, the wells are installed internally to the landfill into the solid waste. Again, they will be connected by a series of header pipes leading to the central blower flare pad, and that gas will also be combusted in the same manner as that collected from the lateral migration system.

Gas from the odor control system does have the potential for energy recovery or use as a natural gas product. However, if that is done, and the manner in which it has been done is not known at this time, and therefore the energy recovery portion is not part of this EIS.

The second element of the closure

plan that is a remedial action in nature and essentially has no viable alternatives is the leachate control system. The most recent proposed Washington Department of Ecology minimum functional standards would allow a cover system two-foot thick of a relatively low permeable earth material. This cover system primarily is intended for landfills that have bottom liner systems in place; and because Midway does not have such a system, that landfill cover is not suitable for the Midway site.

The objective of the leachate control system is to reduce or eliminate the generation of leachate. There are two sources of leachate being generated in the landfill site. The first is from precipitation that falls directly on the landfill, infiltrates through the cover, the existing cover, which is just a generally sandy bottom soil, and escapes out the bottom of the landfill. That source accounts for approximately 32,000,000 gallons of leachate annually.

The second source is off-site infiltration directly from a pipe system that

is east of Interstate 5. In order to reduce the precipitation that falls directly on the landfill, a very sophisticated multilayered cover system is proposed. The key feature of this cover system is a low permeable -- very low permeable barrier layer.

Soils that would be necessary to construct that barrier layer to the low permeability that's required generally do not exist in the Puget Sound region. Therefore, more than likely, and amended soil will have to be installed. The amendment would be with sodium bentonite, which is a naturally occurring material that occurs elsewhere in the United States. Some of it is mined in Oregon and Wyoming. This material will be imported to the site, mixed with a suitable natural or native soil, and then placed on the landfill.

All the water that falls on the cover will not run off. Some of it will infiltrate through the upper topsoil, and would tend to build up on this barrier layer. In order to reduce that water, we have included a drainage layer, which is a granular material with a

very high permeability so that water easily passes through it.

Water infiltrates to the topsoil and does build up on this layer, is removed down the slopes and out of the landfill, collected in perimeter drainage ditches, and then removed through the surface water system. This multilayer system, the technology behind this multilayer system has been applied to bottom line landfills in the leachate collection system of bottom line landfills. With this technology and this system applied to the cover of the Midway Landfill, it's estimated that 30,000,000 of the 32,000,000 gallons of leachate will be removed annually, or essentially a 94 percent efficient removal system.

The other major source of leachate at the Midway site is from an off-site source east of the landfill, approximately 16,000,000 gallons annually from an area roughly bounded by Military Road on the east and I-5 on the west is collected in a depression near I-5 and currently drains under I-5 and directly into the landfill. The objectives of the surface

water management plan is to remove that source of infiltration into the landfill and divert it around, send it elsewhere.

At one time, the Midway Landfill was a gravel pit with a lake in it. It served as the collection area for all surrounding drainage, and there was no outlet from it. When Interstate 5 was built along the east side of the landfill, drainage along Interstate 5 and from the Linda Heights area east of I-5 was constructed to drain into the landfill, also, as there was no other outlet.

In order to remove that source of leachate into the landfill, we have identified four alternatives, all of which use Puget Sound as the ultimate discharge point. The first of these alternatives we've identified as the off-site detention basin alternative, and the first aspect of this alternative, and this is common to all alternatives, so I'm not going to repeat it, but that is the creation of a small detention basin in the depression east of I-5 near the Linda Heights Park, construction of a pump station and a new force main to convey the flow from the east of I-5,

under the freeway in existing storm drainage to the northeast corner of the landfill. That part is common to all four drainage alternatives, and I won't repeat that.

With the off-site detention basin alternative, storm water is continued to be routed across the north end of the landfill and down to the west side. Surface water generated on the landfill is also connected to this storm water system, it's then routed underneath Highway 99, and down to an existing wet land area near Parkside Elementary School. That wet land area, a formal detention basin would be constructed approximately six acres in size, about five feet of actual water depth. A formal basin would be one in which dikes would be constructed around it, fencing, access roads, and there would be a controlled outlet structure.

A buffer zone of natural vegetation would be maintained around the site to screen it from the surrounding properties. The only penetration through it would be access roads. Flows out of that detention basin would be limited through the control structure so that

they do not exceed what they currently are in the 25-year storm.

The discharge from the basin would follow the natural routing through the North Fork to Smith Creek drainage that flows past Parkside Elementary School, westerly, and generally southerly down towards Salt Water State Park.

In this upper reach of North Fork drainage, several deficiencies in the existing storm system have been identified. Although this alternative does not increase the existing flows, because there are deficiencies existing already, corrections to these deficiencies are included, and those consist of a new storm sewer system across or around the playfield at Parkside Elementary School, and several culvert improvements at 20th Avenue, 245th Place, and 246th Place. No additional downstream improvements are proposed with this alternative.

The second alternative which we have identified as the on-site drainage basin -- detention basin, excuse me, is very similar, with the exception that at the north side of

the landfill, the detention basin would be constructed on property to be purchased adjacent to the landfill. Generally, the basin would be about six acres in size. Flow from Highway 99 that currently discharges westerly to this existing wet land would be rerouted into this detention basin so that the total combined flow could be controlled and the discharge from the basin would not exceed what the present discharge is naturally into that detention basin by Parkside Elementary School.

This alternative again would route flow out of the basin westerly under Highway 99 to the existing detention basin, natural detention basin; but under this plan, no improvements are proposed for that wet land detention basin.

In order to distribute the flows through a little better, a diffuser pipe would be installed right at the outlet with the opportunity then for storm flow to seek several natural channels through it, through the basin. Again, with this alternative, improvements in the downstream part of the

drainage would be provided across Parkside Elementary School and several culverts in the neighborhood streets.

The third alternative for storm water drainage has been identified as called the no detention alternative. This alternative essentially picks up all flows at the northwest corner of the landfill in conjunction with those that are generated on site, routes them westerly and southerly along Highway 99, westerly again, generally to the vicinity of 16th Avenue and 250th Street South, where the North Fork of Smith Creek drainage is in a very deep ravine. Flows would be discharged into the ravine at that point. The flows with this alternative are somewhat higher than the existing flows, and would have some impacts on the North Fork of Smith Creek and the main stream of Smith Creek down stream in Salt Water State Park.

Although the impacts would be relatively insignificant, because the major component of that flow is from the southerly drainage basin of Smith Creek, which extends down to about Star Lake, improvements are

included in the state park to four culverts that have been identified as being under capacity, along with some bank improvements to the channel where it tends to overflow during high flows.

The fourth alternative was developed to bypass all of the Smith Creek drainage basin and route flows directly to Puget Sound. For that reason, it's called the direct discharge alternative, or tight line alternative to Puget Sound.

That alternative has two variations, one with and one without a detention basin. If it had the detention basin, it would be located on site at the north side of the landfill, and the pipeline would be smaller than if the alternative did not include the detention basin. In either case, the pipeline follows the same general route as the previous alternative, except near 16th Avenue, it continues westerly, until it can be routed down into Salt Water State Park, and follow along the Smith Creek and eventual direct discharge into Puget Sound.

All four of these alternatives have

the same effectiveness in removing storm water that would otherwise be leachate from Midway Landfill. The difference lie in their time of construction, their costs, and their impacts on downstream facilities. These would be some of the considerations in selecting the alternative for storm water management.

The other element of the closure plan that offers alternatives is the final site grading plan. The objectives of the grading plans again are to enhance surface water run off by providing an absolute minimum of two percent slopes over the entire landfill, but more desirably, a five percent minimum slope.

The second objective is to stabilize the fill and adjacent properties where there are some steep banks currently existing by flattening those out so that no slope is greater than a four to one slope. Three alternatives have been identified to do this, the first being the minimum grade alternative. It was selected on the basis of being the absolute minimum amount of fill necessary to bring the site up to an elevation that provides at least two percent slopes over the

entire site.

Under this alternative, approximately 200,000 cubic yards of fill material will be imported to the site and placed primarily in the south pond, the central pond, and on the contiguous property, which is also a low area, and would tend to pond water, unless it was also filled. The elevation of the landfill would essentially not change significantly from what it is, except that the overall site would be about five feet higher to allow for the final cover system.

The second grading alternative is identified as the intermediate grade alternative. This alternative is the one that provides the desired minimum five percent slopes over the entire site. It also includes filling of the south pond, the central pond, and the contiguous property; and additionally, more fill placed over the south central part of the site. The total volume of imported fill material with this alternative would be 370,000 cubic yards.

The final grading alternative is identified as the maximum grade alternative,

again, an alternative provides the desired minimum five percent, at least all over the site, but it also brings the elevation of the site high enough so that it blends into the surrounding topography, primarily on the south and on the west, in a much better fashion than the other two alternatives. Another feature of this alternative is that the area designated as City of Kent Park would consist primarily of five percent slopes prior to any work done out there, so it provides a greater useable area for the park site. This alternative, however, requires 1,000,000 cubic yards of imported fill to bring it up to the grades that are shown. With this alternative the highest point on the landfill would be about 15 to 20 feet higher than it currently is; but rather than being located in the southeast corner of the site, it would be shifted to near the south central area of the site.

All three of the grading alternatives meet the objectives, however, the intermediate grade and the maximum grade, because they provide the desired five percent minimum slope,

meet it slightly better than the minimum grade alternative, which does have some two percent slopes on the landfill.

The duration of construction of all these elements for the closure plan is estimated at one to three years, primarily depending upon the grading plan that's selected. If the minimum grading plan is selected and we had a construction season similar to the one we've experienced this year, that alternative could be constructed in one year. With the typical weather patterns we have around here of more rain during the summer months, probably two years would be required for the minimum grade alternative and also the intermediate grade alternative.

The maximum grade alternative would require three years construction time because of the great volume of fill that needs to be brought into the site, the construction schedule to begin, on whatever alternatives are selected, in the summer of 1986. The exception to this is that work has already begun on the lateral migration, gas migration system, because of recent information out

there.

The cost of the project is estimated to range from 12 to 16 and a half million dollars, again, depending upon which grading plan is selected and which surface water management plan is selected.

Thank you.

MR. EDENS: We'll now take a short five minute break while we change the set-up up here to take your comments.

(Brief Recess).

MR. EDENS: Once again tonight, this is going to be a public hearing, and the main purpose is to get your comments and statements, to get information from you on the Environmental Impact Statement. You may also have questions that you want answered in the Final Environmental Impact Statement. You can state those here, and they will be answered in the Final Environmental Impact Statement. We are not going to be answering questions tonight, just recording them so we can answer them in a final document.

When you're making your public comment, I'd appreciate it if you'd come up

here to the podium, and state your name and address, and also spell your last name. We do have a court reporter here tonight, and it would benefit her greatly if you would spell your last name.

I'll be calling you in the order you have signed up on the list. Presently we have ten names, approximately, on the list, and so I'll still be limiting that to five minutes per each comment. I'll go through the list one time, and then if there are new speakers, I'll call on them. If some of you who have already made some comment wish to come back, then we've start over with the top of the list, whoever is up there can raise their hand and come to the podium and make additional comments.

We're also prepared tonight to take exhibits from you, and an exhibit would be something such as a map where a well is located, or where your house is located, or where you may have detected some gas. If you do have an exhibit, I would appreciate it if you submit it here to Mary Turner, who is with our Office for Citizens' Participation, and

she will give that an exhibit number, and we will record that for the record.

Also, there are some exhibits outside which you may wish to wander out and take another look at. We have agendas for the public hearing out there on the table, and in addition, we have a sign-up list for additional speakers. We have another list out there you can sign up on as the hearing progresses. We also have a mailing list, and that is for our Waste Watch, which we publish once a month. If you're not already on that mailing list, we'd appreciate your adding your name to that, and we'll get more information as we go along.

With that, I would like to ask for the first speaker, (b)(6).

PUBLIC COMMENT AND QUESTIONS

(b)(6)

(b)(6)

(b)(6) Kent, (b)(6) I have four questions.

T1-1 What effect will the new landfill

adjacent to Kent Highlands have on your proposal to dump Midway's leachate at Kent Highlands?

T1-2 What effect does the leachate seepage have on the domestic and private water supplies in the surrounding districts?

T1-3 Will pumping the methane from Midway cause further migration of the Kent Highlands methane?

T1-4 Will Seattle compensate owners for property devalued in the area?

Thank you.

MR. EDENS: Thank you.

The next person on the list is (b)(6)

(b)(6)

(b)(6)

(b)(6) Des Moines, (b)(6)

T1-5 My home is approximately (b)(6) north of the North Fork-Smith, and in the readings and hearing of what I've seen and heard thus far in this Environmental Impact Statement, at no time have I heard or seen anything that would address the health and

welfare of the residents within the general area.

The waters that come from Smith Creek or come down Smith Creek from 99 and the landfill area serve to water certain fruits that grow wild in the area, which are eaten daily by kids and adults, and I'm wondering just what this is going to do to those kids, or what effect it might have on their lives in the future.

T1-6 The recent readings of the daycare center adjacent to the landfill indicated there was 15 to 21 percent methane gas located around the foundation of the building. The Health Department the day before stipulated that the building was safe, yet my understanding is that four percent accumulation of methane gas is explosive. If that's the case, what is the explosive capabilities of 15 to 21 percent?

T1-7 Is, in fact, the city engineers, the City Health Department, are they trying to relocate the problem that they have with the Midway Landfill, or are they trying to eradicate it entirely?

MR. EDENS: Thank you.

The next person on the list is (b)(6)

(b)(6)

T1-8 (b)(6) I'm chairman of the CAML Committee, (b)(6) and I noticed two things in the EIS statement that I'm concerned about. One is the holding pond by Parkside School. In your proposal, you're going to reroute the water that's coming off of I-5 around the landfill into Smith Creek. By doing that, you will also be taking all of the chemicals that are on I-5 and putting them into Smith Creek. I think you ought to address that problem and have a filter system to catch all those chemicals.

T1-9 The other question I have here is, at the completion of this final grade, the maintenance shall be conducted by the owner of the site at the time of abandonment. I find it hard to believe that Mr. Romano will take care of this site after you leave it, and who is going to be responsible if he doesn't take care of it?

Thank you.

MR. EDENS: Thank you.

The next is a (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) I have (b)(6) (b)(6) and I also own property on (b)(6) (b)(6).

T1-10 On the Pacific Highway South property, I have a well (b)(6) that's approximately 250 feet deep. I have several times asked the authorities if they would check this well, and I haven't had any response or no report on it. This well is right adjacent to the landfill. I feel that this here well would tell an awful lot to everybody here if we can get a report on the condition of that well, which is approximately 250 feet deep.

T1-11 Another question, how is all this here going to have an effect on our property valuation in the areas? Just recently, I received an increase in my tax valuation on my properties. I don't think this is fair.

We're here, we're all victims of something we have no power over, the authorities, what they crammed down our throats. We pay to suffer now. We have to pay increased taxes.

T1-12 I also own that deep pond on my (b)(6) Where the deep pond is, I've lost approximately 60 trout that were up to seven pounds, and it's a refuge there for wildlife. There is Canadian geese, there is species of ducks such as Mandarin, wood ducks, Canadian honkers that come in there, migrate in there, and some of the Alaskan dangerous -- not dangerous -- species is Golden Eye birds that come in there and stay for the winter.

Just recently, I noticed on my lake that there has been a scum, an oily scum; and I also have three ponds on the ten acres, and there is a scum on that, those ponds.

Now, they say that the southeast corner of the Parkside where all this comes, is that where it presently seeps into now from the Midway Landfill? It comes through the southeast corner of the Midway Landfill, it comes through the neighborhood, the backyards of people where the children play, is that all

water bad water? It comes down there now.

It seems to me the number four, the direct discharge to Puget Sound would be the best to get rid of that water so it wouldn't have to go through the backyards of the citizens that live in that area, and there is an awful lot of water that is seeping from the bank there on my ten acres that comes right out of the ground. It would be equivalent to the discharge water of, say, a three-inch fire hose running continually. That water comes down, empties into the lake, and is that water seepage water?

T1-13 Also, I have a spring on my property that I have put in that was in there several years ago. I ran an inch pipe back under the ground so that I could check the spring water. I asked the EPA or the Health Department, it was either one of the two, to come out and please check it, which they did. They didn't give me no report. I thought that that spring water would be -- I would be able to drink from it. I can't drink from it, it's terrible; and this is all seepage that's probably coming from the Midway Landfill. It would be very,

very -- I'd like to have these questions answered.

T1-14 Most important is the tax valuation on the property. With all the taxpayers that are in this room, are within that area, how is it going to affect their taxes; and are they going to be increased or decreased, or are they going to receive some compensation until this is resolved? There is only one way that I could see for it to resolve is to take that Midway Landfill and don't run it over anybody's property.

T1-15 Another question I would like to ask, if they bring in all this dirt, millions of yards of dirt, are they going to cover the Midway Landfill with it? What's going to happen to the seepage from that, is that going to solve it? What are they going to do with the gasses escaping? Is it going to trap it in there, or are they going to continue to have the methane gas burning out. Even though they put a park there, what is going to happen?

I think that's about it.

MR. EDENS: Thank you very much.

I'm not sure about this pronunciation.

I think it's (b)(6)

(b)(6)

(b)(6) My name is (b)(6)

(b)(6) I live at (b)(6)

Kent. I live on the (b)(6)

(b)(6) of the Kent

Landfill, Midway Landfill.

T1-16 I would like to know why there isn't, in the final impact statement, a suggestion that perhaps we might have the alternative of purchasing homes, say, in case there is such danger or hazards or emotional stress to the people that they are not able to live there any longer, and they are not able to sell their homes.

T1-17 Number two, I would like to know why they changed the initial plan of a couple years ago to down 250th as opposed to a closed pipeline -- as opposed to 252nd. 250th is right down the middle of our subdivision. It's a more heavily populated area, it's a more quick and direct route to go down 252nd to the Salt Water Park.

T1-18 I would like to know why they have no

reference to a pipeline to carry the leachate from the Midway Landfill to the Kent Highlands system, which will ultimately go to the sewage plant. I would like to see this done. I feel like pumping it out in trucks is just a tentative measure, and it's something that after 30 years, there still could be big problems, and I would like to see the money going into a piping system rather than this system of pumping it out in trucks and moving it manually down to the Kent Highlands.

T1-19 One thing I've been questioning, also, is that it's my understanding everyone is saying that the water is moving south, but I'm quite sure that from different viewpoints that I've heard over the past few years, that the water is also coming out behind the Midway Chinese Restaurant and going downstream right on through there, not just down the South Creek.

T1-20 I also would like to know why, when Kent residents that are close to the Kent Highlands are believing that their dump is going to be closed within the next year or two. From what I understand, they're having plans

right now to enlarge this dump, and to extend the life of that dump.

Thank you.

MR. EDENS: Thank you.

Next on the list is (b)(6)

(b)(6)

(b)(6) My name is (b)(6)

(b)(6) My property is at (b)(6)

(b)(6) However, at the present time, I'm living in Seattle.

T1-21 My concern is this holding pond near the grade school. I find the credibility gap -- this holding pond, I take it, ideally is to be pure water, and nothing that's going to harm these kids. I remember when they started this dump madness, there was not going to be any decomposable garbage in there, it was all building materials and just landfill, no decomposable garbage.

I'm concerned. Is that going to be a safe place for -- (b)(6) I have (b)(6) that have gone to Parkside, and probably will in the future. Is it going to be safe for these kids? I find the

credibility gap because we were not to have any of this problem when they started the landfill.

T1-22 I would also like to know how to have my house checked. Long before this landfill started, we bought the house in (b) , and we altered the drainage of the property so that instead of a slope, we had a direct cut-off. All the way across the back of our 120 feet are underground streams that come through there. I can show you where they are. I have water sitting there all year. I've had the City of Kent out to check for sewage or what that odor is a number of times in the last several years.

T1-23 I have a bedroom now that has an odor in it that has a two-and-a-half year old baby in it. I'd like to know how to get that checked.

Thank you.

MR. EDENS: Thank you.

Next on the list is (b)(6)

(b)(6)

(b)(6) I'm (b)(6) I

live at (b)(6) and I have approximately five questions.

T1-24 Question one, what about substances other than methane moving laterally off-site? The focus here seems to be primarily on methane, I'm wondering about others. That leads to question two.

T1-25 What has been tested for in regard to the 128 primary toxins listed by the EPA? In other words, it's one thing to run a test, but if you don't specify what you're testing for, it's not too meaningful. Where have these tests been run? I see no indication of testing in the area in back of my house where what appears to be little artesian wells are rising to the surface and running downhill.

T1-26 The other comment in regards to question three is, specifically, has the Parkside playground area been tested for any of the above 128 primary toxins listed by the EPA?

T1-27 The fourth question is in regards to leachates on site. Are the leachates on site going to mix with the drainage water that's going to be running to the potential off-site

holding ponds?

T1-28 The fifth question is, who is going to pay for all of this that has to be done?

Thank you.

MR. EDENS: Thank you.

The next is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6). I live at (b)(6) (b)(6) about (b)(6) (b)(6) between 99 and I-5.

T1-29 My question is, will documented health problems, such as respiratory illnesses, at least, that are pretty obviously linked to the pollution of the landfill, be given financial relief by any funds allotted for the clean-up, or are there any funds that will help, except the sick peoples' own funds or insurance?

Thank you.

MR. EDENS: Thank you.

Next is (b)(6).

(b)(6)

(b)(6): My name is (b)(6), (b)(6). I live over near (b)(6) but I do go to church every Sunday up near the wet lands, which is where the holding pond is supposed to be built, if that site is chosen.

T1-30 It seems that we're given two alternatives as to what's to be done with the drainage from the Midway Landfill. The one alternative that Seattle seems to be plugging for is the drainage of everything coming from the landfill going down into Puget Sound with either a direct pipeline down, or a stop, an intermediate stop somewhere in between. I feel that that isn't really the best of the alternative solutions.

The other alternative, as I understand it, is to pipe the water, leachate, whatever, over to the Kent Highlands landfill, where it would be purified and then turned loose as good water. Why isn't this, as in my opinion, a better solution, why isn't that pursued with the other solutions set aside? Any other solutions is nothing more than just putting off what has to be done.

Dumping into Puget Sound, we have problems there. If we dump into Green River, we have problems there, as well as in Puget Sound ultimately.

So I feel that why not get rid of the problem immediately, get it over to the Kent Highlands landfill.

Thank you.

MR. EDENS: Thank you.

The next is (b)(6)

(b)(6)

(b)(6) Thank you.

T1-31 My name is (b)(6) I'm (b)(6) Highline School District; and since this is a public meeting, we want to go on record as sharing our concerns for the children, the health and safety of those children at Parkside Elementary School, which this year will be a primary school composed of children K through 3, rather than a full 6th grade primary school.

We have been concerned for some long time in the Highline District about this whole matter, and have done some monitoring and

study of it ourselves. We wanted to go on record tonight as saying that on or before the September 11th meeting, we will have a recommendation from the Board with questions and issues that we feel should be raised.

Thank you.

MR. EDENS: Thank you.

I'm not sure of this name here, Mr. (b)(6) I think. (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) I live at (b)(6) in Kent on the (b)(6)

T1-32 I notice in this form that we've been given tonight, under Midway Landfill Closure Project, Summary of Proposed Project, Description, it says here in the second paragraph, this closure plan was prepared in November 1983. This is 1985. The people here tonight and the people in Kent are outraged. We're sick and tired of the foot dragging that's been going on, and we want some action.

There have been studies that that seem to have been lost. We've been informed

that they're going to do another study that will take at least another year before anything really concrete is done. We're not waiting. We want action now. We want to see things happen. We want to see this thing cleaned up. We want to see this thing resolved.

Look about you and see the people that are here tonight. These people are concerned, these people are afraid, and we want something done. We realize there is a lot of money involved in cleaning this up, but you look at a human life, and there is no monetary value you can put on a human life.

So let's do something. Let's stop these studies, let's use the studies that we have, and let's get something done now. We are outraged.

Thank you.

(Applause).

MR. EDENS: Thank you.

I have now been through all the people who have signed up on the speaker list, and I expect that some of you might want to have a short break to think over whether you'd

like to give a comment or not. Is there anyone else who has signed up? I think we'll have just one other person speak, and then take a five minute break and see if others wish to speak.

This name I think is (b)(6)

(b)(6)

MR. BLALOCK: (b)(6)

(b)(6) My address is (b)(6)

T1-33

I'm a real estate agent, and I have been observing the slowness in selling in this area. This area does not move at all that is in this, and I don't know whether it's a direct relationship between the word and the fear of the landfill, or whether there is a real worry there.

Anyway, I'm wondering if there is going to be any type of compensation for the people that have purchased here, and the land value has gone down, or just not even to sell.

Thank you.

MR. EDENS: Thank you.

We'll now take a five-minute break; and if others of you wish to speak or submit a

written comment to Mary Turner up here, you may do so, and we'll reconvene.

(Brief Recess).

MR. EDENS: We would like to reconvene, please. The next person on the list is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) I live at (b)(6) Kent.

T1-34 The first question I'd like to know is how they're going to measure odor when they have no scientific way of measuring odor. I'd like to know what the criteria is, if they're going to measure it by gas, which is not a very valid measurement.

T1-35 The next question is, 20 years ago, I was down here when they discussed this landfill project, and at that time, we were told there was going to be dry rubbish put in the landfill.

(b)(6) owned that. If I was to dump crank case oil on my property and let it leak on somebody else's property, I'd be liable for that. Why isn't (b)(6) paying

for this instead of the taxpayers?

T1-36 The next question is, I read the charts out in the lobby, and noticed that my home is one of the places where they're supposed to be monitoring gas. They haven't monitored gas on my property. If they have, they were out there without me knowing it, and I wonder about the validity of the rest of the chart.

(Applause).

MR. EDENS: The next is (b)(6) (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) I live at (b)(6) I represent myself and my family, a wife and two young children, and I am a homeowner in the area.

I have four points. I got the copy of Draft Environmental Impact Statement earlier this week, and I haven't had time to go through everything, but there are four points of concern as I read through.

Number one, I'm not a skeptic by

nature, but ever since I've lived by the
T1-37
landfill, I've turned into one. The first thing I've seen in the report that I was looking for was that there were no comments about any testing for radiation to see if people had dumped, at any time in the landfill, illegally dumped radioactive materials from hospitals, or from whatever, industry, or any sources; and since then, I've called the Department of Ecology at the request of Mark Edens, who had at that time told me that he did not know of any studies as to any testing for radiation. I talked to an individual at the Department of Ecology today, and he said that no testing was done by them for radiation, and he called the Department of Social and Health Services, which he said was responsible for testing of radioactive contamination in the State of Washington, and he said that they had done no studies as to it.

So from my attempts today, I would assume that there has been no testing or studies done in that regard.

I would hope that there would not be any of that substance in the landfill, but how

can we know unless testing is done to determine whether or not it does or does not exist. It's one thing to say this, that it might or might not be there; but if testing isn't done, no one knows for sure. So I would like to see that, see some comment or statement as to whether or not there is going to be testing for -- possibly if they haven't tested for radiation or radioactive material, there are other substances that haven't been tested for either.

T1-38 The next statement would be in regards to purchase of land. I notice nowhere in the Environmental Impact Statement, the draft statement, that there was any consideration in any point, except for section -- getting back to the statement about material that might be in the landfill, it did say in the Environmental Impact Statement, page 13, prior to 1980, the quantities and characteristics of individual waste disposed at the site were unknown, so there could be anything there, and I think it's worth looking into.

T1-39 Page 113 and page 114 of the impact

statement shows project costs, and under that, there is a subtitle of land purchase. Reading on, it shows that on page 21, the city has proposed purchase of 11 acres of land. On the basis of that, it would seem logical that they could include -- this has to do with surface water detention, but it would seem that on the basis of that, they could include information in the impact statement as to the possible projected cost of purchasing individuals' lands associated or around the landfill site.

T1-40 The next statement would be the utilization of landfill methane. The Draft Environmental Impact Statement says that there might be proposed utilization for industrial resale of the methane. That was under the gas and odor control plan, section two, page 44; and I would like to see possibly a study done that would allow the methane, if it was found to be safe and utilizable, to be put back into the gas lines and given to the residents in the area that are forced to live around the landfill. It would be one way of holding our costs -- being able to show something desirable, to be able to sell our house with

30 years of free natural gas to the person that might want to take the risk of living there.

T1-41 The fourth point that I would like to make tonight would be in support of the maximum grade for the landfill site. Everything that I've read in the Draft Environmental Impact Statement points to the maximum grade alternative as being the most desirable to eliminate the leachate and the gas problems. The gas problems would probably be minimal, but the leachate is the most important characteristic, but I see that the City of Seattle has a cost factor. If it costs too much, they're not going to consider it. If they can't get the dirt at a low or no cost, that they aren't going to seriously consider the maximum grade alternative.

I don't know if cost should be a factor at this point, that the factor should be the best alternative, not whether or not it cost more or doesn't cost more.

That's all I have to say.

(Applause).

(b)(6)

MR. EDENS: (b)(6)

MS. MORRISON: My name is (b)

(b)(6)

T1-42

and I was wondering if the surface water coming from 5, and that generated at the site itself becomes more contaminated as it goes over the surface of the landfill, and going eventually into Salt Water Park.

MR. EDENS: Thank you.

At this time, I've been through all of the first time speakers on the list. Is there anyone else that has not spoken yet that wishes to speak now? Yes, sir?

(b)(6) I'm (b)(6) I live at (b)(6) Kent (b)(6) on the (b)(6)

MR. EDENS: Sir, could you please spell your name?

(b)(6) (b)(6)

MR. EDENS: Thank you.

(b)(6)

(b)(6) I think we should go

T1-43

back about 20 some years. I'd like to ask to

find out exactly as we were told, and I have had previous people here stating that, and I have heard the same thing, that the landfill would only be such as wood, paper and nontoxic materials. I'd like to see a record of these minutes of the council meetings between the City of Seattle and the City of Kent.

T1-44 Also, why have we not been informed recently, all we hear on TV is usually the worst, there must be some good sides to it. They have been up to my area, have checked various houses, they have not checked my house at the present, so therefore, I request that my house be checked. The house next to it was checked.

T1-45 Also, will this information that has been asked, the questions tonight, will we all here be able to see a copy of this that we all can see the answers to what was asked tonight?

Thank you.

(Applause).

MR. EDENS: Is there anyone else that has not spoken that wishes to speak at this time? Yes, sir?

(b)(6) My name is down

there.

MR. EDENS: I'd like you to once again state your name and your address, and spell it out, please, for the record.

(b)(6)

(b)(6) My name is (b)(6) is the first name, (b)(6)

I'm a former resident of (b)(6) (b)(6) I no longer live there, but since I (b)(6) the Midway Garbage Protesters 20 years ago, I have a lot of historical fact, and know -- and I turned over all the records that I had to some of the people that are in a committee that's questioning this procedure.

T1-46 The reason I came up here is that the Environmental Impact Statement, in my opinion, is kind of an unusual report in that it proposes a solution or solutions without defining the problem. Now, here we have a landfill that has been in effect for 20 years, and the section on geology, particularly, though very, very sparse, in reference to a couple of studies that have been done in a cursory basis years and years ago, there were

no core samples mentioned in there for examining the geology, structural formation of the earth, as I understand it. And when I lived out there at the top of 250th Street, which is a block away from the landfill, a block away from Highway 99, or two blocks or three blocks on the landfill, there are layers of gravel that extend from the landfill in that direction, and that is glacial till.

Now, nobody defined what glacial till is. They are alternating layers of gravel and silt. There is a layer of silt, and there is a layer of gravel, and there is a layer of silt. And that makes a perfect conduit for water. So it makes a perfect conduit for gas, which is a fluid. In fact, it may be a better conduit for gas.

Now, in a 20-year period, these conduits may all be full, maybe saturated with methane gas and toxic materials that were leached out from the landfill with water flowing there, and this year particularly, which is dry, I would suspect if the gravel got saturated with methane, that extends thousands of feet away from the landfill site.

Now, trying to catch that and confine it in the immediate boundaries may not be enough. I suspect that when you get wet years, as the water table rises, you may get methane gas into houses for an indefinite period of time. They may be permanently damaged for thousands of feet around that.

T1-47 The other question, now, a suggestion since the solution has to be proposed of some sort here, let me talk about the surface water drainage. There is an outfall line that goes through Salt Water State Park that was owned by the now defunct Sylvia Plant Sewer District. I was a commissioner of that when I lived in that area. Now, that sewer district and the utilities and probably the pipeline has been inherited by the City of Des Moines, the Des Moines Sewer District. So in fact, maybe you could save some money in getting an outfall that would take the water way out into the sound without having to build a new one. That sewer plant was right at the bridge which crosses the ravine that is Salt Water State Park on 16th Avenue. You might pursue that with the Des Moines Sewer District.

T1-48 Now, the other question that I ask is the credibility gap here with the City of Seattle, the way they handled that dump and other dumps. Why are they trying to fix it right now when they caused the problem to begin with? It's like having the hen house guarded by the fox. There should be a third impartial body, maybe Metro should handle the fixing of that particular garbage dump, somebody that hasn't got anything to hide.

(Applause).

T1-49 (b)(6) The other question which may be addressed to the EPA is, does the EPA have subpoena powers in which they could get some of employees of Seattle, the Seattle sanitation that was running that. There might be some people around who might be summoned and interrogated as to what went before 1980. I suspect there are some very, very definite toxic materials there, because I heard, it has been alleged that they were bringing load after load of material that was pumped from bilges of ships, it was dumped in there. And there is a load of dead chickens dumped in there, too. There's all kinds of stuff in

there that had been there in 1980. There was some people that tried to keep an eye on it, but at that time, it was supposed to be nonputrescibl material, nonrotting material, and suddenly, it's putrescible. Now it's a problem.

Thank you very much.

(Applause).

MR. EDENS: Is there anyone else that has not spoken yet that wishes to speak? Anyone else? Hearing none, (b)(6) has already requested to come back and talk some more. Do you still wish to?

(b)(6)

(b)(6) Yes. (b)(6) I think you had it earlier.

T1-50 A couple other questions that come to mind. One of them is, I asked this last week, too, and I didn't get a proper response then. The area that is affected by the waste run-off waters, we are pretty well assured have extended to at least below or west of 20th Avenue South, and yet there are houses that have recently been built or are being built, and real estate agents are out selling these

houses now, and I'm wondering what's happening to prevent the King County Health Department from issuing these permits to the contractors to build houses in areas that are known, probably known -- I can't see otherwise -- known to be affected by this landfill problem.

T1-51 The other question I had was the control of the waste water run-off into the Parkside detention hole. My understanding from people who live adjacent to the school, who observe the wet land overflowing in heavy rain periods, and all of the water that flows into that wet land does not come down Highway 99, that could be channeled over into the landfill to be controlled, input water into the landfill, how do they intend to control all of the water that's there in the landfill, in the detention hole, or the underground seepage from the landfill that they're not going to have any control over either?

Now, I came here tonight, and I'm sure a lot of other people in this room came here tonight with the idea that we were going to pop questions and get answers, and we all found out that wasn't to be the case tonight,

that we was just going to pose our questions for a future answer when the Environmental Impact Statement is finally published in October or so. The meeting that's being held next week in Seattle is of the same format that we have here tonight, and will provide no answers then either. I notice we have three television stations that are monitoring this meeting tonight, and I would like to go on record as challenging those reporters here tonight to make an effort to get some answers to some questions that we posed.

(Applause).

MR. EDENS: Is there anyone else who has not spoken who wishes to speak, or is there someone else who wishes to come back and make an additional statement? Is there anyone else at all who wishes to come back and speak? Anyone else who wishes to speak?

Hearing none, then I will close the public record of this public hearing.

I will want to say that this is not the only place that you have to make comments. There will be another meeting in Seattle on September 11th, the 4th floor of the Seattle

Municipal Building. That will be held from 6:30 to about 8:30 or 9:00 o'clock, and it will be in the same format as this public hearing tonight. If you do not wish to make a public statement, you can also submit written statements, and you can address those to me, and my address is given there on the agenda.

In terms of when these questions will be answered, they will be answered when the final Environmental Impact Statement is published. That is what the SEEPA process is all about, that is how we have to address them. We have to receive your comments as a legal public record, and we have to answer them in the same manner. We can't give you off-the-cuff answers. We need to give them for the public record for everyone to see.

Another question that's been asked is, will you get to see the comments that were given tonight, and the answer to that is yes, we will be having a transcript done of this hearing, and it will be available publicly. In addition to that, I hope to try to compile all the written comments that I receive and include those in the record, and I hope to

give it the same distribution that the draft Environmental Impact Statement has received. So you will get a chance to see those comments.

A VOICE FROM THE AUDIENCE: When and where?

MR. EDENS: The comment period extends until September 19th, and it will take us some time to get that together. I would expect the record of the hearing will probably come out around the first part of October. I expect that the Draft Environmental Impact Statement, or I hope to get it out around the end of October, or early November. That is what I'm shooting for. I can't say that this is absolutely, positively for sure that it's going to come out on that date, but that is what I'm shooting for.

With that then, I'll now close the public hearing. Thank you for coming.

(Hearing terminated at 8:38 p.m.).

C E R T I F I C A T E

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I, JULIA OBIEN, the undersigned Court Reporter, do hereby certify:

That the transcript hereto annexed was given before me at the time and place indicated in said transcript, and that the testimony thereupon given was by me stenographically recorded and typewritten under my personal supervision;

I further certify that the foregoing transcript contains a full, true and accurate record of all of the testimony and all of the proceedings given and occurring at said time and place.

Julia Obien

Notary Public in and for the State of Washington, residing at Renton.

RESPONSE TO PUBLIC HEARING TRANSCRIPT NO. 1
TESTIMONY RECEIVED ON AUGUST 29, 1985

(b)(6)

T1-1. If the Kent Highlands Landfill is expanded to the north, the existing leachate collection and pretreatment facilities will be upgraded to accommodate all leachate flows from the Midway Landfill and existing and new portions of the Kent Highlands site.

T1-2. No evidence of leachate from the Midway Landfill has been identified in public and private water supplies in the surrounding districts. See the revised Public Water Supplies section in Section II of this FEIS, and the Beneficial Use Survey in Appendix N.

T1-3. No. The distance between the nearest refuse at the two sites is over 4500 feet. No known natural or man-made conduits exist between the two sites.

T1-4. See response to Letter No. 15, Comment 3.

(b)(6)

T1-5. See response to Letter No. 15, Comment 5.

T1-6. You are correct that 4 percent methane gas within a confined space is the lower end of the explosive range. Therefore, 15 to 21 percent in a confined space would represent a high risk of explosion. However, a level of 15 to 21 percent measured in the soil around the foundation of the building would not be explosive. Since the time the daycare center was evacuated, methane levels at which evacuation will take place have been defined more precisely.

T1-7. The City of Seattle is proposing measures for closure of the Midway Landfill that will correct (not relocate) identified problems pertaining to surface water, groundwater and air quality in the vicinity of the landfill.

(b)(6)

T1-8. See response to Letter No. 9, Comment 16.

T1-9. See response to Letter No. 11, Comment 12 under Site Responsibility.

(b)(6)

T1-10. Comment noted. Your well was included in the beneficial use survey conducted in December 1985 (see Appendix N of this FEIS). Some wells in the vicinity will be tested as part of the ongoing groundwater investigations (see Appendix M).

T1-11. See responses to Letter No. 15, Comment 3 and Letter No. 27, Comment 15. Complaints regarding the assessed valuation of your property for tax purposes should be directed to the King County Property Tax Advisor at (206) 344-5202.

T1-12. The main source of water that presently enters these ponds is from the upstream marsh and local runoff. As described in the Final EIS, much of the water currently entering the marsh is runoff water from nearby commercial areas and highways. Urban runoff such as this is typically high in oils and grease. The oily scum that was observed is not abnormal for a small water body that is influenced by urban runoff.

The inlet to the first pond was sampled in September 1985. The measured conductivity was somewhat elevated in the pond and other sampling sites in the area. Although increased conductivity is sometimes used as an indicator of leachate, it can also be caused by urban runoff. No other signs of leachate seeps were observed during the September sampling. Future sampling in this area is planned to check again for signs of leachate contamination. If any leachate seeps should appear, appropriate remedial actions will be taken and the area will be sampled as part of the normal monitoring plan for the landfill vicinity. The response to Letter No. 12, Comment 3 is also relevant.

T1-13. Seeps and springs in the vicinity of the Midway Landfill will be checked during the on-going groundwater investigations described in Appendix M of this FEIS. See response to Letter No. 12, Comment 3.

T1-14. See response to Comment T1-11 above.

T1-15. Clean fill material would be brought in as necessary to achieve the desired final grade. The proposed final cover system would be installed over the soil fill (see page I-29 and Figure I-10 of the DEIS). The proposed cover system will reduce seepage of precipitation into the landfill, reducing leachate generation by an estimated 94 percent over present conditions. As described on page I-38 of the DEIS, methane and other gases would be collected in an extensive gas control system and burned in high temperature flares rather than just being vented to the atmosphere.

With regard to future use of the closed landfill site, see response to Letter No. 35, Comment 28.

(b)(6)

T1-16. See response to Letter No. 15, Comment 3.

T1-17. See response to Letter No. 34, Comment 3.

T1-18. See response to Letter No. 29, Comment 4.

T1-19. Additional groundwater studies described in Appendix M of this FEIS will provide a better understanding of groundwater flow directions in the vicinity of the landfill.

T1-20. At present, the City of Seattle is preparing an EIS for closure of the Kent Highlands Landfill. Two alternatives for closure are considered: the Intermediate Grade Alternative, which would result in closure by March 1987, and the Maximum Grade Alternative, which would result in closure by the end of 1990. Because this is an active landfill, alternatives for disposal of the Kent Highlands waste stream are also evaluated in this document. Two alternatives for disposal are considered in detail: use of the King County regional landfill at Cedar Hills and expansion of Kent Highlands to the north. Under the expansion alternative, Kent Highlands would not close until the year 2005. The Kent Highlands EIS is expected to be issued later this year.

(b)(6)

T1-21. See responses to Letter No. 9, Comments 16 and 18. The revised Surface Water Management Plan section in Section II of this FEIS presents additional on-site detention alternatives with pipeline routes that bypass the school area.

T1-22. See response to Letter No. 12, Comment 3.

T1-23. You may contact the Seattle Solid Waste Utility to have your house checked (telephone (206) 625-2324).

(b)(6)

T1-24. See response to Letter No. 22, Comment 2.

T1-25. Testing for priority pollutants has been done on samples obtained from groundwater monitoring wells and from the ponds at the landfill. See Table A-3 in Appendix A for a list of pollutants tested for at the landfill. Seeps and springs in the landfill vicinity will be studied as part of the on-going groundwater investigations described in Appendix M (see response to Letter No. 12, Comment 3).

T1-26. The Parkside Elementary School playground area has not been tested for priority pollutants. However, there is no evidence of significant leachate contamination in this area. See response to Letter No. 12, Comment 3.

T1-27. Construction of the proposed closure facilities is intended to prevent any leachate that is in the landfill from mixing with surface water runoff and being discharged from the site.

T1-28. See response to Letter No. 35, Comment 1.

(b)(6)

T1-29. See responses to Letter No. 15, Comments 3 and 5.

(b)(6)

T1-30. All surface water management plan alternatives include eventual discharge of runoff to Puget Sound. This runoff will be monitored to ensure that it does not contain leachate (see response to Letter No. 9, Comment 18). Only leachate from the leachate collection system will be trucked to the Kent Highlands landfill for treatment and disposal.

(b)(6)

T1-31. Comment acknowledged.

(b)(6)

T1-32. Comment acknowledged. Although some studies will continue, construction for closure of the Midway Landfill is expected to begin during the 1986 construction season. Construction of the landfill gas migration control system is already underway.

(b)(6)

T1-33. See response to Letter No. 15, Comment 3 and Letter No. 27, Comment 15.

(b)(6)

T1-34. As discussed on page II-46 of the DEIS, the gas from the Midway landfill contains several constituents that can cause odor problems, including butanoic acid and its esters and hydrogen sulfide. Although the sense of smell differs from person to person, "odor thresholds" have been defined for these constituents that represent the concentration at which most people would detect an odor. These standard odor thresholds, which are listed in Table II-11 on page II-45 of the DEIS, provide a scientific method of evaluating odor.

T1-35. See response to Letter No. 35, Comment 1.

T1-36. Comment acknowledged. The chart was meant to be representative of the scope of the landfill gas monitoring program and was not entirely accurate in showing the location of individual residences. To have your home tested, you may contact the Seattle Solid Waste Utility (telephone (206) 625-2324).

(b)(6)

T1-37. Although there is no evidence that regulated radioactive wastes were disposed of at the Midway landfill, certain exempt wastes (below the regulatory concern) have probably been disposed of at the landfill. It is possible that these minimal quantities may be detected in the leachate. A screening of leachate for radionuclides listed in the Primary Drinking Water Standards will occur as part of the Work Plan for On-Going Groundwater Investigations (see Appendix M of this FEIS).

T1-38. During the time period from 1980 to 1983 wastes including paint sludges, dyes, preservatives for decorative plants, alkaline wastes, oily sludges, waste coolant, truck steam cleaning wastes and some oily wastes were approved for disposal at Midway by the Seattle-King County Public Health Department. The Health Department evaluated these waste streams according to federal and state hazardous waste criteria and determined them to be non-hazardous.

The quantities and characteristics of the industrial wastes disposed of at Midway Landfill prior to documented approval are unknown. The Washington State Department of Ecology and the U.S. Environmental Protection Agency are currently investigating the contents of the Midway Landfill as part of the Superfund study they are conducting on the site. Additionally, a Work Plan for On-going Groundwater Investigations has been developed to better evaluate groundwater contamination by landfill leachate (see Appendix M of this FEIS).

T1-39. See response to Letter No. 15, Comment 3.

T1-40. Comment acknowledged. The utilization of landfill-generated methane as an energy source will be evaluated once the gas withdrawal system is in operation and quantities of methane available are known.

T1-41. As discussed in Section I, the preferred alternatives were selected primarily on the basis of their ability to achieve project objectives, not just on the basis of cost. With regard to the maximum grade alternative, see responses to Letter No. 35, Comments 4 and 20.

(b)(6)

T1-42. After landfill closure is complete, it is expected that surface runoff water leaving the site will be typical of surface runoff water generated from any grassy urban site. Therefore, no addition of contaminants is expected. Runoff water from the site will be monitored to ensure that it is not contaminated by landfill leachate (see response to Letter No. 9, Comment 18).

(b)(6)

T1-43. The Lease and Easement Agreement between the City of Seattle and the owners of the Midway site (Appendix B of the DEIS) specifies that the "operator shall be entitled to utilize the site and the property herein described as a place for depositing and caring for non-putrescible type waste material, including but not limited to rubble, rocks, stone, bricks, sand, gravel, tile, dirt, plaster, lath, plasterboard, broken concrete, paper, shingles, asphalt and construction and industrial waste materials." You may contact the City of Kent and Seattle to determine if minutes of 1965-66 council meetings are still available.

T1-44. See response to Comment T1-23.

T1-45. The City of Seattle Solid Waste Utility compiled the comment letters and public testimony in a document entitled "Record of Public and Agency Comments" in October 1985. This document was sent to the recipients of the Draft EIS and persons commenting on the Draft EIS. No response to comments was included. The Final EIS contains a copy of all letters and public testimony received, plus responses to comments.

(b)(6)

T1-46. Additional studies described in the Work Plan for Ongoing Groundwater Investigations will further define the geologic characteristics and groundwater regime in the site vicinity. The City of Seattle and Washington Department of Ecology are conducting an extensive program of regular testing of methane levels at homes and businesses in the site vicinity (see revised Risk of Explosion and Hazardous Emissions section in Section II of this FEIS.

T1-47. See response to Letter No. 29, Comment 3 regarding the existence of the referenced outfall line through Salt Water State Park.

T1-48. Closure of the Midway Landfill will comply with all federal, state, and local regulatory requirements, as discussed on page I-2 of the DEIS. The final closure plan and detailed design documents will be reviewed by the Washington State Department of Ecology and the U.S. Environmental Protection Agency. In addition, Ecology and EPA are conducting an independent study of the site under Superfund (CERCLA). These two agencies, in cooperation with the Seattle-King County Department of Public Health, will have the final say as to the closure requirements of this site.

T1-49. See response to Comment T1-38.

(b)(6)

T1-50. Water quality monitoring performed in the area west of Highway 99 by the Seattle-King County Public Health Department and Washington Department of Ecology has found no evidence of leachate contamination (see response to Letter No. 12, Comment 3). Because this land is within the limits of the City of Des Moines, Des Moines is responsible for the issuance of building permits, not the Health Department.

T1-51. Surface water to be diverted into the on-site detention basin is presently collected in storm drainage facilities located along Highway 99 and discharged at a few locations on the west side of Highway 99 towards the wetland area west of the landfill. By diverting this runoff into the on-site detention basin and releasing it out of the basin at a controlled rate, the total discharge to the west can be controlled so that it remains below the peak discharge from current conditions. Because more water will be discharged, the duration of the discharge will be increased.

TRANSCRIPT NO. 2

P U B L I C H E A R I N G

MIDWAY LANDFILL CLOSURE PROJECT

Fourth Floor Municipal Building

September 11, 1985

6:30 p.m.

I N D E X

	Page
Introduction	3
Consultant Presentation	6
Public Comment and Questions	
List of Speakers	
1 (b)(6)	29, 112
2	31
3	34
4	37, 113
5	39
6	47
7	57
8	58
9	61
10	63, 111
11	66
12	69
13	77, 108
14	75
15	79
16	82
17	87
18	93
19	96
20	97
21	102
22	103

P R O C E E D I N G S

MR. EDENS: Good evening, and welcome to the public hearing for the Midway Landfill Closure Plan. My name is Mark Edens and I am the project manager for the City of Seattle on this project.

I have a couple of housekeeping items tonight. The bathrooms are outside on either side of the elevator. The men's is to the north, and women's is to the south.

I would like to say that I think it's about 7:00 the guards lock the stairwell doors, and they lock them from the inside, so if you get into the stairwell, the only way to get out is to go down to the fifth floor and pound on the door, so I'd appreciate it if you don't try to use the stairwell. I know it's only one flight up to the fifth floor, but you will have to take the elevator to get there.

Also, the door into the parking garage may be locked, so if you go out that door you might not be able to get back in; and once again, the only way is to go up to the fifth floor parking garage, the plaza out

there, and the guard will let you get back in.

On the agenda for tonight we show that we would run from 6:30 until 8:00. We will be going until 8:30. We've scheduled that long. If there are additional comments, we will keep going a little bit longer, if we need to, to get those in the record.

The purpose of this hearing is to take your comments and your questions and information on the Draft Environmental Impact Statement, and mainly we're looking for additional facts that may not be in that document; or if there are some material in there that you don't think it was adequately explained, you may have some more questions that you feel need to be answered in the final Environmental Impact Statement.

We do have a sign-up list out in the hallway, and people will be called to make their comments in the order that they sign up on that list. So if you do intend to make comments tonight, I would suggest that you go ahead out now and put your name on that list.

Also, out in the hallway we have some displays which we used in the public workshop

and also in the last public hearing. You may want to go look at those and help familiarize yourself with the project.

We also have copies of the Draft Environmental Impact Statement available out in the hallway. If you would like to look through one of those and review it while some of the other comments are going on, you're welcome to do so.

We also have some copies of the EIS available for purchase, and we also have some copies of the technical appendices available. If you do wish to purchase them, we would like to accept checks only tonight. We don't have facilities available to make change and so on so we'd rather receive checks.

The second item on the agenda after this introduction is a short presentation by the consultant working for the city, Parametrix, Incorporated. If you don't have any questions right at this time, I'd like to allow him to go ahead and make his presentation. Any questions right now?

Okay. Right now Richard Dunlap of Parametrix will come up and give a short

presentation on the EIS and its contents.

CONSULTANT PRESENTATION

MR. DUNLAP: Mark, is it all right if I stand over here without the aid of the microphones?

MR. EDENS: Yes.

MR. DUNLAP: I'm sure everyone can hear me. If you are taping the proceedings this evening, hopefully my voice will carry sufficiently to be recorded.

Most of you -- and I recognize a number of your faces -- have seen what I'm going to be talking about tonight, but basically what I'm going to do is go over the concepts and more appropriately termed alternatives that are being presented in the closure plan and evaluated by the Environmental Impact Statement for the closure of the Midway Landfill.

I think it's important that you understand that your input, especially your input now, will be very, very important to the city, and in turn to Parametrix, Incorporated,

in evaluating the alternatives and picking a preferred alternative which will become the preferred alternative addressed in the final Environmental Impact Statement.

If you haven't structured your comments in that fashion, I would appreciate it if you would help us so that we can recommend to the City Council and to the Landfill Committee the preferred alternative based mostly on environmental engineering issues, based mostly on the input we've received from the public, because as I have seen in the last few months, especially the numbers of people who are more familiar with the site, more familiar with the impacts associated with the Midway Landfill and do have a meaningful input, and I can assure you that that input is being utilized by our consultant team in evaluating these particular alternatives.

As I've outlined in the previous workshops, the alternatives at the Midway Landfill forclosure consist of several areas. The first area that we were concerned about is the final grading plan of the landfill. We

developed three alternatives and presented those in the Environmental Impact Statement.

The first is termed the minimum grade alternative, and that's designed to provide for an engineering closure of the site that does all the things that we need to do environmentally, but does it in a way that is minimal change to the existing ground profiles at the site, and, conincidentally, with minimum cost in terms of developing that grading plan.

Things we do that are important to those who are adjacent to the landfill and those who are concerned about environmental issues are that we develop a grading concept that takes all of the surface water that enters the site through minor amounts of inflow from adjacent properties, and, of course, the major amount of precipitation that lands on the site, and channels that off the landfill.

Regardless of which grading alternative we've picked, we have proposed a cover cap, a sealing of that landfill that will reduce the amount -- significantly reduce

the amount of infiltration that is now producing the leachate that is causing potential groundwater contamination. Another aspect, of course, is the surface water, and I'll be dealing with that in just a little bit.

But the minimum grade alternative develops a plan that essentially does not alter the physical contours of the site a great deal. We're not raising the landfill up in the air. Elevation 405 is our maximum proposed elevation. As you can see on the map, there is an existing ground elevation in that southeast corner of about elevation 400.

We are filling some areas that are currently problem areas. One is called the south pond, another is called the middle pond, and we're reserving an area in the north called the north pond, which we will potentially, depending upon the surface water management alternative, convert that to a detention basin for better control of surface waters.

The next alternative that we've considered is termed the intermediate grading plan. It does no more in terms of prevention

of infiltration, it does no more in terms of meeting the contours in the immediate area of the landfill in terms of raising it than the minimum grade, with the exception of if we go up to elevation about 415 --

And the reason we've done that is that most of our landfills -- and I don't think Midway will be much of an exception -- have a tendency to settle. The higher we can make that landfill, the more assured we are that grading, surface water run-off, will be preserved over the life of that closure period, which we expect to be approximately 20 years.

The other thing the minimum grade alternative does is produce a better chance of routing surface drainage off the site in a more preferred manner. It uses a bit more material to reach those elevations in the minimum grade alternative and therefore is a bit more expensive.

The maximum grade alternative does all the things that the minimum grade plan presents, but it does raise the landfill a bit more in height.

We're up to elevation 420, and

instead of making that elevation at its highest in the southeast corner, we've moved it more to the central portion of the landfill, and we can produce a grading plan that we are really confident that can manage the surface water run-off.

However, certainly at no expense, because we are talking about a significant amount of material, two to 300,000 cubic yards for the minimum and intermediate grading plan. We're up to 700,000 cubic yards if we go ahead and implement the maximum grading plan.

All of the plans that are presented here in terms of alternatives have that final cover system that's outlined in the Environmental Impact Statement. That's a ten to the minus seven centimeters per second clay barrier. It may not be natural materials. It may have to be amended with sodium bentonite mineralized clay that we will have to import from out of the State of Washington, if we can not find suitable natural materials.

All of the grading plans provide for surface water management, and there are, with the exception of what we do with the water on

site, four alternatives to surface water management for the Midway closure plan.

We identified early on in the development of the project two potential places -- areas that we could discharge the water that we would collect at Midway, since we are in somewhat of a drainage defi, although the Midway Landfill in and of itself is its own drainage basin.

Since the construction of Interstate 5, all of the freeway drainage from I-5 at this location and to the north has been discharged directly into the site, directly into the refuse, and is a major leachate generator of its own. In addition, all of the precipitation that falls on the land area occupied by the Midway Landfill becomes leachate.

So our primary goal and objective is to reduce the amount of both surface water and discharge as well as precipitation infiltrating the landfill cover that would produce leachate. Once we've achieved that objective of keeping I-5 drainage out, once we've achieved that objective of sealing the

landfill, we now have surface water that we have to deal with.

We looked at the Green River discharge area as one potential route, and we looked at Puget Sound as a second potential discharge route. We discarded the Green River options primarily because of legal issues.

King County, the City of Kent, the Corp of Engineers indicated to us that the Green River could not accept additional discharge from areas not within its drainage basin. We therefore selected the option of using the Puget Sound as a final discharge point, and developed four specific alternatives to deal with that. Really, there are only two.

The first two alternatives, A and B, consider managing the discharge of surface water using existing courses, existing drainage routes, between the landfill and Puget Sound.

The first alternative A considers development of a detention basin at or near the landfill site to collect all the rainwater, plus I-5 drainage, plus a bit of water that

occurs -- or is tributary to the site from the east side of I-5 in a residential neighborhood area, putting that in a detention basin and discharging that out at a metered rate that would be no greater than what would be occurring under existing conditions.

A second alternative considers moving that detention basin to the west and utilizing an existing wetland, developing that into a more formal detention basin, and, again, metering the discharge from that area out at a rate that is no greater -- in fact, in some cases less than -- the amount that's currently being discharged out of that area.

The selection of those two alternatives principally -- and I know the concerns of many of you are with the wetland area -- was that flooding problems are already inherent to this area. In fact, I believe there are some litigations pending regarding what's happened to the drainage in that wetland area.

We felt that to not develop it as a formal detention basin, and manage it so that the discharge rates leaving that site would be

below those that are currently there, would be a mistake. We did not decide to use the on-site detention concept without a great deal of study.

One of those elements that are important to you in that on-site detention, which would be developed here (indicating), is that all of the water that is currently being discharged to the wetland area along Highway 99, which, as you know, are primarily commercial properties, would be routed to our detention basin, thus limiting the amount of water that goes to the wetland area. We would hold it in our detention basin, and then meter it out at a rate that would be again at or below current rates of discharge; and we predicated that design on an event that would occur at least once every 25 years. Engineers term that the 25 year storm.

Downstream of that particular area, specifically the wetland near Parkside Elementary School, are culvert crossings of a number of streets, and, of course, a small privately owned pond north of 250th. We looked at those culverts and found that they

are currently undersized for existing conditions, so whatever plan we would implement, either on-site or off-site detention, those culverts would be upgraded.

The North Fork of Smith Creek discharges or combines with the South Fork to essentially make up Smith Creek as it flows through Salt Water State Park.

There are some problems in Salt Water State Park with respect to flooding. We've been apprised of those problems by the State Department of Parks. Our programs with on-site or off-site detention would limit the amount of waters there so that there would be no increase in impacts due to what's proposed by either of these alternatives to the existing conditions in Salt Water State Park.

On the basis of considering additional alternatives, we developed routes and plans that consider getting the water directly from the landfill or a detention basin on-site to Puget Sound.

One considers the use of an on-site detention route that would discharge at a point near the confluence of the north and

south forks of Smith Creek, and would consider development or improvement of those, as I outlined earlier, culverts, or in some cases bridge crossings, small bridge crossings in the park area that are currently impacted. Those would have to be upgraded to sustain the 25-year event without flooding.

The second alternative considers a pipeline route that generally flows the same general topographic region, but does not discharge water to Smith Creek. It generally follows the creek in the area of Salt Water State Park, but separate from it, and is a direct discharge to Puget Sound.

Both of these alternatives are subject to minor revisions in that we are dealing with an Environmental Impact Statement and that our picking of a route was based on topographic conditions. Final design would have to consider certain property acquisitions, right-of-way easements, and so forth.

The last and probably one of the most publicized issues with respect to the closure of the Midway Landfill is the control of landfill gas.

Landfill gas is being generated at Midway Landfill currently. It has migrated laterally away from the site, primarily in directions shown by these shaded areas (indicating), to the south and east, and to a certain degree to the north and west.

The need to control that migration originally was thought to be possible using what we call passive methods. Those have in some cases been implemented with the operational programs at the site. We found that they have been only partially successful.

We now are proposing an active gas system which considers initially as the construction of a series of wells, as many as 50 or 60 wells around the periphery of the site. These wells will range in depth from about 50 to as great as 80 feet deep. They will be 36 inches in diameter and be designed to work almost like a vacuum system -- in fact, exactly like a vacuum.

When completed in terms of construction, which will be in approximately six months, each well will be withdrawing landfill gas from the landfill, thus

preventing lateral migration. All gas will be collected in a central manifold pipe brought to what we call in that particular graphic (indicating) a blower and flare pad. And I think for those of you who have looked at the graphic outside, you know what I'm talking about.

It is a central location where we have motor blowers that provide us that vacuum or that suction. We're going to be burning the gas in some ground level flares, but they will be sightless, approximately 10 to 12 feet in diameter, approximately 14 to 16 feet in height. Each flare -- and we plan six of them now -- will burn gas at a rate of approximately 1,000 cubic feet per minute; and I think that tells you how many cubic feet a minute we're going to be withdrawing: approximately 6,000.

That gas will be combusted for two reasons. One, we don't want to allow the gas to be emitted because of obviously the odor problems we've experienced in the past. Secondly, the gas that has been tested at Midway does contain some materials that we

believe are not successfully emitted without destruction of certain constituents.

That combustion of natural gas, which methane is, will provide the needed temperatures for destruction of some of the volatile organics and some of the noxious compounds that we found in that gas.

If we move to final closure -- and I say the migration control system, that system will be built immediately -- if we move through closure, which is planned to start next year, one of the next elements of that plan will be the construction of an interior odor control system.

We've shown it conceptionally here as, again, a series of wells advanced within the refuse. We are looking at design options which may include some trenches because of what experiences we've found at other landfill sites.

Combined with the migration control system, again, will be a series of flare pads and blower assemblies that will combust the gas at the site to eliminate both the unsightliness of the discharge, as well as

potential odor and health problems.

We have not ruled out the possibility of recovery of the methane gas, which is a feasible option and has been used elsewhere.

This system is completely set up so that it could be converted to an energy recovery program either in terms of utilizing the energy in the gas as a low BTU fuel to burn and produce steam, which would drive, then, a generator set; or potentially cleaning the gas up, which is also an option, with the direct discharge as pipeline quality or high BTU gas through an existing natural gas pipeline.

We've contacted both the purveyors in the area and they are at this point in time very cooperative and very willing to provide assistance and essentially be a customer of that system.

So regardless of what happened in terms of long-term maintenance, that system could be converted to a landfill gas recovery system.

The final graphic I wanted to share with you quickly before we start the public

comment period -- and I did go over it rather briefly in the introduction of the grading plans -- is the final cover system. Some of you have asked me a number of questions about that cover system at previous meetings and I want an opportunity to describe it to you.

We are going to slope the landfill both with the minimum, intermediate, and maximum grading plans, and then we are going to be applying a very impervious cover system followed by a soil cover system that would be amenable for turf grass development.

A number of you have asked me why -- or what will happen to the landfill after closure. There are some pictures of the landfill closure similar to the Midway site out there and you can see that it is not necessarily a park-like setting, but certainly nonoffensive in terms of its appearance. It's a grassy knoll.

That turf grass or that ground cover system will require continued maintenance, and the City of Seattle has committed to maintain that system both in terms of the turf grass, as well as the final cover system, to ensure

that we are not producing any more leaching.

By the way, the leachate production at that site will be reduced by some 90 million gallons annually with the addition of this final cover system.

The City of Kent has been given by legal doctrine the right to develop -- or be given a parcel of land that would be developed as a park at the landfill. The development of this final cover system would not preclude that park site development, but we are stating in the Environmental Impact Statement that active recreational facilities would probably not be built there immediately due to the fact that that landfill is settling and there may be some problems associated with structures or the development of certain recreational facilities such as tennis courts or public utility services.

The maintenance of the drainage facilities both on and off-site are going to be a requirement through that. Not just the 20-year closure period, because it will not stop raining at the end of 20 years in Washington. So the maintenance of those

facilities will be required after closure.

The City of Seattle is committed to maintain all on-site drainage facilities. Those facilities that are not their own in terms of the use of open channels and in terms of the use of other public entity utilities such as culverts and storm sewers -- downgrading, an example would be a culvert crossing at Salt Water State Park. Those facilities would be basically maintained by the owner of those untilites at this time. An example would be the state park would maintain and operate the culvert system even though they may be upgraded with this project by the City of Seattle.

We are hopeful that both the gas migration and the surface sealing and surface water management programs will be successful in mitigating problems both now and potential with respect to groundwater contamination and gas migration. However, as you've read in the Environmental Impact Statement, a contingency plan is also proposed.

The first part of that contingency plan is a very detailed monitoring program.

We will be monitoring both groundwater and surface water with respect to quality and quantity; primarily quantity with respect to surface water discharges, but quality as well. We'll be monitoring gas.

In fact, that monitoring program has already begun. Mark has outlined it on a number of occasions, the extensive house to house monitoring program that the City of Seattle and King County Health District has instituted, as well as the Department of Ecology.

And finally, we'll be monitoring the effect of the final cover system or the condition of the final cover system during that closure period. And the City of Seattle has committed that if these systems do not perform as required, that they are willing -- or committed to institute a contingency plan.

The contingency plan may consist of upgrading the cover system. It may consist of specific withdrawal of leachate from -- or contaminated surface water from certain areas.

For example, if our on-site detention basin shows signs of contamination, the City

of Seattle would not discharge that water to downstream water courses, but halt that discharge and remove that water and take it to a location that is suitable for discharge.

In the current situation with Midway we're already doing that, trucking that contaminated surface water to the Kent Highlands landfill where they provided treatment and then discharged to the Metro sewer system.

If groundwater contamination is found to be a problem after closure, the city is prepared to institute a contingency plan for management of that groundwater which may include alternative water sources if those that are currently under beneficial use are effective; or it may include actual groundwater withdrawal, either upgrading it or downgrading it to prevent contamination, or if contamination occurs, withdraw that contaminated water and provide for a treatment or discharge.

So coupled with the issue of the need to do something now, this closure plan has been developed with a series of grading

alternatives, a series of surface water management alternatives, and in some cases no alternatives.

We really don't have an alternative to gas migration. We've got to get in there and do something right now, a contingency plan with an environmental monitoring program to evaluate that closure, and if need be, upgrade it, enlarge it, or improve it during the post-closure period. The city is committed to that post-closure maintenance and operation period.

That concludes my presentation this evening, and I think Mark now is prepared to have you all provide your input.

MR. EDENS: We'll take about a five-minute break and break down some of this audiovisual equipment and then start.

(Break.)

MR. EDENS: At this time we'd like to start taking public comment. Can I have your attention, please?

As I said at the beginning, the purpose for this hearing is to get your comments on the Draft Environmental Impact

Statement. I realize that you may also have quite a few questions concerning the EIS. We are not prepared tonight to answer those questions. Your questions will be recorded and then answered either in the final Environmental Impact Statement or in a separate document. We do hope to make that available for public review about two weeks after the close of the public comment period.

If you do not wish to make a public statement tonight, you can also submit written comments to me. My address is listed here on your agenda. The public comment period will run until September 19th.

The persons who wish to comment tonight I would like to come up to the podium and please state your name and your address and please spell your last name. We are making a transcript of this hearing and it would help the court reporter very much if you would spell your last name out.

I'd also appreciate it if you would use the podium up here. It's the tallest microphone on the podium. That will also assist in everyone being able to hear your

comment.

Right now I have 22 names on this list, so it is imperative that I try to limit your time to no more than five minutes the first time we go through the list. If you wish to speak again after we have been through the complete list once, and we've been through any other people who have not spoken at the first and wish to speak, then we'll let you come back and give some additional comments.

If there are no questions at this time, I'd like to call the first speaker. The first person on the list is a (b)(6).

PUBLIC COMMENT AND QUESTIONS

(b)(6)

(b)(6) My name is (b)(6) (b)(6) I live at (b)(6) (b)(6) in Kent. I have a couple comments to make about the Environmental Impact Statement itself.

T2-1 I myself don't think there should be any containment next to Parkside School. If

there is going to be containment -- and I think there should be -- it should be kept at the landfill itself; and I don't believe a park should be built there at least for ten years; and I also think -- believe that monitors should be kept along the full pipeline that they decide to run, whichever direction they decide to run it, for contaminants.

T2-2 Also, there has been nothing addressed as far as EPA checks from the state or the Federal Government on the west side of the landfill for -- on any of the private land for the families or the children involved that lived on there. As far as I know and as far as I've heard, nobody has checked to see if any of the contaminants have leaked down into that area as well as the Parkside School area.

T2-3 Also, I would like to know if there is leakage from the cap that they put on, what they are going to do about the leakage.

T2-4 Also, I would like to know if they are going to monitor anything that comes out from underneath the cap on the sides towards the south end. They're talking about a

barrier wall on the north end, but they haven't talked about anything -- a barrier wall on the south or the west end.

And that's all the comments I have to make.

MR. EDENS: Thank you, (b)(6).

(Applause.)

MR. EDENS: The next speaker is Julie Wade.

JULIE WADE

MS. WADE: My name is Julie Wade, W-a-d-e, and I'm an attorney representing the owner. I know there have been questions about the owner's position in the past, and I would like to take this opportunity to make some brief comments.

Our address, for the record, is 510 Marketplace One, 2001 Western, here in Seattle.

We have reviewed the EIS prepared by the city's contractor and we believe there are some deficiencies with it. Some of those (b)(6) just mentioned, as a matter of fact. However, we think it is a good beginning and

we are encouraged and relieved, frankly, that the city has finally made some progress toward proper closure of the landfill.

T2-5 Like other landowners in the area, we are extremely anxious, extremely concerned, to see that this landfill is closed in a manner which will limit the greatest extent possible the impacts not only on the landfill but surrounding properties in the future.

As most of you here know, it has been closed for two years. During that period of time the owner has received no income from the landfill, has not been able to use the property because it is still subject to the lease, and has not been able to use other property that it owns around the landfill because it has not been filled, in spite of the fact that our lease agreement with the city provides that that property would be filled and that the landfill would be properly closed at the end of our lease term, which is February of 1986. Now, that's obviously not going to happen.

This property was leased to the city 20 years ago. At that time the city promised,

and in various renewals it promised again, to operate a nonputrescible sanitary landfill in accordance with good sanitary landfill practices.

My clients did not have any expertise in the area of operation of a landfill. We relied on the city to do what it said it would do, which was to operate it as a nonputrescible landfill in accordance with good sanitary landfill practices; and somewhere along the way something has gone wrong and we are faced with a tremendous problem out there.

However, at this point it seems that it would do very little good to try to assign blame, and that the only productive approach is to move forward, to try to identify the problems which must be dealt with, and properly close the landfill.

T2-6 As I said earlier, the EIS is a good beginning. We think there's some major deficiencies, especially in the area of groundwater contamination. There is not -- there simply is not enough information on that subject.

We think, for example, that some of the contingency plans mentioned by Mr. Dunlap should be part of the EIS -- should be part of the closure plan, that we shouldn't wait around to see if they're going to be problems, we should investigate right now.

At the same time, from the evidence we have seen, the test results that have been provided to us, we do not think that the problem out there is insurmountable. We don't think it's another Western Processing site.

T2-7 We do think that the City of Seattle can close this landfill properly and limit the impact, and we would like -- we will cooperate with the city in their efforts to effect a closure -- a proper closure, as they agreed to do when they leased the property from us.

Thank you.

MR. EDENS: Thank you, Miss Wade.

The next commentor is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) and I'm --

Did you want my address?

MR. EDENS: Yes, your address and spell your last name, please.

(b)(6) and my address is (b)(6) I have been a resident of Kent for (b)(6) and we live (b)(6) Highway 99 and the landfill area.

T2-8 Over the years we have seen an increase in our groundwater in our yards and we would like to know what our yards are contaminated with now.

T2-9 The holding pond for Parkside School is not at all acceptable. They're talking about a pond five feet deep. The children already have a problem with the culverts and going down into the culvert areas and playing in the stream even though there's a large barbwire fence -- wire fence around the area. So that would just be a total enticement for them to have that holding pond there.

T2-10 Salt Water Park, I can't see putting 90 million tons of water going down that way, groundwater. It's a little tiny creek, and if they're talking about this much water, it should be going to the Green River instead. I

know they said that the Green River can't handle it, but actually it can. The water level has dropped over the years because Tacoma has been siphoning off water. You talk to any steelheader and they'll tell you there isn't enough water in there now for fishing.

T2-11 A capping of the site, I know that's the only alternative, but that won't solve the problem. We're still going to have leachate leaking underground for I don't know how many years. They figure two million tons of leachate is going to be created every year, and they're only going to be able to truck off 500,000. That leaves us still with one million and a half tons of leachate going underground.

T2-12 The methane gas, I would like to see that burned or used as heating or electricity.

T2-13 As far as the pipeline going South 250th, you have several homes on that street and it is a busy street. South 252nd would be a much better street. It runs right directly into Salt Water Park. If you have to go with a pipeline, we'd prefer it on South 252nd. And it's a dead-end street and there's much

less homes on that street.

T2-14 We don't want the Seattle to be doing the monitoring for us. We've had a sample of Seattle's monitoring already and we're living with methane gas, leachate, and water runoff. We want a private party to do it who has no interest in the dump.

T2-15 There should have never been a landfill of that type put in the residential area to begin with, and as long as profit is the name of the game, there's probably more Midway landfills going on, and I think people are a lot more important than profit.

Thank you.

(Applause.)

MR. EDENS: The next speaker is (b)(6).

(b)(6)

(b)(6) My name is (b)(6). (b)(6) just got through speaking. I'll just add a couple of comments to what (b) had to say.

T2-16 I'd like to know what gases are in

the dump besides the methane that would be burned off. Mr. Dunlap made a mention of that. I'd like to know how poisonous they are and how they might affect the surrounding neighborhood.

T2-17 Another thing I would like to know is the height of the dump cover. Is it above or below the adjacent ground level. And just how the wall or barrier would be constructed, that is, would the length be completely around, or just partially around, or near the holding pond, and what means would be to prevent it -- what's in the holding pond -- from running off if there's an extremely large rainfall like we had in 69.

T2-18 And Mr. Dunlap made a comment about park property being granted. Way back in 1969 before the dump whatever started, the agreement was between the City of Kent and the landowner that as soon as that dump site was filled with nonputrescible materials it would be covered and made into a park. Now we can see that that will never happen. Does the City of Seattle plan to buy an equal acreage of parkland in the near area?

And that will be all. Thank you.

MR. EDENS: Thank you, (b)(6)

(Applause.)

MR. EDENS: The next speaker is (b)(6) (b)(6)

(b)(6) Let me take a rain check on that at this time.

MR. EDENS: Please note that (b)(6) may want to speak later.

The next speaker is Eleanor Lee.

ELEANOR LEE

MS. LEE: My name is Eleanor Lee. I am the state senator for the 33rd District. I live at (b)(6) I spell my last name L-e-e.

I sometimes, in describing my district, describe some of its main features. It surrounds the Seattle/Tacoma airport; and, of course, the Midway Landfill is the heart of the legislative district, and some people might say "the bowels" because of its problems.

T2-19 I'm going to address the surface water management portion of the EIS. The

other two portions, the covering and the gas management system, sow relatively sound reasoning as far as engineering practices are concerned, and the EIS does reflect the fact that it was done by some fairly competent engineers.

T2-20 However -- and I can say this because I work for engineers -- they don't always consider some of the jurisdictional and political problems; and I think as far as the surface water management issue is concerned that the EIS is very deficient, and, in fact, a fifth alternative needs to be considered.

I'm going to give five points and try and get them in within the time period allowed.

The first one relates to the jurisdictional/political issues that are not even mentioned in the EIS.

The liability issues which are not up-to-date.

The drainage basin issue is one that is more than where water goes. It's where people are in those particular drainage basins.

The state's role, the work that is coming up in the next legislative session that

would relate very closely to this.

And fifth, the request for a fifth alternative as an enlargement of the Metro treatment solution that you propose to do for the on-site holding of the leachate that comes from the landfill itself, and the need for a supplemental EIS to cover that portion.

T2-21 First of all, the jurisdictional and political issues I think are at the heart of this entire problem. If this had not been a kind of a site where it was owned by a private owner, had been given the permit to exist by the City of Kent and was operated by the City of Seattle, I suspect something would have been done about it 10 or 15 years ago.

In the surface water management part of your EIS you're proposing to complicate that even further by sending the water into -- again, part of it into the City of Kent -- but into the City of Des Moines, involving the state as far as the Highway Department is concerned, as well as the State Parks Department.

The thing that I think we need to keep very clearly in mind is that this is not

like the City of Seattle where the city takes care of its sewage treatment. It's an entirely different body of people called sewer district commissioners. They are separately elected.

Any responsibility for treatment or something that's going into Puget Sound that is improper is going to fall upon their shoulders, and the only way they have for raising any funds for any kind of advanced treatment that may be required once that things enters the Sound or goes through their stream management process has to come from the rate payers. They have no other basis for taking care of that particular problem.

So I think that sending it to the west side is going to complicate it tremendously as far as the jurisdictional issues are concerned once it is off the site.

T2-22 The second one is the liability problem. I would wager that there is an 80 percent chance or better that the surface water that you're intending to place in a pond or to -- which will have to have a holding facility as well as a discharge facility, that

that will have to be treated.

The reason I say that is it's just within this last year the Department of Ecology has now begun to acquire waste water discharge permits for water -- surface water runoff facilities.

It wasn't until the recent studies were done opposite the sites where there was only street water runoff from the City of Seattle, which has been removing it from their sewage system one at a time, that they discovered that those are some of the hottest spots in Puget Sound.

The heavy metals, the zincs, the leads and so on that wash off the streets because of what the streets are being used for is a problem that has not been fully recognized, and I can see no possible way that there is not going to be some kind of a treatment required of that surface water runoff that is bypassing the site, and that should be recognized up front.

In fact, it was recognized in the action of the City of Des Moines when last Thursday evening they started the process to

amend their zoning code in order to protect the city from lawsuits over runoff draining across city land.

T2-23 Seattle, as a city, is part of Metro, and if they decide -- which I think they should -- to have this surface water runoff as part of their Metro treatment facilities, they will at least have something to say about it because they sit on the Metro council. If they're sending it to the west side, you do not, because all of the west side water, none of it is any part of the Metro sewage treatment system.

The other point is that in using through the Metro treatment system, you have already established that as a wise course of action for the on-site water retention, and this simply enlarges that capacity; and if sending it to the west, you are impacting people who have never before been impacted by the problems of the landfill.

It is not unlike what happened a number of years ago. The City of Seattle had a large problem with sewage disposal and so they put in a good sewage system, top

engineering quality, the best for its time, and dumped it into Lake Washington. That got rid of their problem.

Well, a few years later Lake Washington became polluted because other cities were doing the same thing, and so top-notch engineering facilities and so on went to work and they solved that proble. They took that sewage out of Lake Washington and now they're dumping it into Puget Sound, and now we have to clean up Puget Sound.

I'm just simply using this as a similar kind of thing that we should not be dumping it on another area that does not now have that problem.

T2-24 The state at the present is going through the process of ammending its laws as far as hazardous waste management is concerned, and including within that, mitigation of any kind, and putting as part of the definition of disposal any decomposition product, so that the hazardous waste statutes will cover the kinds of issues that we're talking about as far as the Midway Landfill is concerned.

T2-25 In conclusion, I do request that a

fifth alternative be considered for the surface water bypass system, that it be done in conjunction with the on-site water disposal system by either sending it to the Midway Landfill and then -- excuse me -- to the Kent Highlands Landfill and then to Metro treatment, or be piped directly to the Renton treatment plant where they have the kind of facilities that treat the kinds of things that are going to be in this runoff water.

If that is done, you will actually be improving the environment for the people who live on the west side, because right now they are receiving some of these toxic substances into their soil from the run-off of those highways.

Thank you very much for the opportunity, and I look forward to this supplemental EIS statement that I believe is required.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: The next speaker is (b)(6) (b)(6)

(b)(6)

(b)(6): My name is (b)(6) that's (b)(6) Kent, Washington, 98042.

I ask that you would forgive me for my lack of preparation in that I just got back from out of the country. I've only had a few days to start looking over the EIS, and I'm a long way from completing that examination.

I'd like to open with just a few brief comments, that being, a former speaker on behalf of the landowner mentioned that the site certainly is no Western Processing. I agree. Most likely it's worse than Western Processing.

T2-26 Number one, that much more material has been deposited at the landfill that never went to Western Processing. Number two, materials that the owner of Western Processing refused to accept at their site because of their toxicity went to Seattle's landfills, being Midway and Kent Highlands. Also went to Cedar Hills Landfill, by the way.

Also mentioned was the fact that the gases are

T2-27

going to be combusted in large stacks and that all of the synthetic organic chemicals are going to be combusted that way. I think that's a naive assumption at best.

We know today from experiments and from industrial practice in combustion technology that low BTU gas such as is present at the landfill is not suitable for combusting organics. Anybody who says that they are is either lying to you or is a fool and doesn't know what they're talking about.

That might seem a little bit harsh. I think some of my comments tonight are going to be that way. I would hope nobody takes that personally.

If you're going to destroy organics, you need temperatures in the range of at least 3,000 degrees Fahrenheit. You may be able to get by with around 2,000 degrees Fahrenheit if you're willing to have a fairly good dwell time. I give to you that if you're burning 6,000 cubic feet a minute, your dwell time is not anywhere near adquate to ensure combustion of organics.

A lot of the organics that we know

are present in the landfill gas at Midway are not suitable for low temperature incineration. The primary reason for that is that they're chlorinated compounds.

We know that if you try and destroy chlorinated compounds at low temperatures, the products that you get are much worse than the ones that you start with.

This isn't anything that is too complex, and most people, I think, are perfectly capable of understanding this, even the City of Seattle.

We've had some problems with the city in the past trying to get them to understand what's going on at the landfills. They don't seem to have any idea.

T2-28 I keep seeing this phrase "nonputrescible garbage". I wish somebody would just throw that phrase away. If that happened at the landfill, perhaps it was the first two years it operated, but certainly after that, chemical companies were using the landfill and were using it clear up until the time that it closed.

T2-29 One thing we have to consider is the

hazardous wastes that have gone into this landfill, and this EIS doesn't even talk about hazardous waste.

I can understand that litigation is pretty scary for cities and that the City of Seattle certainly doesn't want to admit to any problems it doesn't have to admit to, but there's a few facts staring you straight in the face and I think a little reality therapy is in order.

T2-30 One of the people mentioned tonight that the site's not suitable for a park, and I would certainly agree. They said ten years. Experience has shown us that the smallest amount of time it would go by before you'd even consider putting a park in there and having children anywhere in the neighborhood would be at least 30 years.

If you want to know where I got that from, I suggest that you look at the City of Seattle/King County documents on old landfills that have been abandoned in both Seattle and in King County.

The conclusions that the King County Health Department drew is that some of those

sites are having serious problems 40, 50 years after they were closed.

So to talk about a park at Midway is just ludicrous.

I'm speaking pretty much on behalf of the Toxic Environmental Action Coalition of Kent. We want to make it real clear to the property owner, to the city, to the City of Kent, and everybody involved: if there's any attempt to put a park into the landfill, we'll take whatever direct action is necessary to shut it down and stop it. We will not allow a park to be put into that landfill, and we want to make that real clear; and we want deed restrictions that are legally binding to go in on that now.

T2-31 A couple of comments on the EIS.

It's stated in the summary, which is pretty much the only part I've dealt with, that the major difference between closure alternatives is the final grade of the landfill. I don't think there's any merit to that. The major differences in closure alternatives, it's going to have a big impact on groundwater gas generation and the organic

and inorganic constituents in the groundwater and in the gas.

To just take a look at the slope of the closure and talk about surface water completely ignores the most significant problems of the landfill. That is, the hazardous wastes that are there, and the migration of those hazardous wastes through both surface water -- groundwater being even more important -- and then also the gas that is apparently all over off the site.

T2-32 You talk about an odor control plan and you talk about controlling the gas migration. What I don't see this EIS addressing at all is the fact that there are significant volumes of gas on virtually all sides of the landfill well beyond the boundries, and this EIS does not deal at all with that problem. It just says, well, as soon as we pull the plug the whole thing dies.

We aren't dealing with a TV set that's hooked up to an electric current. The gas that's already beyond the boundries certainly isn't going to magically disappear when you start withdrawing it from the source

of generation.

And I think that you need to take a look at reality, take a look at what you're going to do for the people that you are drastically impacting.

T2-33 Another thing that has come up, I've been reading some newspaper articles trying to catch up on what's going on, and I notice that one of the houses around the landfill -- according to the media anyhow -- had 4 to 500 parts per million of landfill gas in their house.

Now, in the past Rich Owings and Mark have told us that the gas off the site is no problem because it's at barely traceable levels, if traceable at all, and therefore no possible health risk could result from that.

Asked to respond to the 400 to 500 part per million level, the City of Seattle says, well, this is no problem at all because it can't blow you off the face of the earth until it's at least 100 times that high.

Well, some of us are worried about being blown off the face of the earth, but a lot of people are a little concerned, too,

about breathing toxics, especially if they have little infants that are particularly susceptible to these toxics.

Four to 500 parts per million of landfill gas in anybody's house is unacceptable and your EIS certainly ought to be dealing with that.

I think I covered the park. That was in the grading plan.

T2-34 Surface water management plan, the first step is to eliminate all discharge from 90 -- Highway 99 and Highway I-5.

The discharge of those freeways into the landfill, the people who approved that and pushed for it must have been totally out to lunch and ought to be checked into Western State. There's just a total lack of any brain use in that decision.

It's obvious to anybody that those problems have to be immediately eliminated, and this shouldn't wait for the development of some complex EIS and land use plan. There's no reason to allow any further discharge from I-5 and Highway 99 into a solid waste site. You know the problems it's going to cause, you

know the leachate it's going to generate. It ought to be a pretty simple matter to turn it off.

What's going to be done with that material is another question, but that is not our problem. The Department of Transportation at the state and federal levels are going to have to figure out what they're going to do, and I think they ought to also be somewhat sensitive to the fact that they may be sued fairly soon for their portion of this problem.

I think that pretty much deals with the surface water plan. I think Senator Lee dealt with that pretty well.

T2-35 Puget Sound discharge, I think I mentioned that the on-site water -- I-5 and 99 water should be separated. The on-site water should be real limited to just the water that's developed at Midway.

T2-36 Setting up a holding basin at the elementary school is certainly not compatible with the prevalent land use. It's a school for children, it's not a facility for discharging landfill sewage into, and so I think that, you know, that usage simply ought

to be written out of the final EIS.

So there's a couple more things that I wanted to mention.

MR. EDENS: Could you kind of wrap it up? You've been going about nine minutes.

(b)(6) Oh, okay.

MR. EDENS: You can come back at the end again, if you wish, and speak some more.

(b)(6) Okay. I'll wrap it up real quick, then.

T2-37 If you want to discharge the material through the creek, I think that you're going to have to do both real time and also grab sampling monitoring.

T2-38 Also there's no provisions in this EIS for public participation in the monitoring. Irregardless of whether you make such provisions, the Toxic Environmental Action Coalition will be doing on-site monitoring throughout this process pre and post-closure.

We'd like to be able to do that legally and have it written into the EIS that the public has a right to show up, to observe, and to participate in this monitoring program, but irregardless of your decision on that

matter, we will be doing that anyhow.

MR. EDENS: Thank you, (b)(6)

(Applause.)

MR. EDENS: The next speark is (b)(6)

(b)(6)

(b)(6)

(b)(6) My name is (b)(6)

(b)(6) You spell the last name

(b)(6) I live at (b)(6)

(b)(6) Kent. I'm a member of the CAML organization and have been involved in that for the past several years.

T2-39 One question I had was in 1983 when the city did testing of the soil of the landfill and sent them back east, and they were back there for six months, and we were waiting for the results, and we heard that they were lost. I wonder if they were found, and if they were ever found, what they found.

T2-40 Number two, I would like to see the City of Seattle consider a treatment plant on-site for all water.

T2-41 Number three, as (b) just mentioned,

I feel like the City of Seattle has lost a lot of credibility with the Kent residents, and I would like to see individuals from the community participating in the final closure and overseeing the testing that's going to be done over the past -- or over the next several years until it shows us that there's no reason for questions regarding pollution.

Thank you.

(Applause.)

MR. EDENS: The next speaker is

(b)(6)

(b)(6)

(b)(6) My name is (b)(6)

(b)(6) The first name is spelled without a (b) The last name is (b)(6) I am representing Marcus Whitman Presbyterian Church located at 2130 South 249th in Kent.

We have several concerns regarding the EIS. The first -- primarily concerning surface water management. First of all, we'd like to address the off-site detention alternative.

T2-42 The detention basin would require approximately 15 acres of land, which is designated at wetland in the EIS. A portion of this land is owned by the church and we consider this land marginally wetland, and its market value is probably higher than the City of Seattle is aware of.

Also, we have a building program beginning in February of 1986 which will affect a portion of that land if a detention basin is put in.

We are also questioning what will happen to the value of the church and how it will affect our effectiveness in the community with a detention basin beside it.

T2-43 Another concern we have is for the health and safety, particularly regarding the off-site detention plant. If the detention basin is built in a wetland, we believe the fencing that is mentioned in the EIS is insufficient.

Also, we question whether the Des Moines police would be responsible for patroling that area and keeping juvenile-type people out. I was about to say "juvenile

delinquents" because that is a problem in that area. Also, with the City of Des Moines, if they are responsible for patroling that area, would be supported financially by the City of Seattle.

T2-44 Okay. If the basin is put in that wetland area, would there be any controls for mosquitoes or other pests, or is that left up to the local jurisdiction?

T2-45 Some other issues that we have are, when the construction is going on, whatever alternative for off-site water -- for water is done, we would like to see that the trenches are opened, the pipe immediately laid and re-covered so that all -- so the greatest amount of safety can be given to that area.

T2-46 Also, if it is routed down South 250th, that area is the primary pick-up point for all elementary, secondary, and high schools in the Highland School District service area there. Those pick-up points must be put somewhere else and the safety of our children in that neighborhood provided for.

T2-47 When construction is going on and when the capping is finally completed will

there be an office where we can contact the City of Seattle regarding any problems that we see arising in our neighborhood, for example, increased surface water going through the wetland, or increased odor, or what have you?

T2-48 And in final EIS will specifically -- will a specific contingency plan be written into the final EIS that goes with the final surface water alternative?

T2-49 And I would also like to add my agreement to Senator Lee's comments about the jurisdiction problems.

And that's all I have. Thank you.

MR. EDENS: Thank you, (b)(6)

(Applause.)

MR. EDENS: (b)(6)

(b)(6)

(b)(6) (b)(6) with an (b) on the end of it, (b)(6)

Senator Lee's comment there about not going over the hill, evidently the engineering department is not intelligent enough to realize that water will run downhill.

T2-50 To go east you've already got a pipe under I-5 that directs the water -- the runoff on the east side across to the west side. It can also be utilized to run the water in the other direction. You wouldn't have to trespass on anybody. You could use the right-of-way on the east side of I-5 to direct this drain-off water, down to the Kent Highlands place where you already have a monitoring system, plus a pipe going to Metro.

Then if you didn't want -- there are other water running along with it that's on the east side on that draining program -- you could run a parallel pipe that would take that down at the same time in the ditch to run that, which is nothing more than runoff water, which almost any accepted system would take.

So it's a very simple situation. You get that water down to the other one where you already have a monitoring plant, to save that extra expense. To me it seems too simple to be true, but it is.

T2-51 The other thing I have directly right now that I'm disturbed at the present time, with the rain, with the garbage that they're

dragging back out of the dump onto the road out there. It is an unbelievable mess out there. It's a regular quagmire.

I would like to see some form, with the amount of trucks you're going to have coming in there, with the rains on now, some form of a wash basin to wash those darn trucks out there before they come out, because it's just a quagmire out on the road out there 90 percent of the time.

And I'll leave the rest up to (b)(6)

MR. EDENS: Thank you, (b)(6)

The next speaker is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) I live at (b)(6) I would like to make kind of an opening comment here and then a recommendation.

T2-52 Because of the apparent mislocation of the Midway Landfill in terms of geology and hydrology -- and I think this is generally agreed that it wouldn't meet any standards of

today in terms of location -- and because of the mislocation in terms of this was put in against the objections of a lot of people that were residents at the time it was put in -- put in in spite of their concerns -- these people were living adjacent to it and around it -- and because of the apparent history of poor management such as no records or poor records being kept of the content of the dump and generally a poor monitoring of the materials going into the dump -- and I think there is ample evidence of what I'm saying -- and because of the on-site and off-site gas problem that has resulted from what's been put into the dump and the drainage problems associated with it, and because of the threat or existence of migrating leachate off-site, I make the following recommendations:

That a permanent board -- and by "permanent" I mean the life of the closure plan, 20 or 30 years, whatever it survived at -- be formed for members representing the various concerned groups in the area, such as homeowners, businesses, residents, and maybe some of these environmental groups too, and

these would be elected -- this matter could be decided later as to how they could be elected or chosen -- but these people or representatives be incorporated in a board.

And that further, that this board -- which would do two things. First of all, it would provide continued citizen participation and representation -- in other words, it would provide input through the life of the closure plan -- as well as an output device -- in other words, an unbiased source of citizen information to the concerned citizens that are adjacent and surrounding the landfill. In other words, it would provide a vehicle for this.

And further, that this particular board be empowered to review all data, drawings, correspondence, et cetera, pertinent to the closure of the landfill to ensure the proper closure and monitoring of this landfill given the previous conditions of neglect.

And forth, they would also be empowered with veto plans for future use so that some of the mistakes of the past wouldn't be repeated.

It's been stated here that this is a poor site for a park, which had been anticipated be planned; but what I'm trying to suggest here is that we provide an ongoing vehicle for citizen participation to ensure that the citizens surrounding the area are well-represented throughout this closure plan.

I would further suggest that they have not only a power of veto over future plans for the site in terms of recreation and et cetera, but they also have power to review and to veto the awarding of contracts for services performed on the site that might be contracted out, to prevent any potential for collusion or this kind of thing.

That's about all I have to say. Thank you.

(Applause.)

MR. EDENS: Thank you. The next speaker is (b)(6)

(b)(6)

(b)(6) Thank you. My name is (b)(6)

and I speak as a homeowner of some (b)(6) with a prime location.

My residence was (b)(6) (b)(6) the Highland and the Midway site. I saw the inception of these two landfills and lived through the air pollution and the odor that erupted from them.

We were at a distinct disadvantage. In the summer the prevailing wind is southwest. That struck us in the summer. In the winter we had a north wind so we took in the Highland side. Be that as it may, we raised a family, and their noses are a little larger, I think, than most.

T2-53 But the vote that I would register with you is that we take the mid or the second alternative in terms of the capping, and that we have a pipeline or closed pipe into Puget Sound if we can not go to the east to the Highland site.

T2-54 The fact that you're concerned with a settlement basin on the lower level by the Parkside school -- I'm speaking now as a (b)(6)

Utilizing this five acre site with a

five-foot deep pool is unthinkable. I think in legal terminology in the courts it's called attractive nuisance. You can not possibly --

(Applause.)

-- you can not possibly build a fence or a containment to keep youngsters out of there. The only way you can do it is to put a cement top on it, and even then I wonder at today's youngsters with their pipe bombs.

T2-55 I would like to say that unfortunately early on the governmental entities who had the primary responsibility to respond to the problems generated by these locations were not answered in a responsible manner. The consequence was the development of forces within the community over the past 20 years that have culminated in 15 -- or excuse me -- 150 or so members of the citizens against the Midway Landfill.

I'm hoping that this permanent multimillion dollar mushrooming blight on the community can be answered with the technology that's available to us today. I know it's there.

The closed methane system that's been

mentioned earlier on has been utilized in a number of different areas, and I think if we take the millions that is being spent there and rectify the community's real estate values and certainly the home environment, that you can put this thing to sleep; but if there is a continuation of erroneous information and technical gobbledygook, then this thing is going to go on, and I think that the people may be able to outlast all of us.

Thank you.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) My address is (b)(6) I'm with the CAML group.

T2-56 The first thing I want to bring up is I've been at all of these closure meetings asking questions, and one of the questions I asked at one of the meetings was I understand how they're going to take care of this surface

water, and at the time I said, well, that's fine, but what about the groundwater seepage into the landfill, and Parametrix assured me that the groundwater table was lower than the bottom of the landfill.

Since that time I've done a little investigating and I found two wells on the north side that have been drilled, and groundwater was found 51 feet down in both wells. The Midway Landfill is over 150 feet deep.

So sometimes we wonder about some of the answers we get.

T2-57 Another meeting I questioned that they were kind of leaving out the west side. They said the south side and the east side was quite a problem, but the west side there was really not too much problem.

On investigating that I found out that they haven't done hardly any testing to the west side. They said the groundwater was flowing to the south.

There are residents on the west side that have underground springs that haven't been tested, to my knowledge. They've called

me and told me they haven't been tested. There's wells that haven't been tested in several years.

So I'm kind of wondering how in the heck can we have an EIS statement without all these tests being made. Thank you.

MR. EDENS: Thank you, (b)(6)

(Applause.)

MR. EDENS: The next speaker is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) Auburn. I represent Marcus Whitman Presbyterian Church. That's at 2130 South 248th, to correct the address given earlier, although with all the problems happening now I can see why we'd want to move.

T2-58 I really hate to go against public -- publicity, but I do think that at least from Marcus Whitman Church and the people at the west side a thank you is in order, to especially Richard Dunlap, part of the people

of the Seattle engineering department, and to those people who are representatives of the community.

Last September the 5th there were -- last Thursday there was a meeting held at Marcus Whitman Presbyterian Church to give information to the members of the community on the west side about what was happening, and we had about 105 people at that meeting showing a concern that hadn't previously been acknowledged, is prevalent along the west side, and again, I thank those people who helped with that.

Many questions and comments, concerns, angers, came from that meeting from the people of the community. There will be a summary of the minutes of that meeting given to Seattle engineering and Mark Edens in the future, some that I believe need elaboration now, so I will do that.

T2-59 One of things that Senator Lee stated was that the west side is becoming -- they're becoming involved possibly when they shouldn't have to be. They're becoming involved because a problem from another area is being taken and

put into their side, put into their area. Moving the problem doesn't help.

T2-60 It has been mentioned that the wetlands is next to Parkside. What the wetlands is is it is catty-corner to Parkside to the southeast. It is also the -- the wetlands are also directly south from Marcus Whitman Presbyterian Church. So that you're not only dealing with a school, but you're also dealing with a church community.

It is a repeat, but to put a detention basin there, whether it is a natural detention basin, as they claim already exists, or a cemented type pond, just simply creates problems. There are problems in the community with respiratory problems, people do not feel safe, and that's a reasonable concern because of leachate seepage into the pond already.

An off-site detention basin would simply create an eyesore, a smellsore -- if there is such a word -- and a potential problem for all the youth and adults in the area.

T2-61 We strongly recommend that if there is no alternative to go into Green River, that

a tightline to Puget Sound be the alternative chosen, with an on-site detention basin. We also strongly recommend, as many people have commented so far, that it be routed down 252nd Street as opposed to 250th.

For some numbers for you, there are approximately 40 homes along 252nd Street. That is a major bus pick-up for Midway, Mt. Rainier, and Parkside Schools.

(b)(6) 250th, you mean.

(b)(6) Excuse me. 250th. I correct that.

252nd, on the other hand -- if I have the streets right -- 252nd has 13 homes on it. It goes about halfway down to I believe 18th where it becomes a dirt road. It is more expensive to build a tightline down 252nd street -- it is monetarily more expensive, that is. At this point in time we can not concern ourselves as much with that as with the human concerns and the human costs.

Going down 250th would create, especially if the maximum grade proposal is used where you're going to have to spend three years, would create problems in that area for

three years, as opposed to the other street.

Again, there are many concerns, and they will be addressed to you, Mark, at a future date from what the citizens have brought, but I think the main concern now is that a tightline be chosen and that that tightline be routed down 252nd Street.

MR. EDENS: Thank you.

We'll take a five-minute break to allow the reporter to change the paper and have a little break.

(Break.)

MR. EDENS: At this time we'd like to resume, please. The next speaker is (b)(6) (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) Kent, Washington.

T2-62 First I'd like to point out in the statement made by (b)(6) that there was a mistake in that the wetlands are not located to the south of Marcus Whitman, they are to

the east, directly east of Marcus Whitman Church.

T2-63 All right. As another concern that was not mentioned by either (b)(6) or (b)(6) (b)(6) was a concern of the church that would a pump station or a lift station be needed to move water off the landfill site if one of the two either minimum grade or medium grade alternatives were used in order to pump the water along 250th.

T2-64 Okay. I'd like to read from the EIS under the post-closure plan and activities. It says, it is planned that a weekly inspection will be conducted for approximately one year after closure. These inspections may include, but are not limited to, observations of possible damage to the security of the landfill, and inspections of leachate, collection and treatment system, methane gas testing, and checks on control measures, and observations of surface grading, erosion, or drainage. These initial observations will determine the latter frequency of inspections.

It also says that ground monitoring will occur for 30 years unless data indicates

that less frequent monitoring is acceptable.

A question I have is, after one year, with what frequency will the inspections of the landfill occur? Will they still maintain the one week, or will they be reduced to monthly or bimonthly or quarterly or what?

Also, what data will determine whether the groundwater monitorings will not have to continue for 30 years? What information do you need to decide this?

T2-65 Okay. You have stated that you are not able to dump the runoff water from the landfill into the Green River, and it was brought up at a workshop held by the City Council of Des Moines that the present surface water runoff -- or the surface water runoff is now being taken by truckloads, and if it is not acceptable, it is being dumped into the Kent Highlands Landfill for treatment, or if it is deemed chemically acceptable, it is being dumped into the Green River.

I would like to know what difference there is between dumping this water and the the water that would be coming off the landfill from the cap; and I would like some

explanation because I feel that you have not expressed a good explanation for the reasons you can not take it to Green River.

T2-66 Also, if you do take it into the wetlands and not into the Green River, you will be destroying one of the City of Des Moines' and one of the area's last wetlands. Some people have called them not so wet, but right now they are unofficially classified as wetlands. And I would like to know whether there is going to be such a great environmental impact on the Green River that it merits the destruction of approximately 15 acres of wetland.

T2-67 Next I would like an explanation of why the water is being taken from the landfill to Puget Sound when Governor Gardner is now trying to clean up Puget Sound.

T2-68 And last, I would like to point out a problem that the City of Des Moines had with its publicity, was the fact that not enough information in the form of fliers and leaflets were passed out to the neighboring areas and all of the affected neighborhoods, and it was not until after the first informational

meeting that this was taken care of, thus not allowing through the city any information to be -- any questions to be answered immediately, and since your next meetings, were not allowed to have questions answered.

And it was only through the effort of members of the Marcus Whitman Church that the main opportunity for these residents to have questions answered was provided by the form of a town meeting held at the church.

I'd like to point out the fault that the city has made there and I'd like some explanation as to why that was not taken into consideration before.

Thank you.

(Applause.)

MR. EDENS: The next speaker is John O'Rourke.

JOHN O'ROURKE

MR. O'ROURKE: My name is John O'Rourke. I'm a lawyer. My business adress is P.O. Box 98741, Des Moines, Washington, zip, 98188.

I represent Kent View Properties, Incorporated. Kent View Properties is the landowner which owns the land, a portion of which is subject to the City of Seattle landfill lease for Kent Highlands.

T2-69 My comments are directed to that portion of the Draft Environmental Impact Statement that proposes or assumes the discharge of substantial volumes of leachate into the City of Seattle leachate treatment plant at Kent Highlands.

As Mr. Dunlap of Parametrix indicated tonight, that activity is ongoing or current, I believe he said, even as we speak.

As Senator Lee suggested, many times the scope of inquiry that engineers will take becomes limited by the assumptions which they are given or supplied.

My specific comments are as follows: The Draft EIS calls for drainage of substantial volumes of leachate from Midway, at least during the closure construction period, by trucking the leachate to the Kent Highlands Landfill and introducing the leachate into the lagoon and leachate

treatment plant owned and maintained by the City of Seattle at Kent Highlands.

In this connection please note the following: One, the Statutory Warranty Deed recorded from Kent Highlands to the City of Seattle by which the city obtained its right-of-way in permanent easements for the leachate treatment plant specifically defines and limits leachate to be treated there as that originating from the Kent Highlands site.

Two, the City of Seattle/City of Kent agreement for transport of leachate to Metro provides at section seven, quote, that this agreement does not authorize use of said leachate sewer line for any purpose other than conveying leachate from the landfill. That agreement is referring to Kent Highlands to the Metro trunk, end quote.

Accordingly, please be advised that the continued discharge of Midway leachate into the Kent Highlands lagoon and treatment plant can not continue without the agreement of my client and without the amendment of the City of Seattle/City of Kent agreement, neither of which have been solicited to this

date. To that extent, the Draft Environmental Impact Statement is incorrect in that it assumes consent or authorization which has not yet been given or requested.

Now I will summarize these comments by letter to the project manager and supply the exhibits to which the comments refer.

(Applause.)

MR. EDENS: The next speaker is (b)(6) (b)(6)

(b)(6)

(b)(6) My name is (b)(6) (b)(6) I live at (b)(6) Kent, 98032, up on (b)(6)

T2-70 We're all aware of the methane gas problem; however, methane is only the tip of the iceberg. Like the Titanic moving on in the night, the majority of people have not yet awoke to the potential danger that is before them. Only God knows what has been dumped at that landfill before 1980. The quantities and characteristics of industrial waste deposited at the site, we're told, are unknown.

From 1980 to 1983 when better record keeping at the site was in effect, records indicate wastes including paint sludges, dyes, preservatives for plants, alkaline waste, oily sludges, waste coolant, truck steam cleaning waste, and oily waste were deposited at the site with the approval of King County Health Department.

Files from the EPA region X document that chemical wastes at Midway have been generated by a variety of industries including construction, painting, steel and iron foundries, labs, hospitals, utilities, general chemical, and others --

(b)(6) I can hear you.

(b)(6) What's that?

(b)(6) I can hear you quite well.

(b)(6) Okay. I'm sorry.

(b)(6) I recognize you're angry. I've been angry for years too.

(b)(6) Kent News Journal in an article by Dean Forbes dated May the 11th, 84, reported that cyanide was found at the Midway Landfill. The cyanide was measured at 50 parts per million, five times the health limit.

Levels of hydrogen sulfide were also found at a measure nearly four times the health limit. Do you know what happens when you're exposed to this substance? Your nose starts bleeding, you get nauseous, and you start to vomit.

T2-71 The EPA hazardous ranking system rated the Midway Landfill as a high-ranking site with a high priority for remedial actions, and the high score was based primarily on the potential of groundwater contamination. Compounds detected in the groundwater by the EPA included lead, toluene, ethyl benzene, and xylene, and arsenic.

I understand that these compounds are known to cause cancer from the benzene; the lead can affect the brain, the blood; the other items can affect internal organs such as the kidney and the liver, and this is what we found -- was found in the groundwater.

It's the groundwater that really upsets a lot of people. It upsets me.

We're told in the Environmental Impact Statement draft that the existing releases of hazardous material into the

1 groundwater have not yet been quantified, and
2 the potential for these releases to
3 contaminate existing water supplies is unknown.
4 That's scary. If a foreign country were to do
5 this to our groundwater system, it would be
6 tanamount to an act of war.
7 Again, the EPA's high score in
8 ranking Midway as a Superfund site is a
9 contamination in our groundwater, and it's
10 common knowledge that the groundwater system
11 under the earth's cover moves about in such a
12 way that it is nearly impossible to guarantee
13 that either old wells or new wells dug will be
14 safe.
15 A plume of poison moves slowly as a
16 few feet a year underground, so a chemical
17 absent one year might show up the next.
18 (b)(6) of Princeton University,
19 a specialist in this field, has said, quote,
20 once you contaminate groundwater, you may
21 contaminate it for geologic time.
22 When I last heard, Bridgeport, New
23 Jersey -- and this is quite awhile ago -- was
24 trying to remove contaminants by pumping out
25 all the water in its polluted aquifer.

1 (b)(6) of the conservation
2 foundation said we have a problem that is at
3 best extremely expensive and at worst
4 irreversible, and last I heard they were
5 pumping out for over ten years trying to clean
6 that.
7 This is like the hidden iceberg
8 because no one knows the potential danger, not
9 only in our groundwater, but who knows where
10 the toxic wastes are seeping from the site
11 into our environment.
12 **T2-72** Seattle, seriously considere the
13 buying up of those who would give their
14 consent the homes and property within their
15 defined danger zones and compensating these
16 people in such a way that they will be able to
17 relocate with the least possible cost and
18 convenience.
19 This will be to your economic
20 advantage. The alternative is potential legal
21 action down the road with various possible
22 ramifications from this contamination, as well
23 as the lowering of property values just by
24 being located in an area where you chose to
25 dump hazardous waste materials.

God forbid that people should develop cancer, or birth defects, or miscarriages, or whatever else may come from the release of these contaminants, but if that were to happen, you will have to own up to your own liability.

Seattle, be compassionate. Do the right thing. Give these homeowners a break if they so desire to sell. Buy them out.

(Applause.)

MR. EDENS: It's now 8:30. I have five more people down here that wish to speak, and if there's no objection, I'd like to extend this hearing until 9:00. If there's no objection? Okay, then we'll go until 9:00.

The next speaker, Darcia Tudor, I think.

DARCIA TUDOR

MS. TUDOR: Darcia Tudor.

MR. EDENS: Darcia Tudar.

MS. TUDOR: I appreciate your extension of the meeting. D-a-r-c-i-a, T-u-d-o-r.

I'm an attorney and I represent (b)

(b)(6) who (b) (6)
(b) (6)
(b) (6) you plan on presently as an alternative of transferring or dumping or using as a retention pond.

T2-73 I think the man that just spoke pretty much summed up a lot about what I want to say, and that is, we are dealing with a neighborhood that has children, and you can't replace a human life.

I have a client in the back of the room that was just diagnosed to have a tumor. Her neighbor had meningitis. Her daughter has been suffering from unexplained nosebleeds for the past few years that they've lived there, kidney infections, and all sorts of unusual medical problems.

The lady up the street just lost her baby. They're doing some testing to see if it was possibly toxic-related.

It's unknown, and when you're dealing with the unknown, who wants to risk their children's lives. No amount of money is worth it. They don't really care about your solution, what they care about is the effect.

1 **T2-74** And you're talking about a solution
2 that has not even been tested. You're talking
3 about moving this surface water to the present
4 pristine wetland and you don't even know the
5 existing state of the pristine wetland area.
6 I was out there today. I wouldn't
7 walk my dog out there. The EPA man that came
8 by to see my client wouldn't walk back there.
9 Now, she's been telling him for years
10 that she's got mud in her clothes that the
11 kids won't wash out, like a tarry substance.
12 There's a smell and an ooze out there that's
13 unexplainable.
14 Now, the EPA man keeps telling her,
15 no problem, this is just surface water, Folks.
16 Well, ask the neighbors who live there.
17 And let me ask you, would you move
18 your family there? And if so, we've got a
19 house for sale.
20 And I'm pretty sure there's not too
21 many people that would move out there right
22 now with the present unknows. All we want is
23 **T2-75** two things. We want notice before the plan is
24 put into action.
25 Now, granted, you've got some experts

1 here that I have been thoroughly impressed
2 with. You hired a good company that's done
3 their homework. Unfortunately, no one sent my
4 clients notice two years ago when they were
5 doing their studies where they could report to
6 them the nosebleeds, the meningitis, the
7 unexplained other medical problems, the
8 pollution in the wells, the kids coming home
9 after swimming and playing in that muddy area
10 with unnatural substance adhered to their
11 clothing that didn't wash out in the wash.
12 If you had known these factors, I think your
13 experts could probably answer these questions
14 today.
15 **T2-76** The main question is, what effect is
16 it going to have on our lives, not the
17 property value so much, but the physical lives
18 of their children that no amount of money is
19 going to compensate this woman back here
20 that's facing possibly her daughter having
21 cyanide poisoning, or lead poisoning, or
22 something else, and that's going to help her
23 through this operation with the tumor if they
24 tell her it's related or could be related to
25 the hazardous waste that's been deposited

there.

So first of all, we've got a notice problem because it's a little too late now. Your experts have been working with, unfortunately, a half deck; they haven't had all the facts. A simple mailing would have taken care of getting the people out there to tell you their stories. It didn't happen.

T2-77 Number two, you're talking about basically robbing them of their only investment.

This is not a high class neighborhood. You wouldn't try to put this little retention pond in Bellevue or Mercer Island or Magnolia. You're going into --

(Applause.)

-- a neighborhood where you've got working class people who work very hard for their money, and usually their only and largest asset is their home, and you're going to rob them of that, because I'll tell you, there is no way in heck anybody that's been up on the news is going to buy my client's property that neighbors this potential retention pond.

And my client has a conscious. She's not going to lie to them. She's not going to not tell them that I don't know this is going to damage your children. She's going to tell them the truth. And let me tell you, they're not going to buy her property, and that's their major asset. This is a working class neighborhood.

And I think that the only reason now that it's coming to the forefront, their concerns, is because the media has gotten involved, it's been publicized, they now know; and there are a few of attorneys here that are willing to take the risk with their clients just to find out.

If you really think it's a good idea, why don't we move it to the wealthy area? You know, there's some real nice housing areas that I think have open areas in that area too.

T2-78 Last but not least, I think, as they have brought up before, you're talking about putting possibly this retention pond that the waters have not been tested. And I'll tell you, I won't walk back there. There's something going on there. It hasn't even been

tested to see what contamination exists.

T2-79 It's not the surface water that's the problem; it's the groundwater. There has been no testing, as I understand it, of the underground water flow, so you don't know what's flowing downhill into these people's neighborhoods.

T2-80 But I can tell you, I got involved in this two days ago and I've talked to ten people in one small block that have had some very unusual medical problems. It's too close.

There has not been any testing of health effects either in that neighborhood, and before you effectuate a solution that could possibly aggravate the problem, because it could be an existing problem, let's test that area, let's put these people's minds to rest. All they want to do is raise their kids in a healthy environment.

Thank you for your time.

(Applause.)

MR. EDENS: Thank you. The next speaker is (b)(6)

(b)(6)

(b)(6) My name is (b)(6) and I live at (b)(6) in Kent. You just heard from my attorney. Now you're going to hear from me.

T2-81 My daughter have been suffering from nosebleeds for the last six years of which doctors can not explain. She wakes up in the middle of the night screaming because she's terrified; her pillow has been soaked with blood.

My husband has a tumor in his face that has to be removed. We don't know what caused it. There has never been any cancer in his family.

I was just diagnosed two days ago as having a cancerous -- or having a tumor. We don't know if it's cancer yet. We're going to find out real soon. I also have no cancer history in my family, either side.

I just spoke with a neighbor tonight after showing her this small statement, having my neighbor sign it, and learned that her child which she was six months pregnant with had multiple birth defects and subsequently

she lost the baby. She does not smoke. She does not drink. She is a registered nurse. They do not understand why multiple. If it was just one birth defect, there might be some explanation other than toxins.

We have been awakened in the middle of the night gagging and coughing and gasping for breath from the gas and the putrid air that has permeated our neighborhood and my home.

I live (b)(6) the pristine wetland that you intend or may put a retention pond in. My children as well as all the children in my neighborhood have been playing in this wetland for years. They have all -- my daughter has chronic kidney problems that will go with her for life.

We don't know what has caused all these problems. All we know is we were a healthy, happy family before we purchased this home eight years ago, and since that time our health has gone straight down the tube.

And now you're telling us that you want to continue dumping your crap in my backyard. I don't want it there. My yard has

enough of your crap sitting in it already.

Thank you.

MR. EDENS: Thank you.

The next speaker is (b)(6) (b)(6) (b)(6) has summarized our comments. Thank you.

MR. EDENS: Thank you.

The next speaker is Steve DiJulio.

STEVE DiJULIO

MR. DiJULIO: Steve DiJulio, D-i-J-u-l-i-o, Kent City Attorney, 224th Avenue South, Kent, Washington, 98032-5895.

The City of Kent will be making its extensive comments in response to the Draft Environmental Impact Statement in writing prior to the deadline on the 19th. My only comment this evening is that the comments that the City of Kent is preparing are remarkably similar to the comments that you've heard tonight.

It is an interesting phenomena for someone who has no technical background to see that the uninformed public such as this who

have taken the time and interest to be involved in an issue have been able to identify such significant issues with no little -- with little or no technical background.

T2-82 The fact that the Environmental Impact Statement makes no -- has no discussion of groundwater problems or potential solutions for groundwater problems has been identified by nearly every speaker tonight, yet the Draft Environmental Impact Statement dismisses the issue in two paragraphs.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: The next speaker is (b)(6) --

MR. (b)(6) Don't try it.

MR. EDENS: I can't pronounce this one.

(b)(6) Thank you. I knew I followed (b)(6)

(b)(6)

(b)(6): I'm (b)(6) (b)(6) spelled the way it's

normally spelled, representing (b)(6) who lives at (b)(6), I think. It's (b)(6) from this wetland. I was going to remember the address.

MR. EDENS: Could you spell her last name, please?

(b)(6) (b)(6)

MR. EDENS: Thank you.

(b)(6) I only found out about this yesterday. I haven't had time to review the Environmental Impact Statement to look at it. I did review the materials here tonight.

T2-83 I came here primarily because she was concerned with the foul odors that are already there, and she was concerned with having what equates with an open cesspool in her neighborhood, and concerned about property values.

Sitting here tonight, I'm concerned about a lot more, including checking with her to find out if she's on a well, which I think she is, and if she's had it checked recently.

(b)(6) commented about that this is the only investment most of these people

have, and she made the comment very nicely, there was no way in heck that anybody would buy it. Well, I'll put it the way it should be: there's no way in hell people would buy down there.

(Applause.)

T2-84 The lady I represent is a (b)(6) and (b)(6) worked hard to buy a small parcel of property. She's been trying to sell it. She wants to move from there, find a place where she can relax. She's now with the knowledge of -- the pollution that's there, I think, has effectively denied the benefit of her property. She'll never be able to sell it. It concerns me.

T2-85 She told me the odor was terrible. I've been down in the area. I've had other clients in the area and have been there on several occasions. A few years ago it wasn't there. I know that as a fact.

T2-86 My concern is once the groundwater has carried all of these pollutants into the area -- the earlier comments are certainly appropriate. Taking away the continuing flow of the groundwater into this area is not going

to remove what's already been deposited into the soil, and the continuing flush of the groundwater is going to continue to bring these out. It's going to affect that area for nobody knows how long.

T2-87 Putting an open pond there and running this through a schoolyard or right adjacent to it, I don't want to speak too harshly, but it does border on stupidity, at least in the eyes of the average person who's dealing with it.

Concern. They talk about, from what I gather here tonight, that they're going to raise the level of the wetlands, it's a natural retainage basin. That automatically -- good old farm kid, you got to know that if you raise the water level there you're going to push it up in the low areas all around it, which includes the schoolyard. That's automatic. You're going to then start leaching out these leachates that are already deposited in the ground.

It's an open invitation to continuing problems, and the liability is the least of it. There's not enough money to pay for the

problems it can create.

T2-88 I think it's time that the city, with all of its expertise -- the kind of expertise that when you tell them they're doing wrong they say don't tell us, we're experts, you don't know anything, and then 20 years later when the very thing is predicted, it comes true, they say, well, we're only human and we make mistakes, too, and it's really not our fault. Well, maybe it's time for them to stand up and be responsible and resolve this problem for the people out there.

On behalf of (b)(6) I want to register strong opposition and to recommend or suggest that the recommendation be made that these people be bought out and removed from the problem, that that be followed.

Thank you.

(Applause.)

MR. EDENS: (b)(6) I think you wanted earlier --

(b)(6) I think it's all been covered. I think that I would just be redundant.

MR. EDENS: Okay. Thank you.

We've now been through the complete list of everyone who has signed up. Is there anyone who has not spoken yet that wishes to make a comment?

(b)(6)

(b)(6) Could I say something?

MR. EDENS: Sure.

Since I don't have your name down, would you please state it and spell it and give me your address, please?

(b)(6) Do you want my full name or just my nickname?

MR. EDENS: Full name, please.

(b)(6)

(b)(6)

(b)(6)

T2-89 I just wanted to say that I really appreciate these people coming here and just doing -- giving me a lot of insights, because my kids have played in those wastelands and I am kind of worried.

And there is some things that bother me, too, and that's the same thing as

everybody says, a park site. I have a little girl that goes there.

It's really sad to see this happening. You know, here we are in this great land of opportunity, our technology, and all this, you know, and here we are. It seems a minor problem, but we're making it a really -- it's become a real bad problem.

And for the people on (b)(6) where I live at, you know, we've been living with this, and now with all this water runoff, I know that those wastelands now are -- I feel are very polluted, and there has to be something done about even cleaning that area up instead of dumping more water from the dump there.

Thank you.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: Is there anyone else who has not made a comment yet who wishes to speak? Anyone else?

(b)(6)

(b)(6) I think I might as well take advantage of it, just to introduce myself. A captive audience.

(b)(6)

(b)(6) Kent, 98032.

T2-90 A couple years ago I announced myself as a citizen advocate for protected environment. The main reason for doing so was that I was hearing an awful lot of dissension about all the garbage, the waste material, the landfills, the bad smells, this, that, and some of the other things, but I didn't find anybody coming up with an option or any alternative. This is where I stepped in.

I thought, hey, you and I are dumping our waste into somebody else's backyard and then we're turning our back on it, and this is not the way to go. We've all got to pull together and pull some of this garbage out.

T2-91 It was mentioned tonight that nonputrescibles would not be permitted in that landfill. Well, that must have been forgotten by the time Tuesday rolled around and everybody was out of the office for Labor Day weekend. Well, we can't be out to coffee all

the time. Somebody's got to mind the store.

One of the ways to avoid putrescibles in the waste stream is to not put them in there, avoid putting in anything that is of organic or putrescible or decom -- that can decompose, which is what makes the problem in the landfill.

T2-92 Added to that with all of our industrial waste, we've developed or permitted to be developed a Love Canal out there, and the evidence is here in the unexplainable illnesses.

These are the same symptoms that have popped up among the 200 odd residents in the Love Canal, also in the area in Memphis and Miami Beach and two or three other areas. It didn't take more than about three or four years for the Public Health Department to reverse themselves and find out, that, yes, they did have something wrong with them, and, yes, it was because of something picked up from that landfill.

T2-93 It's a -- it's really rough on any community or us as citizens or residents or just tourists passing through and distributing

our litter along the highway that we permit something like this to go on and still refuse to accept the responsibility, to demand an active mandate from the people that we put in the position to exercise these programs, to administer to them, to intelligently make them effective, monitor them as they go along, and see to it that there are responsible and well-experienced, talented people in the areas to see that the programs work. If they don't, then get rid of that program and pull down a new one.

T2-94 There's been a lot said about technology not being effective completely. I think somewhere along the line we're looking for a dollar value on garbage and we're seeking perfection.

There's no way you're going to make money out of that waste stream, recycling notwithstanding. Irrespective of any denial that there's a market for recyclables, the market is lacking because there's been no conserted effort to recycle the recyclable materials.

Companies will insist on primary

materials rather than recyclables because it's cheaper to go that way; however, if in instead of a 20 percent recycle program you can exceed 40 and perhaps approach 60 -- hope that we could -- companies would be delighted to go on and even to change their own packaging and other types of technology to allow for a more reasonable and a more complete recycling program, but the incentive to do so lies with the person who finds it in his hip pocket.

To begin with, the people who would recycle would do so only if they got some kind of a compensation, perhaps on their utility bill. At that point the local utility program would have to charge every resident contributor say $35 a month for just waste disposal. From that they could recycle a certain amount and get a chip. That chip or scrip would permit them a credit against that $35 a month charge.

If the resident wastemaker was energetic enough, maybe had enough kids in the Boy Scouts or girls in the Brownie whatever, they can probably end up with not paying any utility bill. But the whole program lies in

the laps of the contributors to the waste stream.

The people we've got in the office are no more intelligent or no more expert than the ones that go into that voting booth that put them there. The rest is up to you and the post office.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: Is there anyone else who has not made a comment who wishes to speak? Anyone else at all?

Okay. Is there anyone who has spoken before who wishes to come back and make additional comments at this time?

(b)(6)

(b)(6)

(b)(6) You have my name and address. I'm speaking now as (b)(6) concerned citizen, and not necessarily for Marcus Whitman Church.

T2-95 I am concerned about two things. One is the media hype. I don't know if the City

of Seattle Engineering has any control over that. I wouldn't think so. I wish to speak to them, but they are gone.

This is not just a methane gas problem. This is a surface water problem. This is a health problem.

We need to make sure that people get information. If that can't be done through the media without hype, then I suggest that the City of Seattle Engineering Department or whoever's project it is, put out newsletters not just to those people who are on the mailing list, but use a direct mail concept and mail to all the residents in the area.

T2-96 We heard from numerous people here about the Environmental Impact Statement detention recommendation problem at the pristine wetlands adjacent to Marcus Whitman Church and to the Parkside Elementary School.

The reason the people don't want this problem, this detention basin, is because there are problems right now that already exist that they believe will be further extenuated if this detention basin is built. They're not guessing. They know that there

are problems now.

If the safe, logical approach of a tightline is recommended in the Final Environmental Impact Statement, hopefully the problem will not continue in that area. However, there is a problem still in that wetlands that is directly attributable to the Midway Landfill.

T2-97 Many, many people have suggested buying out homes. That is a partial solution. I recommend that a tightline be built, if possible, or be studied, to be built from the wetlands to the tightline that would be built from the Midway Landfill, to intersect at approximately 252nd or 18th Street, whatever would allow proper run-off.

The question, are there any contingencies made for that wetlands in the Final Environmental Impact Statement unless it is used as an off-site detention.

I believe right now that the only time that any benefit will come to that area is if an off-site detention basin is chosen. That is not the only time it should happen, because it is not just a problem inherent to

the wetlands; it is a problem that has been caused through migration of gas and leachate through the Midway Landfill.

And that should be all.

MR. EDENS: Thank you.

(Applause.)

MR. EDENS: Anyone else who wishes to speak again?

Yes, sir.

(b)(6)

(b)(6) As I mentioned before, my name is (b)(6) I'll try to be brief.

T2-98 I just wanted to reiterate my concern that many share here that immediate steps be taken to analyze the soil at Parkside Elementary School, which affects probably several hundred children, that immediate efforts be made to analyze that soil as part of the closure plan, and not wait for any already arranged plan that might be in the future for testing this soil. In other words, I see that as a major priority because of its proximity to the wetlands mentioned previously.

Thank you.

(Applause.)

MR. EDENS: Is there anyone else who wishes to comment again? Anyone else who wishes to speak? Is there anyone else at all?

Okay. One more.

(b)(6) I am a --

MR. EDENS: Could you please come up to the front, sir?

Thank you.

(b)(6)

T2-99 (b)(6) I think that as well as Parkside, that the whole area west of that landfill should being checked out.

A VOICE FROM THE AUDIENCE: Yes.

(b)(6) And I'm not talking just down to my street, but all the way down to Puget Sound, because that landfill has been there for 20 years, it's been filling up for 20 years, and nobody has really found how far the leachate has gone.

Thank you.

MR. EDENS: Thank you.

(Applause.)

(b)(6)

(b)(6) I would just like to make two comments.

T2-100 I was talking with a gentleman today who lives (b)(6) which is a main thoroughfare, and he expressed similar complaints about the smell over the past several years, thinking it came from Tacoma. After describing it, I informed him, I said, that's the same smell we get from the dump.

I think if you took a survey of our neighborhood you'd find a lot more medical problems. This day and age neighbors don't like to tell their -- tell neighbors all their medical problems. I think you'll find quite a list of medical problems that are unexplained.

That's all. Thank you.

(Applause.)

MR. EDENS: Anyone else who wishes to speak at this time? Anyone else at all? Any other speakers tonight?

Okay. Hearing none, then I will now

close the record of the public hearing.

As I said at the start, you do have until September 19th to make written comments, and please address those to me, and my address is here on the agenda.

We also have copies of the EIS available out there for sale if you wish to pick them up. We would prefer you pay for that by check.

In terms of the future, we do plan on trying to issue the Final Environmental Impact Statement, if at all possible, near the end of October or in early November. It depends on how difficult it is to respond to your questions and comments.

We also plan on putting together a compilation of all the comments we received, both the two transcripts from both public hearings, and also any written comments which we've received here in the office. We will give that the same circulation we have given to the Draft EIS. We'll also make that available in the libraries and for purchase here at the city.

Thank you all for coming tonight.

(Hearing terminated at 8:55 p.m.)

C E R T I F I C A T E

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I, CHERYL A. MANGIO, the undersigned Court Reporter, do hereby certify:

That the deposition, a transcript of which is hereto annexed, was given before me at the time and place indicated in said transcript, and that the testimony thereupon given was by me stenographically recorded and typewritten under my personal supervision;

I further certify that the foregoing transcript contains a full, true and accurate record of all of the testimony and all of the proceedings given and occurring at the time and place.

Cheryl Mangio
Notary Public in and for
the State of Washington,
residing in Seattle.

RESPONSE TO PUBLIC HEARING TRANSCRIPT NO. 2
TESTIMONY RECEIVED ON SEPTEMBER 11, 1985

(b)(6)

T2-1. Comment acknowledged. See Transcript No. 1, Comment T1-21. A park will not be built on the closed landfill site until monitoring indicates that it would be safe to do so.

T2-2. See responses to Transcript No. 1, Comments T-25 and T-26.

T2-3. See responses to Letter No. 1, Comments 6 and 7. If leakage from the cap occurs and the leachate enters the surface water on the site, the surface water will be removed and treated as necessary to allow discharge in compliance with water quality regulations (see response to Letter No. 9, Comment 18). The leak through the cap would be repaired to prevent additional leakage.

T2-4. Monitoring of on-site surface waters will be conducted to determine if any leakage is occurring through the cap. This will be conducted on the south side of the landfill also. Permanently installed groundwater monitoring wells on the south side of the landfill will be used to monitor groundwater at this location.

Julie Wade

T2-5. Comment acknowledged. The property contiguous to the landfill site owned by the Romano's and others will be filled as required by the Lease and Easement Agreement as part of the closure process (see page I-16 and Figure I-4 of the DEIS). The response to Transcript No. 1, Comment 43 is also relevant.

T2-6. Comment acknowledged. See Letter No. 1, Comments 2 and 4 and their associated responses.

T2-7. Comment acknowledged.

(b)(6)

T2-8. See response to Letter No. 12, Comment 3.

T2-9. Comment acknowledged. See response to Transcript No. 1, Comment T1-21.

T2-10. It is surface water runoff, not groundwater, that would be discharged into Smith Creek. Effects on Smith Creek are addressed in Letter No. 2, Comment 5. With regard to discharge to the Green River, see Letter No. 11, Comment 12 under Surface Water Management.

T2-11. The annual quantity of leachate generation after the cover system is installed is estimated to be two million gallons (not tons). An estimated 500,000 gallons per year will be collected in the toe seep collection

system and removed for pretreatment at Kent Highlands Landfill and disposal in the Metro sewer system. See response to Letter No. 21, Comment 11.

T2-12. See response to Transcript No. 1, Comment T1-40.

T2-13. See response to Letter No. 34, Comment 3.

T2-14. See response to Transcript No. 1, Comment T1-48.

T2-15. Comment acknowledged.

(b)(6)

T2-16. The contents of landfill gas and its associated impacts are discussed on pages II-41 to II-47 of the DEIS. Also, see response to Letter No. 22, Comment 2.

T2-17. See pages I-16, I-44, and I-46 of the DEIS for a discussion of the height of the landfill with each of the three grading plan alternatives. Generally, the elevations of the Minimum and Intermediate Grade Alternatives are below the adjacent ground level on the west and south sides of the landfill, and the elevations of the Maximum Grade Alternative are about the same as the adjacent ground level. The barrier between the landfill and the on-site detention basin would be located on the north side of the landfill. Runoff from the 25-year design storm would be contained in the detention basin and released through a controlled discharge outlet into the off-site storm water pipeline. The basin would be equipped with an overflow so that runoff from storms greater than the 25-year storm could be discharged from the basin to the pipeline without over-topping the detention basin.

T2-18. The Lease and Easement Agreements that pertain to the Midway Landfill, including the dedication of the park site, are discussed on page II-77 of the DEIS. Both the City of Kent West Hill Plan and Recreation Plan include a park on the landfill site. Although the City of Kent has recently decided that it does not wish to develop a park on site, this does not preclude park development by another entity. All project alternatives would allow for eventual park development and no off-site purchases of parkland are anticipated. See response to Comment T2-1.

(b)(6)

T2-19. Comment acknowledged.

T2-20. Comment acknowledged. Your specific concerns are addressed in the responses to Comments T2-21 through T2-25 below.

T2-21. Comment acknowledged. See response to Letter No. 12, Comment 7.

T2-22. Comment acknowledged. See response to Letter No. 2, Comment 3 for a discussion of surface water treatment to be included in the project. The response to Letter No. 9, Comment 16 is also relevant.

T2-23. Surface water leaving the site is not expected to be contaminated with leachate. See responses to Transcript No. 1, Comment 42; Letter No. 21, Comment 11; and Letter No. 12, Comment 6.

T2-24. Comment acknowledged.

T2-25. See response to Comment T2-23 above.

(b)(6)

T2-26. See responses to Transcript No. 1, Comments T1-37 and T1-38.

T2-27. See responses to Letter No. 14, Comments 7 and 8.

T2-28. See response to Transcript No. 1, Comment T1-43.

T2-29. See response to Comment T2-26 above.

T2-30. See responses to Comments T2-1 and T2-18.

T2-31. The statement you refer to is intended to mean that the major physical, or engineering, difference between the closure alternatives is the final grade of the landfill. All three grade alternatives have the same surface water management alternatives, the same leachate collection and treatment system, the same gas and odor control system, the same monitoring programs (surface water, groundwater, and landfill gas), and the same post-closure maintenance. With regard to hazardous waste and gas, see responses to Transcript No. 1, Comment 38; Letter No. 29, Comment 1; and Letter No. 22, Comment 2.

T2-32. See responses to Letter No. 9, Comments 26 and 27; and Letter No. 11, Comment 7.

T2-33. See response to T2-32 above, as well as the response to Letter No. 22, Comment 2.

T2-34. All proposed Surface Water Management Plan alternatives include elimination of surface water discharges into the landfill from I-5 and the area east of I-5. Surface water from Highway 99 currently does not drain into the Midway Landfill. Rather, this runoff is discharged from several locations on Highway 99 toward the wetland area near Parkside Elementary School.

T2-35. See response to Comment T2-34 above.

T2-36. See response to Transcript No. 1, Comment T1-21.

T2-37. See responses to Letter No. 9, Comments 16 and 18.

T2-38. Comment acknowledged. Although there are currently no provisions for the public to participate in the actual monitoring, results of the monitoring programs will be made available for public review.

(b)(6)

T2-39. You are probably referring to the Port of Seattle Terminal 5 dirt which was stockpiled at the landfill. See response to Letter No. 27, Comment 11.

T2-40. See response to Letter No. 2, Comment 3 regarding treatment of surface water leaving the landfill site. Based on the estimated leachate quantity (500,000 gallons annually) that will be collected in the toe seep system, an on-site treatment plant offers no advantages over combined treatment at the Kent Highlands leachate pretreatment facility. On-site treatment of leachate at Midway is not economically viable when compared to treatment at Kent Highlands. Furthermore, there is little, if any, space on the Midway site that is not underlain with waste. Therefore, it would be difficult to construct and ensure the reliability of an on-site basin.

T2-41. Comment acknowledged. See responses to Comment T2-38 above and Transcript No. 1, Comment T1-48.

(b)(6)

T2-42. Comment acknowledged. That land noted as a wetland on Figure I-6 of the DEIS was surveyed by biologists from Parametrix, Inc., and was determined to be a wetland under generally accepted definitions of wetlands. The City of Des Moines and King County both acknowledge the presence of a wetland at that location. See Letter No. 9, Comment 1, and page II-50 of the Draft EIS. The market value of the wetland has not been determined by the City of Seattle at this time.

T2-43. See response to Transcript No. 1, Comment T1-21. The fence around the off-site detention basin would be at least eight feet high chain link with three-strand barbed wire at the top. Access gates would be provided with locks. This type of security fence is routinely used for similar or more hazardous conditions and serves to prevent casual entry. The fence could be breached by someone determined to do so, however. The off-site detention basin would be located within the city limits of Des Moines. It is within the jurisdiction of the City of Des Moines to provide police protection to all persons and properties within their city limits. Any financial arrangements for this would be resolved between the City of Des Moines and the City of Seattle in accordance with City of Des Moines statutes.

T2-44. The City of Seattle would be responsible for maintaining the detention basin in accordance with applicable regulations (city, county, state).

T2-45. See response to Letter No. 34, Comment 4.

T2-46. Comment acknowledged. See responses to Letter No. 34, Comments 3 and 4.

T2-47. Following closure of the Midway Landfill, all comments regarding problems resulting from the landfill should continue to be directed to the Seattle Engineering Department, Solid Waste Utility. Correspondence could also be directed to the Seattle-King County Department of Public Health, Office of

Environmental Health Services, or to the Washington State Department of Ecology.

T2-48. See response to Letter No. 9, Comment 18. The proposed action does not include specific contingency plans for additional remedial action if any should become necessary. The detection monitoring program will determine the need for any contingency plan measure. Should such additional remedial action become necessary, the details of the plan would be developed and the plan would be subjected to all required agency and public reviews.

T2-49. Comment acknowledged.

(b)(6)

T2-50. The pipe referred to that is under I-5 slopes downhill from the east to the west. It would not be possible to use this pipe to run water from the west to the east unless the water was pumped and a pressure line was inserted through this pipe. On the east side of I-5, water will not flow to Kent Highlands Landfill because of high topography between the two locations. Again, pumping would be required. See response to Letter No. 12, Comment 6 regarding discharge of surface water to the Metro system.

T2-51. Comment acknowledged. As discussed on page II-99 of the Draft EIS, a street sweeper will be used to pick up dirt and mud tracked onto the highway by construction-related truck traffic, both now and in the future. Installation of a wash basin for trucks may also be necessary to mitigate this impact.

(b)(6)

T2-52. Comment acknowledged. At present there are no plans to form a citizens advisory committee for closure of the Midway Landfill.

(b)(6)

T2-53. Comment acknowleged.

T2-54. See responses to Comment T2-43 above and Transcript No. 1, Comment T1-21.

T2-55. Comment acknowledged.

(b)(6)

T2-56. See response to Letter No. 9, Comment 21.

T2-57. See response to Letter No. 12, Comment 3.

(b)(6)

T2-58. Comment acknowledged.

T2-59. See response to Senator Lee's comment (Comment T2-23).

T2-60. With regard to detention basin alternatives and security, see Comment T2-43 above and Transcript No. 1, Comment T1-21. There is no evidence of leachate seepage into the wetland (see response to Letter No. 12, Comment 3). The response to Letter No. 15, Comment 5 is relevant to health concerns.

T2-61. Comment acknowledged. See responses to Letter No. 11, Comment 12 under Surface Water Management; and Letter No. 34, Comments 1 and 3.

(b)(6)

T2-62. Comment acknowledged.

T2-63. Preliminary design of the surface water management plan alternatives indicates that a pump station would not be necessary to move water off the landfill site with any of the Puget Sound discharge alternatives for either the minimum grade or intermediate grade plan. Thus, no pump station is needed for the South 250th Street route.

T2-64. If weekly inspections over the first year do not detect significant problems with the final cover system, leachate collection and treatment system, or other closure facilities, it is likely that inspections will be less frequent during the next year. However, if at any time in the future problems begin to occur, the more frequent inspection schedule will be restored. Data from the groundwater monitoring program described in Appendix M of this FEIS will allow regulatory agencies to determine if monitoring will occur for 30 years. Monitoring will continue until it is clear from the data that significant leachate contamination of groundwater is no longer occurring. See response to Letter No. 17, Comment 1.

T2-65. Unlike a direct discharge of surface water from the landfill to the Green River, discharges from trucking generally do not occur during peak flow periods in the River. Furthermore, the volume of water trucked to Kent Highlands in the past is relatively small compared to what will need to be discharged after the Midway Landfill cover system is in place (2.5 million gallons in 1984 vs. 46.5 million gallons in the future). So in this sense, there is a great deal of difference between the discharging of water that was trucked and that which would be discharged from the capped, closed landfill. See Letter No. 11, Comment 12 under Surface Water Management regarding discharges to the Green River.

T2-66. The wetland would not be significantly impacted by any of the surface water management alternatives that feature an on-site detention basin, including the preferred Wetland Discharge Alternative evaluated in Section II of this FEIS (see response to Letter No. 9, Comment 3). Under the Off-Site Detention Alternative, 6 acres of wetland would be destroyed. As discussed in the response to Letter No. 11, Comment 12, discharge into the Green River was determined to be technically infeasible and inconsistent with King County Surface Water Runoff Policy.

T2-67. In general, all surface water runoff in the Seattle region eventually reaches Puget Sound. Only the route by which it arrives there is variable. The discharge of surface waters from the Midway Landfill will

comply with all applicable water pollution control regulations. See responses to Letter No. 2, Comment 3; and Letter No. 9, Comment 16.

T2-68. The City of Seattle regrets that you feel you were not kept informed of events related to the Midway landfill. The City has made every effort through the environmental review process and additional public workshops and meetings to keep residents in the site vicinity informed of the results of monitoring programs and the progress of closure. Leaflets are continuing to be used to notify residents of meetings or to disseminate information.

John O'Rourke

T2-69. See response to Letter No. 11, Comment 18.

(b)(6)

T2-70. With regard to the types of waste that may have been deposited at the landfill, see responses to Transcript No. 1, Comments 37 and 38. Measurements of the chemical composition of unlit flare gas at the Midway Landfill indicated the presence of hydrogen sulfide gas but not hydrogen cyanide gas. A more chemically specific analytical method was used for the DEIS study than was used in the previous measurements you refer to (see footnote (6) to Table II-10 on page II-43 of the DEIS). The method did not detect hydrogen cyanide, indicating it was present at levels of below approximately one one-hundreth of a part per million. In addition, although relatively high concentrations of hydrogen sulfide were measured at the top of the unlit flare (again by a more chemically specific technique), the gas emission rates are such that there is significant dilution of these high concentrations by the ambient air even under the most unfavorable conditions within several yards of the flare head. At these lower concentrations, the odor problems can still exist, accompanied by nausea and respiratory effects. See the review of public health issues in Appendix O of this FEIS.

T2-71. Levels of contaminants found in groundwater monitoring wells to date are discussed in the revised Groundwater Quality section in Section II of this FEIS. Further information on leachate contamination of groundwater will be developed as a result of ongoing groundwater investigations described in Appendix M of this FEIS. Letter No. 1, Comments 2 and 4 and their associated responses are relevant.

T2-72. See responses to Letter No. 15, Comments 3 and 5.

(b)(6)

T2-73. Comment acknowledged. See response to Letter No. 15, Comment 5.

T2-74. Testing of surface water in the wetland area is discussed in the response to Letter No. 12, Comment 3. The response to Letter No. 9, Comment 16 is also relevant.

T2-75. Comments acknowledged. Citizens in the landfill vicinity will be notified before additional construction for closure is initiated. With regard to potential health effects, see response to Letter No. 15, Comment 5.

T2-76. See responses to Comments T2-70 and T2-75 above.

T2-77. The water quality in this detention basin would not be significantly different than the water quality in detention basins scattered throughout Bellevue. The City of Bellevue routinely uses wetlands and detention basins to control urban runoff in its watersheds. The basin at the corner of N.E. 24th Street and 140th N.E. Avenue is a reconstructed wetland and actually provides a neighborhood amenity with a trail around the perimeter.

T2-78. See response to Comment T2-74 above.

T2-79. See response to Comment T2-71 above.

T2-80. See response to Letter No. 15, Comment 5.

(b)(6)

T2-81. See response to Comment T2-60 above.

Steven Dijulio

T2-82. See response to Comment T2-1 above.

(b)(6)

T2-83. Comment acknowledged. With regard to property values, see response to Letter No. 15, Comment 3. The responses to Comments T2-60, T2-71, and T2-77 are relevant to your concerns about the wetland, detention basin, and groundwater.

T2-84. See response to Letter No. 15, Comment 3.

T2-85. There is no evidence of leachate contamination in the wetland. The odor could be caused by sanitary sewer discharge that originates from failing septic systems in the mobile home park north of the landfill (see response to Letter No. 12, Comment 3).

T2-86. Comment acknowledged. See response to Comment T2-71 above.

T2-87. If a portion of the wetland is converted to a detention basin, it will function in a similar manner to the existing natural detention basin. Some of the water in the basin will seep into the ground, continuing the recharge of groundwater that now occurs in the wetland. As noted in the response to Transcript No. 1, Comment 42, and Comment T2-77 above, runoff from the site that enters the detention basin is not expected to be contaminated with leachate. Also, there is currently no evidence of leachate contamination in the wetland area (see response to Letter No. 12, Comment 3).

T2-88. Comment acknowledged. See response to Letter No. 15, Comment 3.

(b)(6)

T2-89. We assume that you are referring to the wetlands near Parkside Elementary School. See response to Comment T2-85 above.

(b)(6)

T2-90. Comment acknowledged.

T2-91. Comment acknowledged. See responses to Transcript No. 1, Comments T1-37, T1-38, and T1-43.

T2-92. See response to Letter No. 15, Comment 3.

T2-93. Comment acknowledged.

T2-94. Comment acknowledged.

(b)(6)

T2-95. Comment acknowledged. The City is continuing to use leaflets to notify area residents of meetings or to disseminate information. See response to Comment T2-68 above.

T2-96. See response to Comments T2-77 and T2-85 above. Your preference for the tightline alternative is noted. As discussed in Section I of this EIS, the tightline is not the City's preferred alternative at this time.

T2-97. With regard to buying out homes, see response to Letter No. 15, Comment 3. Improvements are proposed to the wetland only under the off-site detention alternative. There is currently no evidence of leachate contamination of the wetland (see response to Comment T2-85 above).

(b)(6)

T2-98. Tests have been conducted of surface water and soils on the school property. See responses to Letter No. 12, Comment 3 and Comment T2-85 above.

(b)(6)

T2-99. See response to Letter No. 12, Comment 3.

(b)(6)

T2-100. Comment acknowledged. Odor-causing constituents in landfill gas are discussed on page II-46 of the DEIS. With regard to public health issues in the landfill vicinity, see response to Letter No. 15, Comment 5.

APPENDIX A

SUPPLEMENTAL INFORMATION

APPENDIX A

Appendix tables A-2 and A-3 have been revised to include a description of the data sources used to compile each. Table A-3 has been further revised to include the results from measurements of the organic pollutants trichloroethene and tetrachloroethene.

Table A-2. Water quality data for Midway Landfill wells. Concentrations are in mg/l. Data on the BH-series wells was compiled from Department of Ecology data and represents an average of one to five sampling episodes during 1983 . Data on MW-1, 2, and 4 is from samples collected in 1985 and analyzed by Analytical Technologies, Inc.

	Drinking[1] Water Standards	BH-1B	BH-3	BH-4	BH-5	BH-6	BH-7	BH-8	MW-1	MW-2	MW-4
Specific Conductivity	700 [2]	981	2956	5148	6815	2372	3050	1996	245	275	320
Chloride	250	37	880	1420	1324	233	765	170	5.38	4.50	9.44
Total Solids		115	7175	3887	4370	3687	2995	1614	266	1266	1294
Total Volatile Solids		236	1100	753	1074	597	425	238	62	98	153
Total Dissolved Solids	500	460	2810	4210	7050	2485	2240	1086	144	124	214
TVD Solids		53	500	610	1110	553	240	149	80	60	96
NO_3 - N	10	4.9	<0.10	0.70	<0.25	<0.10	<0.05	<0.10			
NO_2 - N		0.45	<0.10	2.5	<0.25	<0.10	<0.05	<0.10			
NH_3 - N		2.0	64	250	700	9.8	47	3.9			
Copper[3]	1.0	<.02	0.46	0.06	0.02	<0.02	<0.02	<0.02	0.04	0.05	0.03
Iron	0.3	10.13	248.4	34.1	9.16	19.2	32.5	16.13	1.21	16.7	4.93
Nickel		0.03	0.40	0.07	0.16	0.07	0.05	0.01	<0.01	0.02	0.01
Chromium	0.05 [2]	<0.02	0.31	0.03	0.06	<0.02	<0.02	<0.02	0.01	0.02	0.01
Cadmium	0.01 [2]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001
Lead	0.05 [2]	0.04	0.48	0.23	0.43	0.10	0.48	0.04	<0.005	0.012	<0.005
Manganese	0.05	4.43	8.45	2.47	1.34	12.07	5.1	2.81	0.005	0.45	0.17
Mercury	0.002[2]	0.4	1.0	3.7	<0.2	<0.20	<0.2	<0.2	<0.0005	<0.0005	<0.0005
Zinc	5.0	0.19		0.35	0.39	0.42	0.36	0.03	0.01	0.002	0.001

[1] U.S. Environmental Protection Agency, 1975 and World Health Organization, European Stds. 1970.
[2] Washington State Standard.
[3] Concentrations shown for heavy metals represent the "total" concentration for each.

Table A-3. Priority pollutants detected in Midway Landfill wells and leachate (ug/l). This table was compiled from EPA data (1983) and Analytical Technologies Inc. (1985) analyses.

	BH-1B		BH-3		BH-4		BH-5		BH-6			BH-7		BH-8			MW-1	MW-2	MW-4	MW-5	MW-6	Leachate
Sampling Data	1-83	6-83	1-83	6-83	1-83	6-83	1-83	6-83	1-83	6-83	5-85	1-83	6-83	1-83	6-83	5-85	5-85	5-85	5-85	7-85	7-85	6-85
ORGANICS																						
Acenaphtnene	20U	10U	20U		20U	20M	20U	10U	20U	10M	U	20M	10U	20U	10M	10U	10U	10U	10U	20U	20U	20U
Naphthalene	20U	10M	20U		20U	120	20M	10U	40M	30M	12	20U	10U	20U	20M	10U	10U	10U	10U	20U	20U	20U
Phenanthrene	20U	10U	20U		20U	10M	20U	10M	20U	10U	U	20U	60	20U	10U	10U	10U	10U	10U	20U	20U	20U
Bis-2-ethyl-hexyl phthalate	20U	10M	20U		20U	60	430	110	20U	10U	U	20U	40M	20U	10M	10U	10U	10U	10U	6J	20U	20U
Di-ethyl phthalate	20U	10U	20U		20U	10U	20U	10U	20U	70	30	20U	10U	20U	10M	10U	10U	10U	10U	20U	20U	20U
Acrolein	20U	100U	150M		20U	100U	20U	100U	20U	100U		20U	100U	20U	100U	N	N	N	N	N	N	N
Benzene	5U	5U	5M		6M	9M	5U	5U	26	20M	U	14M	10M	5U	20M	5U	5U	5U	5U	5U	5U	11
Chlorobenzene	5U	5M	5U		5U	5M	5U	5U	44	50	U	12M	8M	5U	20M	5U	5U	5U	5U	5U	5U	27
1,1-Dichloroethane	7.6M	33	5U		5U	5U	5U	5U	5U	5M	U	5U	5U	5U	5M	5U	5U	5U	5U	5U	5U	6
Chloroethane	12M	35M	5M		5U	10U	5U	10U	5U	40M	68	6.5M	10U	5U	10U	68	10U	10U	10U	10U	10U	48
Trans 1,2-Dichloro-ethene	5U	5M	5U		5U	5U	16M	90	5U	5U	U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Ethyl Benzene	5U	5M	5U		24M	50	34	40	140	200	U	36	10M	350	240	5U	5U	5U	5U	5U	5U	100
Methylene Chloride	5U	5M	5U		5U	5U	5U	30	5U	5M	U	5U	30	5U	5M	5U	5U	5U	5U	5U	5U	5U
Toluene	5U	5U	5U		7M	5M	28	5U	310	110	U	5U	5U	5M	9M	5U	5U	5U	5U	5U	5U	66
Heptachlor epoxide	.1U	.005U	.1U		.1U	.005U	.1U	.005U	.1U	.005U		.1U	0.5	U	U	N	N	N	N	N	N	N
G-BHC Lindane	.1U	.005U	.1U		.1U	.005U	.1U	.005U	.1U	0.5		.1U	.005U	U	U	N	N	N	N	N	N	N
Acetone	N	5U	N		N	5U	N	5U	N	5U	10U	N	5U	N	5U	10U	10U	10U	10U	10U	10U	14
Total Xylenes	N	5U	N		N	5U	N	5U	N	5U	5U	N	5U	N	5U	5U	5U	5U	5U	5U	5U	154
INORGANICS																						
Chromium	10U	10U	10U		10U	10U	83	15	10U	10U	10U	10U	15	10U	10U	10U	10	20	10	10M	20	410
Beryllium	5U	5U	5U		5U	5U	5U	5U	5U	5U	N	5U	5U	5U	5U	N	N	N	N	N	N	N
Copper	50U	50U	50U		50U	50U	50U	50U	50U	50U	20U	50U	50U	50U	50U	20U	40	50	25	20	30	20M
Nickel	40U	40U	40U		40U	40U	220	165	40U	40U	50	40U	40U	40U	40U	10U	10U	20	10	20	10	40
Zinc	94	10U	10U		88	137	300	310	140	21	710	19	92	23	12	20	10	20	10	40	40	10

U = Below detectable limits.
M = Pollutant detected, but at levels too low to be quantified.
J = Indicates an estimated value.
N = Not analyzed.

Table A-3. Priority pollutants detected in Midway Landfill wells and leachate (ug/l) (continued).

Sampling Data	BH-1B 1-83	BH-1B 6-83	BH-3 1-83	BH-3 6-83	BH-4 1-83	BH-4 6-83	BH-5 1-83	BH-5 6-83	BH-6 1-83	BH-6 6-83	BH-6 5-85	BH-7 1-83	BH-7 6-83	BH-8 1-83	BH-8 6-83	BH-8 5-85	MW-1 5-85	MW-2 5-85	MW-4 5-85	MW-5 7-85	MW-6 7-85	Leachate 6-85
Silver	10U	10U	10U		10U	10U	10U	10U	10U	10U	N	10U	10U	10U	10U	N	N	N	N	N	N	N
Arsenic	14	10U	10U		10U	10U	10U	10U	32	13	5U	10U	10U	10U	10U	27	5U	10U	5U	8	10	19
Antimony	20U	20U	20U		20U	20U	20U	20U	20U	20U	N	20U	20U	20U	20U	N	N	N	N	N	N	N
Selenium	2U	2U	2U		2U	2U	2U	2U	2U	2U	5U	2U	2U	2U	2U	5U	5U	5U	5U	2M	2M	5U
Thallium	10U	10U	10U		10U	10U	10U	10U	10U	10U	N	10U	10U	10U	10U	N	N	N	N	N	N	N
Mercury	.2U	.2U	.2U		.2U	.2U	.2U	.2U	.2U	.2U	.5U	.2U	.2U	.2U	.2U	.5U	.5U	.5U	.5U	.5M	.5M	0.2M
Cadmium	.4U	1U	1U		1.7	1U	1.3	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	.4M	.4M	1M
Lead	5	5U	5		5	16	13	65	6.8	13	10	5U	5U	54	8	7	5U	12	5	6	3	5M
Iron	1300	134	460		810	847	9200	3440	7600	1070	11600	95	191	210	577	25400	1210	16700	4925	7700	12,100	160
Manganese	1100	2650	5700		2600	2610	280	287	2300	8880	10200	4500	4220	15	8860	7450	5	450	165	390	690	560
Boron	1200	973	33		5600	4750	15	10800	3000	1710	1100	2200	2500	1980	3100	500U	500U	500U	500U	500M	500M	20900

U = Below detectable limits.
M = Pollutant detected, but at levels too low to be quantified.
N = Not analyzed.

APPENDIX D

GEOTECHNICAL REPORTS

APPENDIX D

The following are well logs for monitoring wells MW-5 and MW-6 and gas probes L and M. These are to be added to Appendix A of the report entitled Monitoring Well and Gas Probe Installations at the Midway Landfill (Golder Associates 1985), which is included in Appendix D of the DEIS.

Figure A-18

RECORD OF BOREHOLE MW-5

LOCATION See Figure DATUM 325 ft. (approx.) DATE 6-18-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp Wn WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
325								
0.0	Medium brown to gray; sandy fine to medium GRAVEL and SILT to CLAY and fine to very coarse SAND, some to trace gravel.		1	AR		325		Precast concrete flush fitting vault; 6" locking steel surface casing
			2	AR		320		
			3	AR		315		Bentonite/cement grout; Bentonite seal
310								
15.0	Medium brown; clayey fine to very coarse SAND and fine to coarse GRAVEL to medium to very coarse SAND, trace gravel, some clay.		4	AR		310		
			5	AR		305		4"dia. flush coupled, threaded PVC casing
			6	AR		300		
			7	AR		295		Pea gravel

REMARKS: AR- Air rotary drill.

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-18

RECORD OF BOREHOLE MW-5

LOCATION See Figure | DATUM 325 ft. (approx.) | DATE 6-18-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
290 / 35.0	Medium brown; fine to coarse GRAVEL, some to trace sand, some to trace silt. 38.0-40.0: Boulder.		7	AR		290		
			8	AR		285	4" dia. Flush coupled, threaded PVC casing	
			9	AR		280	Pea gravel	
			10	AR		275		
	53.0: Boulder.		11	AR			4" dia. PVC Sch. 40, 0.020 well screen.	
270 / 55.0	Medium brown; fine to coarse GRAVEL, trace sand and silt.		12	AR		270		
			13	AR		265		
			14	AR		260	6-26-85	

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-18

RECORD OF BOREHOLE MW-5

LOCATION See Figure | DATUM 325 ft. (approx.) | DATE 6-18-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp Wn WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	Medium brown; fine to coarse GRAVEL, trace sand and silt.		14	AR		255		4" dia. PVC Sch. 40, 0.020 well screen
			15	AR		250		Pea gravel
247 / 78.0			16	AR				Bentonite seal
	Gray to medium brown; silty, gravelly CLAY, trace sand.		17	AR		245		Sluff
240 / 85.0	End of Hole at 85.0 ft.					240		

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-10

RECORD OF BOREHOLE MW-6

LOCATION See Figure | DATUM 280 ft. | DATE 6-21-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp ● Wn — WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
280 / 0.0	Light to medium brown; silty, fine to coarse SAND, trace to some gravel.		1	AR		280		Pre-cast concrete flush-fitting vault; 6" steel locking surface casing
			2	AR		275		
	10.0-15.0: No gravel. 10.0-20.0: Trace organic matter.		3	AR		270		Bentonite/cement grout
			4	AR		265		4" dia. flush coupled threaded PVC casing
260 / 20.0	Medium to dark brown; silty fine to coarse GRAVEL and fine to coarse SAND. 20.0-25.0: Grades to silty SAND and GRAVEL. 25.0-30.0: Grades to GRAVEL, some to trace sand, trace silt.		5	AR		260		
			6	AR		255		
			7	AR		250		

REMARKS: AR- Air rotary drill.

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-19

RECORD OF BOREHOLE MW-6

LOCATION See Figure | DATUM 280 ft. (approx.) | DATE 6-21-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
247								
33.0 / 243	Dark brown to gray; silty CLAY, some sand and gravel.		8	AR		245		
37.0 / 235	Dark brownish-gray; fine to very coarse GRAVEL, trace sand and silt.		9	AR		240	Bentonite/ cement grout	
45.0	Medium to light brown; fine to very coarse SAND and fine to coarse GRAVEL, some silt.		10	AR		235	4" dia. flush coupled threaded PVC casing	
			11	AR		230		
222.5			12	AR		225		
57.5 / 215	Medium brown; fine to very coarse SAND, some to trace gravel, some silt.		13	AR		220		
65.0			14	AR		215		

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-19

RECORD OF BOREHOLE MW-6

LOCATION See Figure DATUM 280 ft. (approx.) DATE 6-21-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT	ELEVATION		
	Medium brown; fine to medium SAND, some silt to silty SAND.		14	AR		210		Bentonite / cement grout
			15	AR				Sand Fiter
	75.0-80.0: Trace gravel.		16	AR		205		
200 / 80.0	Medium brown; silty fine to very coarse SAND and fine to coarse GRAVEL.		17	AR		200		4" dia. Flush coupled threaded PVC casing
			18	AR		195		Pea gravel; 7-2-85
190 / 90.0	Medium brown; silty fine to coarse SAND to SILT and fine to coarse SAND, trace gravel.		19	AR		190		
185 / 95.0	Gray; fine to medium GRAVEL, trace sand and silt.		20	AR		185		4" dia. PVC Sch. 40, 0.020 well screen
180 / 100.0			21	AR		180		

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-19

RECORD OF BOREHOLE MW-6

LOCATION See Figure | DATUM 280 ft. (approx.) | DATE 6-21-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp Wn WL)	WELL INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	Gray-brown; sandy fine to coarse GRAVEL, some to trace silt to fine to coarse SAND and fine to coarse GRAVEL.		21	AR		175		
			22	AR			Pea gravel	
						170		
			23	AR			4" dia. PVC Sch. 40, 0.020 well screen	
	115.0–120.0: Grades to fine to coarse GRAVEL.					165		
			24	AR				
						160		
			25	AR				
155								
125.0	Gray; silty CLAY, trace sand to sandy, silty CLAY.					155		
			26	AR			Bentonite seal	
						150		
			27	AR				
						145	Sluff	
142	End of Hole at 138.0 ft.							

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

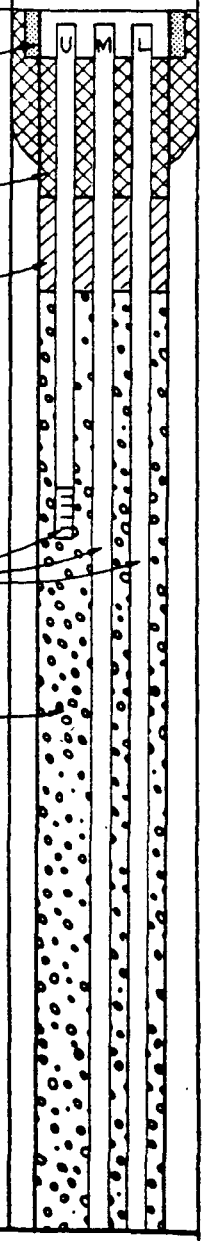
Figure A-20

RECORD OF BOREHOLE L

LOCATION See Figure | DATUM 410 ft. (approx.) | DATE 6-27-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
410								
0.0	Light brown; gravelly fine to coarse SAND, some silt to sandy fine to coarse GRAVEL, some silt.		1	AR		410		Precast concrete, flush fitting vault
			2	AR		405		Bentonite/cement grout; Bentonite seal
400								
10.0	Light brown; sandy SILT, some gravel.		3	AR		400		
395								
15.0	Light brown; fine to coarse SAND and fine to coarse GRAVEL, some silt.		4	AR		395		3/4" PVC; Pea gravel
390								
20.0	Medium brown; silty fine to coarse SAND, some gravel to fine to coarse SAND, some silt, trace gravel.		5	AR		390		
385								
25.0	Medium to light brown; fine to coarse SAND, some silt, trace gravel.		6	AR		385		
			7	AR		380		



REMARKS: AR – Air rotary drill.

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-20

RECORD OF BOREHOLE L

LOCATION See Figure DATUM 410 ft. (approx.) DATE 6-27-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	Medium to light brown; fine to coarse SAND, some silt, trace gravel.		7	AR		375	3/4" PVC	
			8	AR		370		
			9	AR		365	Pea gravel	
			10	AR		360	Bentonite seal	
			11	AR		355		
			12	AR		350		
			13	AR		345		
			14	AR				

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-20

RECORD OF BOREHOLE L

LOCATION See Figure | DATUM 410 ft. (approx.) | DATE 6-27-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp ● Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	Medium to light brown; fine to coarse SAND, some silt, trace gravel.		14	AR		340		
			15	AR				
335 / 75.0	Light to medium brown to gray-brown; fine to coarse SAND and fine to medium GRAVEL, trace silt to fine to coarse GRAVEL, some to trace sand, trace silt.					335		
			16	AR		330		
			17	AR		325		Pea gravel
			18	AR		320		
	90.0-95.0: Grades to sandy GRAVEL, trace silt.		19	AR		315		Bentonite seal
			20	AR		310		3/4" PVC
			21	AR				

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-20

RECORD OF BOREHOLE L

LOCATION See Figure | DATUM 410 ft. (approx.) | DATE 6-27-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	105.0-110.0: Grades to fine to medium SAND, some gravel, trace silt.		21	AR		305		
			22	AR		300		Pea gravel
			23	AR		295		
	115.0-120.0: Grades to sandy fine to medium GRAVEL.		24	AR		290		
			25	AR		285		
			26	AR		280		
280 / 130.0	Yellow-brown; fine to coarse GRAVEL, trace sand and silt.		27	AR				
270 / 140.0	End of Hole at 140.0 ft.		28	AR		270		

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-21

RECORD OF BOREHOLE M

LOCATION See Figure | DATUM 405 ft. (approx.) | DATE 7-1-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
405								
0.0	Dark brown; fine to coarse GRAVEL, some sand and silt.		1	AR		405		Precast concrete, flush fitting vault
400								
5.0	Medium brown; fine to medium SAND, some to trace silt, trace gravel.		2	AR		400		Bentonite/cement grout
			3	AR		395		Bentonite seal
			4	AR		390		3/4" PVC
			5	AR		385		Pea gravel
			6	AR		380		
			7	AR		375		

REMARKS: AR – Air rotary drill.

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

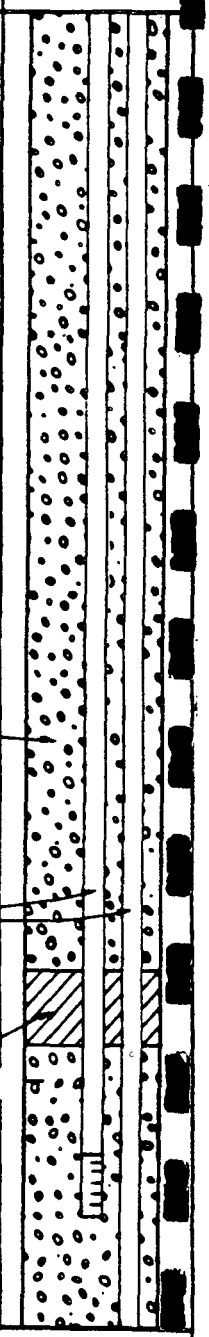
Figure A-21

RECORD OF BOREHOLE M

LOCATION See Figure | DATUM 405 ft. (approx.) | DATE 7-1-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp Wn WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
	Medium brown; fine to medium SAND, some to trace silt, trace gravel.		7	AR		370		
			8	AR		365		
	40.0-55.0: Grades to no gravel.		9	AR		360		
			10	AR		355		
			11	AR		350		
			12	AR		345		
345 / 60.0	Medium brown; fine to coarse SAND and fine to coarse GRAVEL, some to trace silt.		13	AR		340		
			14	AR				



REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-21

RECORD OF BOREHOLE M

LOCATION See Figure | DATUM 405 ft. (approx.) | DATE 7-1-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp, Wn, WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT.	ELEVATION		
335			14	AR				
70.0	Medium brown to gray-brown; fine to coarse GRAVEL, some to trace sand and silt to sandy fine to coarse GRAVEL, trace silt.		15	AR		335		
			16	AR		330		
			17	AR		325		
			18	AR		320		
			19	AR		315		Pea gravel
			20	AR		310		3/4" PVC
			21	AR		305		Bentonite seal

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

Figure A-2

RECORD OF BOREHOLE M

LOCATION See Figure DATUM 405 ft. (approx.) DATE 7-1-85

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD Air Rotary Drill

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲"N" BLOWS PER FOOT / WATER CONTENT, PERCENT (Wp ● Wn — WL)	GAS PROBE INSTALLATION
ELEVN. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FT	ELEVATION		
	Medium brown to gray-brown; fine to coarse GRAVEL, some to trace sand and silt to sandy fine to coarse GRAVEL, trace silt.		21	AR		300	3/4" PVC	
			22	AR		295	Pea gravel	
			23	AR		290		
			24	AR		285		
			25	AR		280		
			26	AR		275		
			27	AR				
			28	AR		265		
265 / 140.0	End of Hole at 140.0 ft.							

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

JOB # 853-1007

APPENDIX F

WATER QUALITY DATA

ANALYTICAL TECHNOLOGIES, INC.

Accession No. 01-002502

DATA SHEET

Client: City of Seattle
Date Received: 7-16-85
Project: Midway Landfill
Date Reported: 8-8-85

Sample Matrix: Water

Units: mg/L

ATI Sample I.D.	Client Sample I.D.	TS	TDS	TVS	TVDS
8507-0348	SPRING at Reith Rd	164	152	80	68
8507-0349	MW-~~8~~ 6	1220	182	136	78
8507-0350	MW-~~7~~ 5	560	142	72	48

ANALYTICAL TECHNOLOGIES, INC.

Accession No. 01-002502

DATA SHEET

Client: City of Seattle
Date Received: 7-16-85
Project: Midway Landfill
Date Reported: 8-8-85

Sample Matrix: Water

Units: mg/L

ATI Sample I.D.	Client Sample I.D.	Cl	SO_4	CN	TOC
8507-0348	SPRING at Reith Rd	5.02	10.2	<0.02	6.1
8507-0349	MW-~~8~~ 6	9.72	18.2	<0.02	2.5
8507-0350	MW-~~7~~ 5	2.11	11.9	<0.02	1.6

ANALYTICAL TECHNOLOGIES, INC. Accession No. 01-002502

DATA SHEET

Client: City of Seattle
Date Received: 7-16-85
Project: Midway Landfill
Date Reported: 8-8-85

Sample Matrix: Water
Units: mg/L

ATI Sample I.D.	Client Sample I.D.	pH	Conductivity (µhmos)	Turbidity	Hardness as $CaCO_3$	Alkalinity
8507-0348	SPRING at Raith Rd	.23	220	<0.40	92.0	83.2
8507-0349	MW-~~8~~6	6.63	310	4.9	137	125
8507-0350	MW-~~8~~5	7.05	184	16	75.0	72.5

ANALYTICAL TECHNOLOGIES, INC.

Accession No. 01-002502

Metals
DATA SHEET

Client: City of Seattle
Date Received: 7-16-85
Project: Midway Landfill
Date Reported: 8-8-85

Sample Matrix: Water

Units: mg/L

Client Sample I.D.	SPRING at Raitt Rd	MW-26	MW-25
ATI Sample I.D.	8507-0348	8507-0349	8507-0350
Zinc	<0.01	0.04	0.04
Nickel	<0.01	0.01	0.02
Copper	0.04	0.03	0.02
Chromium	0.01	0.02	<0.01
Manganese	0.16	0.69	0.39
Iron	0.59	12.1	7.70
Boron	<0.5	<0.5	<0.5
Barium	0.02	0.14	0.03
Mercury	<0.0005	<0.0005	<0.0005
Selenium	<0.002	<0.002	<0.002
Cadmium	<0.0004	<0.0004	<0.0004
Arsenic	<0.002	0.010	0.008
Lead	0.003	0.003	0.006

AnalyticalTechnologies,Inc.

ATI # 01-002502
ATI SAMPLE I.D.: 8507-0348

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client: City of Seattle
Sample I.D. SPRING at Reith Rd
Sample Matrix: Water
Method No. EPA 624
Project: Midway Landfill
Units: ug/L

Date Sampled: 7-10-85
Date Received: 7-16-85
Date Analyzed: 7-17-85
Date Reported: 8-8-85

10U	Chloromethane
10U	Bromomethane
10U	Vinyl Chloride
10U	Chloroethane
5U	Methylene Chloride
25	Acetone
5U	Carbon Disulfide
5U	1,1-Dichloroethene
5U	1,1-Dichloroethane
5U	Trans-1,2-Dichloroethene
5U	Chloroform
5U	1,2-Dichloroethane
10U	2-Butanone
12	1,1,1-Trichloroethane
5U	Carbon Tetrachloride
10U	Vinyl Acetate
5U	Bromodichloromethane
5U	1,1,2,2-Tetrachloroethane
5U	1,2-Dichloropropane
5U	Trans-1,3-Dichloropropene
5U	Trichloroethene
5U	Dibromochloromethane
5U	1,1,2-Trichloroethane
5U	Benzene
5U	Cis-1,3-Dichloropropene
10U	2-Chloroethylvinylether
5U	Bromoform
10U	2-Hexanone
10U	4-Methyl-2-Pentanone
15	Tetrachloroethene
5U	Toluene
5U	Chlorobenzene
5U	Ethylbenzene
5U	Styrene
5U	Total Xylenes

U = indicates the compound was analyzed for but not detected. The numerical value preceding "U" is the Limit of Detection for that compound, based on dilution.
J = indicates an Estimated Value.
B = indicates the Analyte was found in the blank as well as the sample.

AnalyticalTechnologies,Inc.

ATI # 01-002502
ATI SAMPLE I.D.: 8507-0349

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client: City of Seattle
Sample I.D. MW-86
Sample Matrix: WATER
Method No. EPA 624
Project: Midway Landfill
Units: ug/L

Date Sampled: 7-12-85
Date Received: 7-16-85
Date Analyzed: 7-17-85
Date Reported: 8-8-85

10U	Chloromethane
10U	Bromomethane
10U	Vinyl Chloride
10U	Chloroethane
5U	Methylene Chloride
10U	Acetone
5U	Carbon Disulfide
5U	1,1-Dichloroethene
5U	1,1-Dichloroethane
5U	Trans-1,2-Dichloroethene
5U	Chloroform
5U	1,2-Dichloroethane
10U	2-Butanone
5U	1,1,1-Trichloroethane
5U	Carbon Tetrachloride
10U	Vinyl Acetate
5U	Bromodichloromethane
5U	1,1,2,2-Tetrachloroethane
5U	1,2-Dichloropropane
5U	Trans-1,3-Dichloropropene
5U	Trichloroethene
5U	Dibromochloromethane
5U	1,1,2-Trichloroethane
5U	Benzene
5U	Cis-1,3-Dichloropropene
10U	2-Chloroethylvinylether
5U	Bromoform
10U	2-Hexanone
10U	4-Methyl-2-Pentanone
5U	Tetrachloroethene
5U	Toluene
5U	Chlorobenzene
5U	Ethylbenzene
5U	Styrene
5U	Total Xylenes

U = indicates the compound was analyzed for but not detected. The numerical value preceding "U" is the Limit of Detection for that compound, based on dilution.
J = indicates an Estimated Value.
B = indicates the Analyte was found in the blank as well as the sample.

AnalyticalTechnologies,Inc.

ATI # 01-002502

ATI SAMPLE I.D.: 8507-0350

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client: City of Seattle

Sample I.D. MW-25

Sample Matrix: WATER

Method No. EPA 624

Project: Midway Landfill

Units: ug/L

Date Sampled: 7-12-85

Date Received: 7-16-85

Date Analyzed: 7-17-85

Date Reported: 8-8-85

10U	Chloromethane
10U	Bromomethane
10U	Vinyl Chloride
10U	Chloroethane
5U	Methylene Chloride
10U	Acetone
5U	Carbon Disulfide
5U	1,1-Dichloroethene
5U	1,1-Dichloroethane
5U	Trans-1,2-Dichloroethene
5U	Chloroform
5U	1,2-Dichloroethane
10U	2-Butanone
5U	1,1,1-Trichloroethane
5U	Carbon Tetrachloride
10U	Vinyl Acetate
5U	Bromodichloromethane
5U	1,1,2,2-Tetrachloroethane
5U	1,2-Dichloropropane
5U	Trans-1,3-Dichloropropene
5U	Trichloroethene
5U	Dibromochloromethane
5U	1,1,2-Trichloroethane
5U	Benzene
5U	Cis-1,3-Dichloropropene
10U	2-Chloroethylvinylether
5U	Bromoform
10U	2-Hexanone
10U	4-Methyl-2-Pentanone
5U	Tetrachloroethene
5U	Toluene
5U	Chlorobenzene
5U	Ethylbenzene
5U	Styrene
5U	Total Xylenes

U = indicates the compound was analyzed for but not detected. The numerical value preceding "U" is the Limit of Detection for that compound, based on dilution.

J = indicates an Estimated Value.

B = indicates the Analyte was found in the blank as well as the sample.

AnalyticalTechnologies,Inc.

ATI I.D. # 01-002502

ATI SAMPLE I.D.: 8507-0348

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

Client:	City of Seattle	Date Sampled:	7-10-85
Sample I.D.:	SPRING at Reith Rd	Date Received by Lab:	7-16-85
Sample Matrix:	WATER	Date Extracted/Prepared:	7-24-85
Method No.:	EPA 625	Date Analyzed:	7-27-85
Project:	Midway Landfill	Units:	µg/L

20U	N-Nitrosodimethylamine	20U	4-Chloro-3-Methylphenol
20U	Phenol	20U	2-Methylnaphthalene
20U	Aniline	20U	Hexachlorocyclopentadiene
20U	bis(-2-Chloroethyl)Ether	20U	2,4,6-Trichlorophenol
20U	2-Chlorophenol	100U	2,4,5-Trichlorophenol
20U	1,3-Dichlorobenzene	20U	2-Chloronaphthalene
20U	1,4-Dichlorobenzene	100U	2-Nitroaniline
20U	Benzyl Alcohol	20U	Dimethyl Phthalate
20U	1,2-Dichlorobenzene	20U	Acenaphthylene
20U	2-Methylphenol	100U	3-Nitroaniline
20U	N-Nitroso-Di-n-Propylamine	20U	Acenaphthene
20U	Hexachloroethane	100U	2,4-Dinitrophenol
20U	Nitrobenzene	100U	4-Nitrophenol
20U	Isophorone	20U	Dibenzofuran
20U	2-Nitrophenol	20U	2,4-Dinitrotoluene
20U	2,4-Dimethylphenol	20U	2,6-Dinitrotoluene
100U	Benzoic Acid	20U	Diethylphthalate
20U	bis(-2-Chloroethoxyl)Methane	20U	4-Chlorophenyl-phenylether
20U	2,4-Dichlorophenol	20U	Fluorene
20U	1,2,4-Trichlorobenzene	100U	4-Nitroaniline
20U	Naphthalene	100U	4,6-Dinitro-2-Methylphenol
20U	4-Chloroaniline	20U	N-Nitrosodiphenylamine (I)
20U	Hexachlorobutadiene	20U	4-Bromophenyl-phenylether

ATI I.D. # 01-002502
ATI Sample I.D.: 8507-0348 spring

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

20U	Hexachlorobenzene
100U	Pentachlorophenol
20U	Phenanthrene
20U	Anthracene
20U	Di-n-Butylphthalate
20U	Fluoranthene
200U	Benzidine
20U	Pyrene
20U	Butylbenzylphthalate
40U	3,3-Dichlorobenzidine
20U	Benzo(a)Anthracene
13J	bis(2-Ethylhexyl)Phthalate
20U	Chrysene
20U	Di-n-Octyl Phthalate
20U	Benzo(b)Fluoranthene
20U	Benzo(k)Fluoranthene
20U	Benzo(a)Pyrene
20U	Indeno(1,2,3-cd)Pyrene
20U	Dibenz(a,h)Anthracene
20U	Benzo(g,h,i)Perylene

U = Indicates the compound was analyzed for but not detected. The numerical value preceding U is the Limit of Detection for that compound, based on dilution.
J = Indicates an Estimated Value.
B = Indicates the Analyte was found in the blank as well as the sample.

AnalyticalTechnologies,Inc.

ATI I.D. # 01-002502

ATI SAMPLE I.D.: 8507-0349

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

Client: City of Seattle
Sample I.D.: MW-#6
Sample Matrix: WATER
Method No.: EPA 625
Project: Midway Landfill

Date Sampled: 7-12-85
Date Received by Lab: 7-16-85
Date Extracted/Prepared: 7-24-85
Date Analyzed: 7-27-85
Units: µg/L

20U	N-Nitrosodimethylamine	20U	4-Chloro-3-Methylphenol
20U	Phenol	20U	2-Methylnaphthalene
20U	Aniline	20U	Hexachlorocyclopentadiene
20U	bis(-2-Chloroethyl)Ether	20U	2,4,6-Trichlorophenol
20U	2-Chlorophenol	100U	2,4,5-Trichlorophenol
20U	1,3-Dichlorobenzene	20U	2-Chloronaphthalene
20U	1,4-Dichlorobenzene	100U	2-Nitroaniline
20U	Benzyl Alcohol	20U	Dimethyl Phthalate
20U	1,2-Dichlorobenzene	20U	Acenaphthylene
20U	2-Methylphenol	100U	3-Nitroaniline
20U	N-Nitroso-Di-n-Propylamine	20U	Acenaphthene
20U	Hexachloroethane	100U	2,4-Dinitrophenol
20U	Nitrobenzene	100U	4-Nitrophenol
20U	Isophorone	20U	Dibenzofuran
20U	2-Nitrophenol	20U	2,4-Dinitrotoluene
20U	2,4-Dimethylphenol	20U	2,6-Dinitrotoluene
100U	Benzoic Acid	20U	Diethylphthalate
20U	bis(-2-Chloroethoxyl)Methane	20U	4-Chlorophenyl-phenylether
20U	2,4-Dichlorophenol	20U	Fluorene
20U	1,2,4-Trichlorobenzene	100U	4-Nitroaniline
20U	Naphthalene	100U	4,6-Dinitro-2-Methylphenol
20U	4-Chloroaniline	20U	N-Nitrosodiphenylamine (1)
20U	Hexachlorobutadiene	20U	4-Bromophenyl-phenylether

ATI I.D. # 01-002502
ATI Sample I.D.: 8507-0349

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

20U	Hexachlorobenzene
11J	Pentachlorophenol
20U	Phenanthrene
20U	Anthracene
20U	Di-n-Butylphthalate
20U	Fluoranthene
200U	Benzidine
20U	Pyrene
20U	Butylbenzylphthalate
40U	3,3-Dichlorobenzidine
20U	Benzo(a)Anthracene
20U	bis(2-Ethylhexyl)Phthalate
20U	Chrysene
20U	Di-n-Octyl Phthalate
20U	Benzo(b)Fluoranthene
20U	Benzo(k)Fluoranthene
20U	Benzo(a)Pyrene
20U	Indeno(1,2,3-cd)Pyrene
20U	Dibenz(a,h)Anthracene
20U	Benzo(g,h,i)Perylene

U = Indicates the compound was analyzed for but not detected. The numerical value preceding U is the Limit of Detection for that compound, based on dilution.
J = Indicates an Estimated Value.
B = Indicates the Analyte was found in the blank as well as the sample.

AnalyticalTechnologies,Inc.

ATI I.D. # 01-002502

ATI SAMPLE I.D.: 8507-0350

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

Client: City of Seattle
Sample I.D.: MW-15
Sample Matrix: WATER
Method No.: EPA 625
Project: Midway Landfill

Date Sampled: 7-12-85
Date Received by Lab: 7-16-85
Date Extracted/Prepared: 7-24-85
Date Analyzed: 7-27-85
Units: µg/L

20U	N-Nitrosodimethylamine	20U	4-Chloro-3-Methylphenol
20U	Phenol	20U	2-Methylnaphthalene
20U	Aniline	20U	Hexachlorocyclopentadiene
20U	bis(-2-Chloroethyl)Ether	20U	2,4,6-Trichlorophenol
20U	2-Chlorophenol	100U	2,4,5-Trichlorophenol
20U	1,3-Dichlorobenzene	20U	2-Chloronaphthalene
20U	1,4-Dichlorobenzene	100U	2-Nitroaniline
20U	Benzyl Alcohol	20U	Dimethyl Phthalate
20U	1,2-Dichlorobenzene	20U	Acenaphthylene
20U	2-Methylphenol	100U	3-Nitroaniline
20U	N-Nitroso-Di-n-Propylamine	20U	Acenaphthene
20U	Hexachloroethane	100U	2,4-Dinitrophenol
20U	Nitrobenzene	100U	4-Nitrophenol
20U	Isophorone	20U	Dibenzofuran
20U	2-Nitrophenol	20U	2,4-Dinitrotoluene
20U	2,4-Dimethylphenol	20U	2,6-Dinitrotoluene
100U	Benzoic Acid	20U	Diethylphthalate
20U	bis(-2-Chloroethoxy l)Methane	20U	4-Chlorophenyl-phenylether
20U	2,4-Dichlorophenol	20U	Fluorene
20U	1,2,4-Trichlorobenzene	100U	4-Nitroaniline
20U	Naphthalene	100U	4,6-Dinitro-2-Methylphenol
20U	4-Chloroaniline	20U	N-Nitrosodiphenylamine (1)
20U	Hexachlorobutadiene	20U	4-Bromophenyl-phenylether

ATI I.D. # 01-002502
ATI Sample I.D.: 8507-0350

5

SEMI-VOLATILE ORGANIC ANALYSIS
DATA SHEET

20U	Hexachlorobenzene
100U	Pentachlorophenol
20U	Phenanthrene
20U	Anthracene
20U	Di-n-Butylphthalate
20U	Fluoranthene
200U	Benzidine
20U	Pyrene
20U	Butylbenzylphthalate
40U	3,3-Dichlorobenzidine
20U	Benzo(a)Anthracene
6J	bis(2-Ethylhexyl)Phthalate
20U	Chrysene
15J	Di-n-Octyl Phthalate
20U	Benzo(b)Fluoranthene
20U	Benzo(k)Fluoranthene
20U	Benzo(a)Pyrene
20U	Indeno(1,2,3-cd)Pyrene
20U	Dibenz(a,h)Anthracene
20U	Benzo(g,h,i)Perylene

U = Indicates the compound was analyzed for but not detected. The numerical value preceding U is the Limit of Detection for that compound, based on dilution.
J = Indicates an Estimated Value.
B = Indicates the Analyte was found in the blank as well as the sample.

APPENDIX M

WORK PLAN FOR ONGOING GROUNDWATER INVESTIGATIONS

WORK PLAN FOR ON-GOING GROUNDWATER INVESTIGATIONS

MIDWAY LANDFILL

Kent, Washington

March 1986

Prepared for

The City of Seattle
Seattle Engineering Department
Solid Waste Utility

by

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TABLE OF CONTENTS

1. **INTRODUCTION** 1

2. **REASSESSMENT OF EXISTING SUBSURFACE DATA** 2

3. **RECONNAISSANCE GEOLOGY** 2

4. **SUBSURFACE EXPLORATIONS** 3
   - 4.1. Objectives 3
   - 4.2. Drilling Methods 5
   - 4.3. On-site Monitoring 5
   - 4.4. Testing of Physical Properties of Soils . . . 6

5. **GROUNDWATER MONITORING WELL INSTALLATIONS** 6
   - 5.1. Monitoring Well Objectives 6
   - 5.2. Well Installation Methods 6
   - 5.3. Aquifer Testing 7

6. **GROUNDWATER MONITORING PROGRAM** 7
   - 6.1. Monitoring Objectives 7
   - 6.2. Monitoring Locations 8
   - 6.3. Monitoring Parameters 8
   - 6.4. Sampling and Analysis Methods 9
   - 6.5. Monitoring Schedule 9
   - 6.6. Data Reduction and Recordkeeping 11

7. **DATA INTERPRETATION** 11

8. **QUALITY ASSURANCE AND QUALITY CONTROL** 12

9. **NEED FOR REMEDIAL ACTIVITIES** 12

LIST OF FIGURES

Figure 1 - Proposed Boring Locations 4
Figure 2 - Groundwater Monitoring Locations 10

1. INTRODUCTION

The purpose of the on-going groundwater investigations is to supplement the existing knowledge of the landfill, to bring the landfill into compliance with groundwater monitoring requirements of the State of Washington Minimum Functional Standards for landfills, and to respond to concerns brought up in the comments to the Draft Environmental Impact Statement. In order to do this, we will initiate additional work as described below:

a. The groundwater regime in the vicinity of the landfill will be better characterized by evaluation of existing data, installation of additional wells, groundwater level monitoring, and testing of soil and aquifer properties. This information will result in a better understanding of groundwater flow rate and direction, the properties of perched leachate in the landfill, and the fate of infiltrated leachate from the landfill.

b. Explorations designed to identify deeper aquifers and to evaluate hydraulic relationships between aquifers will be made.

c. Springs, wells and seepage in the areas surrounding the landfill will be identified, mapped and tested for indicators of leachate contamination. The focus of this investigation will be in the areas to the west and south of the landfill.

d. A qualitative analysis of stormwater runoff from the vicinity of the landfill will be made to characterize other non-point source pollutant loading to the regional aquifer.

e. Landfill leachate will be tested for the presence of radionuclides.

f. The impacts of projected leachate generation after closure of the fill will be evaluated.

g. A groundwater monitoring program consistent with the requirements of state regulations will be initiated.

h. Selected water supply wells in the vicinity of the landfill will be sampled and analyzed for indicators of landfill leachate.

2. REASSESSMENT OF EXISTING SUBSURFACE DATA

At the present time there are a number of investigations and remedial actions on-going in the vicinity of the Midway Landfill. Many of these involve drilling borings and making observations that could be used to determine the character of subsurface materials. Past geological interpretations were completed without the expanded data base that is available now. The data sources of site specific subsurface information available at the present time include the following:

- Previously Published Reports,
- Water Supply Well Records,
- Groundwater Monitoring Well Installation Records,
- Perimeter Gas Probe Boring Logs,
- Landfill Gas Extraction Well Logs,
- Neighborhood Gas Probe Boring Logs,
- Neighborhood Gas Extraction Well Boring Logs, and
- Maps on file with the Seattle Public Library and the Department of Natural Resources.

This subsurface data will be assimilated into a map, a fence diagram, and a series of cross-sections showing the ground surface, soil types, known and inferred contacts, water levels and extent of waste materials. Cross-sections drawn in the east-west direction will be extended to include lower elevations.

Historical topographic maps and aerial photography will be reviewed to determine areas of fill in the vicinity of the landfill. This information will be included on the map, diagram and cross-sections.

This information will be used to confirm the adequacy of locations selected for additional subsurface exploration and as a guide for reconnaissance investigations for groundwater seeps and springs in the surrounding neighborhoods. Existing descriptions of subsurface conditions will be checked using this increased descriptive data base.

3. RECONNAISSANCE GEOLOGY

A geologist will perform a reconnaissance survey of the neighborhoods adjacent to the landfill. During this survey, surface seeps, exposed soils, and areas of apparent fill will be identified, described and mapped. Specifically, the areas to the west and south of the landfill will be examined in detail. The objective of this survey is to extend our understanding of subsurface geological conditions from the landfill into surround-

ing areas and to identify locations for sampling groundwater fed springs (see Section 6).

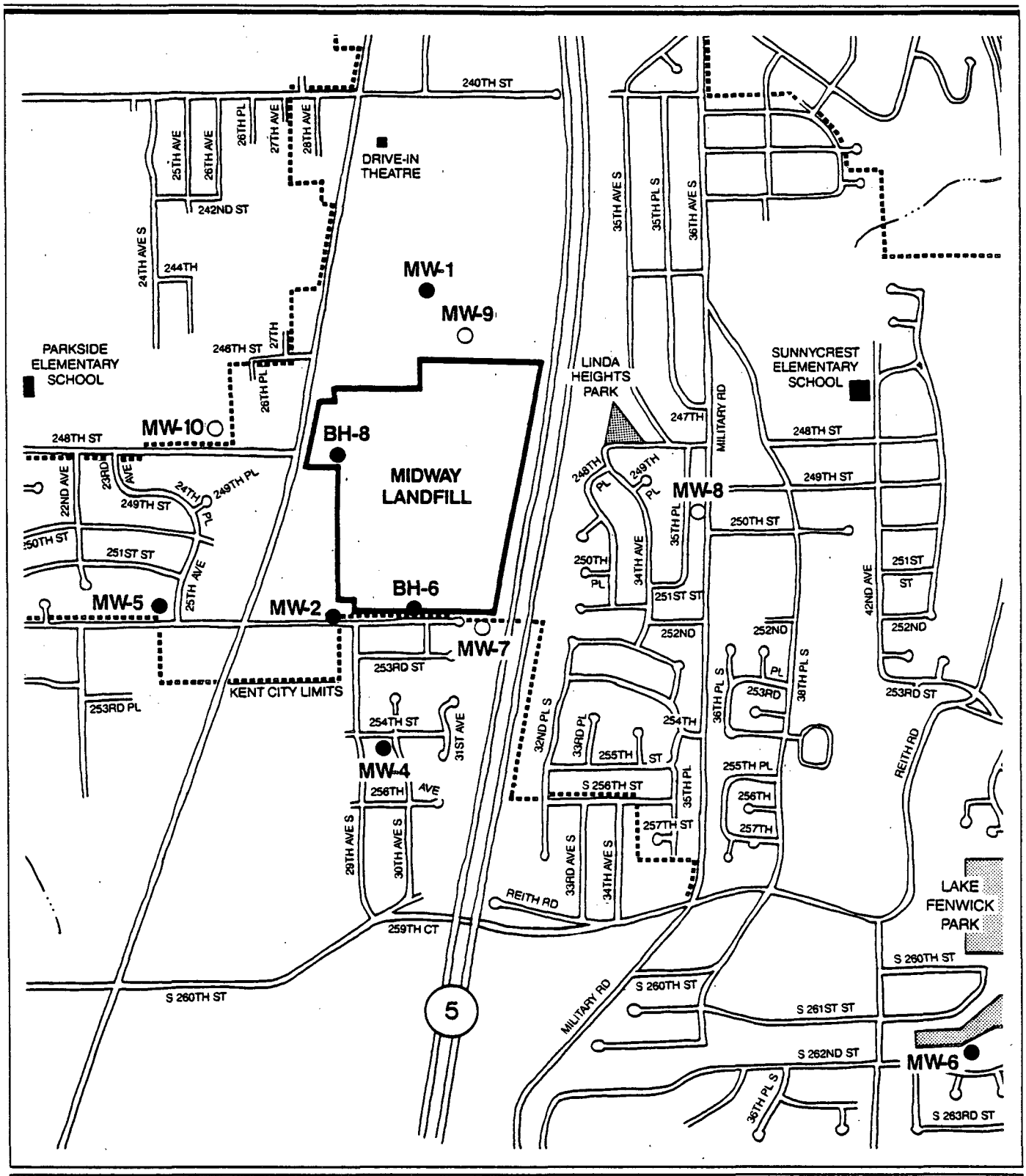
4. SUBSURFACE EXPLORATIONS

4.1. Objectives

There are some unresolved questions concerning groundwater occurrence and movement in the vicinity of the landfill. Specifically, these include identification of specific groundwater flow directions in the water table aquifer and description of deeper aquifers and impacts upon them. The objective of further subsurface explorations is to answer these questions by further characterizing subsurface conditions and collecting representative soil samples for laboratory testing.

Additional subsurface explorations are planned to increase the data base where information is lacking or confidence is low. Exploration to greater depths than have been completed to date are planned in order to identify any deeper aquifers that may be present and to characterize their relationship with shallow aquifers.

Up to six additional borings are planned. The approximate locations of the first four borings are shown on Figure 1. The exact location and depth of the borings will be determined after the reassessment of existing data is complete. Two additional borings are planned for the areas southwest and southeast of the landfill. The decision to place these two borings will be made upon assessment of the findings of the first four additional borings. All borings are to be advanced in a manner that will allow the installation of multiple well and/or gas probes in the completed boring. The maximum depth of each well will be determined during the drilling operations by a qualified geologist. The first boring to be advanced (MW-7), may extend to a maximum depth of 300 feet below the ground surface. The maximum depths allowed for the remaining borings will be based upon the findings of the drilling of boring MW-7.



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● Existing Groundwater Monitoring Wells

○ Proposed Boring/Groundwater Monitoring Well Locations

Figure 1.
Proposed Boring Locations.

4.2. Drilling Methods

Air rotary drilling methods will be used to advance borings to the depths planned. Casing will be advanced as the boring is deepened to maintain the integrity of the bore hole and to provide a temporary seal between geologic units encountered during the drilling operations. Upon completion of the drilling operation, the casing will be withdrawn as the groundwater monitoring wells and gas monitoring probes are installed. Care will be taken to avoid cross-contamination between permeable zones by the placement of seals during casing withdrawal at appropriate locations.

A record of observations made during drilling will be maintained by a qualified geologist who will observe drilling behavior, examine and classify the soils encountered, select sampling intervals, record field tests on soils and water encountered, and maintain a detailed log of each boring. Details of groundwater monitoring well and gas probe installation will also be recorded in the field.

Soils will be continuously observed and logged by collecting cuttings from the air rotary drilling. At intervals selected by the geologist, relatively undisturbed samples will be obtained using either a heavy duty, down-hole sampler or a shelby tube sampler. These samples will be used to characterize soil which may be controlling groundwater movement due their characteristics of lower permeability. It is expected that up to three to four samples will be collected per boring.

4.3. On-site Monitoring

Environmental monitoring will be performed during drilling activities for health and safety considerations and to gather information to aid in the interpretation of subsurface conditions and landfill impacts. Monitoring for health & safety considerations will be done in accordance with already established practice at the landfill. A Health and Safety Plan will be developed for the field work. The plan will be approximately equivalent to that used for previous investigations on the landfill.

Additional environmental monitoring will also be performed on site to contribute to our knowledge of subsurface conditions. This will include sampling and analysis of natural fluids collected during drilling for specific

conductivity and for pH. This information will be valuable in characterizing groundwater conditions and in determining zones to be monitored.

4.4. Testing of Physical Properties of Soils

Soil samples collected, will be tested for appropriate index properties which may include grain size and hydrometer analyses, atterberg limits, moisture content and density. Selected appropriate samples will be tested for permeability using a triaxial cell. This information will be used along with soil observations and field testing to augment our understanding of the actual soil conditions.

5. GROUNDWATER MONITORING WELL INSTALLATIONS

5.1. Monitoring Well Objectives

The objectives for installing the new groundwater monitoring wells are to expand the number of monitoring points in the water table aquifer presently being monitored, to determine the presence and magnitude of vertical gradients in the water table aquifer, and to characterize any deeper aquifers that may be present. This will require the installation of multi-level wells in the borings to monitor discrete zones within a given aquifer and to monitor separate aquifers.

5.2. Well Installation Methods

Wells will be constructed of two inch PVC with screened zones of approximately 5 to 10 feet in length. Each zone to be monitored will be backfilled with a clean, washed sand. Multiple wells will be placed in each boring with appropriate seals to assure the integrity of the backfilled boring between monitored intervals. Groundwater monitoring well installation and development protocol will be equivalent to those typically used at investigations of Federal Superfund sites. In addition, applicable Washington State Standards contained in the Minimum Standards for Construction and Maintenance of Water Wells (Chapter 173-160 WAC) and the Water Well Construction Act (Chapter 18.104 RCW) will be observed.

Gas probes will be installed in all of the borings. At least one probe will be installed to monitor the zone including the upper 50 feet above the water table aquifer.

If space in the borehole allows, additional gas probes will be installed at higher intervals. All gas probes will be constructed and installed using the same procedures used on probes previously installed by the City of Seattle.

5.3. Aquifer Testing

In-place testing of the aquifers encountered will be conducted. Tests will be performed in the new wells to be installed and possibly in existing wells. The information gathered during aquifer testing will be used to estimate flow rates within the aquifers and to determine relationships between different aquifers.

Generally, two non-contaminating methods are available for determining in-place hydraulic properties of an aquifer. These are pumping tests and slug tests using a removable slug as opposed to adding water to a well. In either case, response to stress to the aquifer system is measured to evaluate the aquifer's hydraulic properties. We will perform tests designed to determine hydraulic properties in the upper, water table aquifer and to determine hydraulic connection between the upper aquifer and deeper aquifers.

The selection of the test method to be used depends upon the diameter of the wells to be tested and the expected responsiveness of the aquifer. We plan to conduct four to six aquifer tests.

6. GROUNDWATER MONITORING PROGRAM

6.1. Monitoring Objectives

Groundwater Monitoring at the Midway Landfill will be performed in accordance with the guidelines set forth in the State of Washington Minimum Functional Standards (Washington Administrative Code 173-304).

In addition, the following monitoring tasks will be undertaken to add to the understanding of subsurface conditions, landfill impacts and groundwater movement:

a. Existing groundwater monitoring wells not included in the compliance groundwater monitoring network will also be sampled and analyzed once for the same Minimum Functional Standards (MFS) parameters.

b. Stormwater runoff from Highway 99, Interstate 5, and residential runoff will be sampled and analyzed quarterly during the first year of monitoring for MFS parameters.

c. Surface seeps identified during the reconnaissance geologic investigation (see Section 3) will be sampled and analyzed once for MFS parameters.

d. Selected wells identified during the Beneficial Use Survey will be sampled and analyzed for MFS parameters and primary drinking water standards.

e. Two samples of leachate from wells completed within the landfill and one representative background water sample will be analyzed for radionuclides.

f. Monitoring of groundwater levels will continue on an on-going basis to determine seasonal fluctuations in groundwater levels and gradients.

6.2. Monitoring Locations

Groundwater monitoring locations for compliance monitoring and for the one time test of additional wells are shown on Figure 2. Runoff sampling locations are also shown on this figure. Groundwater level observations will be made in all wells including wells completed within the landfill materials.

6.3. Monitoring Parameters

Chemical parameters required for analysis under the Minimum Functional Standards include the following:

Temperature	Sulfate
Conductivity	Dissolved Iron
pH	Dissolved Zinc
Chloride	Dissolved Manganese
Nitrate as Nitrogen	Chemical Oxygen Demand
Nitrite as Nitrogen	Total Organic Carbon
Ammonia as Nitrogen	Total Coliform

Wells monitored for compliance under the MFS will be sampled and analyzed in triplicate, four times a year.

Radionuclide parameters to be analyzed in a leachate sample and one background groundwater monitoring well will be those described in Washington Administrative Code Chapter 248-54, Public Water Supplies. These parameters are:

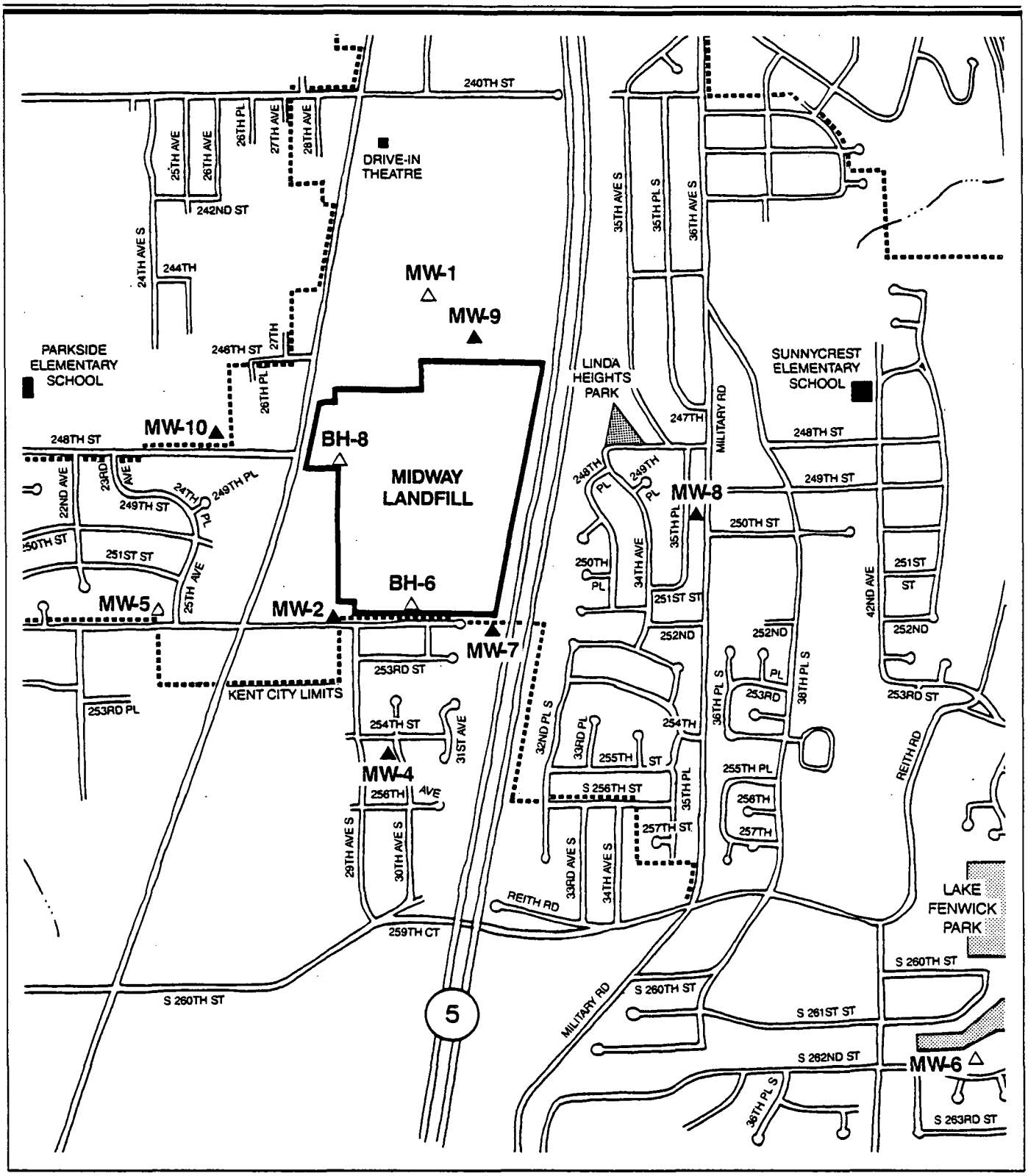
Radium-226,
Combined Radium-226 and Radium-228, and
Gross Alpha Particle Activity.

6.4. Sampling and Analysis Methods

All groundwater sampling and sample handling will be done using general accepted practice for this type of work. Wells will be purged of at least three casing volumes before sampling. All pumps, bailers or other devices which may come in contact with groundwater will be thoroughly cleaned and rinsed prior to sampling. Samples will be filtered in the field and preservatives added as appropriate. Chain-of-custody protocol will be observed for all samples. Samples will be stored and transported to the laboratory as appropriate. Analysis will be performed by a laboratory participating in the EPA Contract Laboratory Program. Analyses will be performed using standard EPA protocol as described in "Test Methods for Evaluating Solid Waste", (USEPA Document SW-846), where applicable.

6.5. Monitoring Schedule

Upon notice to proceed from the City of Seattle, the reassessment of existing subsurface data will begin. Recommendations for the exact locations of the additional wells could be provided within one week. Installation of the additional wells could begin as soon as property access and easement requirements are satisfied. The exact schedule for field work would depend upon the availability of drilling services and supplies. Upon completion of the installation of the wells, the first of the quarterly groundwater monitoring sampling events can be accomplished.



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▲ Wells to be Included in the Compliance Monitoring Network

△ Wells to be Tested Once

Figure 2.
Groundwater Monitoring Locations.

6.6. Data Reduction and Recordkeeping

Compliance groundwater monitoring data will be analyzed statistically using methods outlined in the Resource Conservation and Recovery Act (RCRA), 40 CFR Part 264, Subpart F, "Groundwater Protection". If the data indicate a statistically significant increase in any of the MFS parameters above the background values, then the City of Seattle would be required to notify the Seattle-King County Health Department and comply with applicable sections of WAC 173-304-490(2)(i). All records involving groundwater sampling, analysis and data reduction will be forwarded to the City of Seattle and the Seattle/King County Health Department with a summary of findings.

Groundwater level data will managed on a computer spreadsheet program. Water level contours will be determined and plotted on a plan view of the site on a monthly basis. A graph of water levels will be maintained along with a precipitation summary (based upon data from SEATAC Airport) for use in evaluating seasonal water level fluctuations.

7. DATA INTERPRETATION

Compliance groundwater monitoring data will be interpreted in accordance with procedures outlined in the Minimum Functional Standards and briefly described above.

Testing of other wells for MFS parameters will be evaluated to determine if the monitoring network is adequate to characterize groundwater conditions as groundwater moves across the site. The results of this data could result in recommendations to change the number of or selection of wells included in the compliance groundwater monitoring network.

If values observed for radionuclides in leachate exceed the standards outlined in WAC Chapter 248-54, Public Water Supplies, then the values observed will be compared to background values. If the data indicate that the radionuclides may be derived from the landfill, then a more extensive, statistically valid sampling and analysis approach will be recommended to the City.

Groundwater level data, soils testing and aquifer testing data will be used to provide estimates of groundwater movement (flow rate and direction). This analysis will also consider seasonal fluctuations in water levels and flow characteristics. The focus of this analysis is to determine where groundwater goes as it leaves the vicinity of the landfill.

Using the data collected, modeling will be performed to predict the impacts of continued leachate generation upon groundwater after landfill closure. This will incorporate physical and chemical data characterizing the leachate and groundwater system as well as information about other pollutant loading to the aquifer.

8. QUALITY ASSURANCE AND QUALITY CONTROL

All work will be done using established Quality Assurance and Quality Control (QA/QC) procedures as required of Federal investigations conducted under the Comprehensive Environmental Response and Liability Act (CERCLA or Superfund). The specific procedures are outlined in a number of publications distributed by the Environmental Protection Agency including "Guidance on Remedial Investigations and Feasibility Studies Under CERCLA" (EPA/540/G-5/002 June 1985).

9. NEED FOR REMEDIAL ACTIVITIES

The need for remedial activities related to possible groundwater degradation will be determined by the results of the compliance groundwater monitoring program. The Minimum Functional Standards contain requirements for a "Corrective Action Program" to be initiated by the jurisdictional health department if performance standards are not met.

APPENDIX N

BENEFICIAL USE SURVEY

MIDWAY LANDFILL BENEFICIAL USE SURVEY

A survey of groundwater supply wells in the vicinity of the Midway Landfill site was conducted in December of 1985 to provide an inventory of groundwater use, and to identify possible groundwater sampling points that may be utilized in the future. The scope of the inventory was to identify all private wells within a one mile radius of the Midway Landfill site and all public wells within five miles of the site. Wells located east of the Green River were not included in this inventory since the river is a hydraulic boundary. Therefore groundwater from the Midway area would not be expected to reach these wells. Private wells were categorized as Class 3 or 4 systems (WAC 248-542-015) which include wells servicing a transient population or from 2-9 people, respectively. Public wells were Class 1 or 2 systems (WAC 248-54-015) designed to supply 10 to 99, or 100 or more people, respectively.

The first step in compiling the list of area wells was to review agency files and collect the available information on wells near the Midway Landfill site. The Seattle-King County Health Department, Washington State Department of Ecology, and Washington State Department of Social and Health Services files were reviewed. This information, combined with information from a groundwater survey conducted by the USGS in the early 1960's (Luzier, 1969), was then used to compile the well list. The location and current use of each well was verified, where possible, with the well owner or user. Table N-1 lists the wells currently utilized or capable of being utilized within the specified areas. Figure N-1 depicts the location of private wells within a one mile radius while Figure N-2 shows the location of public wells within five miles of the site. Attachment 1 contains a water well data sheet for each of these wells and a well log when available. Water quality information is available for some of the wells; if available, it is noted on the well data sheet. This data is on file with the City of Seattle Solid Waste Utility.

No laboratory water quality data was available for private wells located within a one mile radius of the site except for personal observations noted by various users. In areas where the groundwater is close to the ground surface, shallow wells have been dug. As might be expected, these shallow wells were often found to have a limited water supply and to be more susceptible to contamination, while deeper wells were trouble-free according to the owners spoken to. It is not uncommon for shallow water supplies to become contaminated. Percolation of precipitation through geologic units has a purifying affect as suspended particles are removed and physical and chemical processes transform would-be pollutants. A shallow well's proximity to the surface means that there is less distance for percolating water to travel; therefore, less "purification" takes place and these wells are more easily contaminated.

Water quality data available for some of the public wells includes measurements of total coliform bacteria, metals, and various conventional parameters. All these measurements were within State Public Water Supply Standards (WDSHS, 1983 WAC 248-54-175) except manganese. The maximum contamination level set for manganese is 0.05 mg/l, but it is a secondary drinking water standard that is set for aesthetic and not health-related purposes. The concentration of this metal typically exhibits high natural variation in groundwater in this area. The manganese concentration ranged from below the detection limit to 0.59 mg/l in the public water supply wells. Public wells located both upgradient and downgradient of the landfill site had manganese concentrations above 0.05 mg/l, thereby indicating that landfill leachate was not the source. Furthermore, in some cases there was a wide range in measured concentrations of manganese at public wells located adjacent to each other, again emphasizing the high natural variation of this constituent. Although no major water quality violations occurred in public water supplies, it must be noted that the data available is from water supplies that are located a comparatively long distance (i.e., 1-5 miles) from the site. Water quality data from wells located closer to the site would be more informative in terms of identifying potential leachate receptors.

Although a detailed list of wells was compiled, there are some limitations to the data base. Agency records are incomplete since there has been no means of tracking past well development. Wells overlooked in the first (USGS) survey, or installed since that survey but before reporting requirments were enforced, would not have shown up in the file search or report review. A questionnaire regarding well use was distributed to approximately 90 households in neighborhoods near the landfill site where there was reason to believe a well might be located. Response to the questionaire was low. It is possible that some domestic wells may not be accounted for in this survey. The number of wells not identified by this survey is expected to be minimal. Most of the area has shifted to public water supplies during the past 20 years; consequently, there has been little development of private wells.

REFERENCES

Luzier, J.E. 1969. Geology and groundwater resources of southwestern King County, Washington. Water Supply Bulletin. No. 28.

Table N-1. Public and Private Wells in the vicinity of the Midway Landfill Site.

Well #[1]	Owner/Property Address	Location	Information[2] Level	Well Depth (ft)	Depth to Water (ft)	Present Use	Condition
1	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 27 1/4NW 1/4NE	A	137	79	Private (1 home)	Operating
2	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 27 1/4SE 1/4NE	A	39	17	Private (1 home)	Operating
3	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 27 1/4SE 1/4NE	A	30	6	Domestic (1 home)	Operating
5	Hayett Water System 26612 Lake Fenwick Rd. Kent, WA	T22N R4E Sec. 27 1/4NE 1/4SE	A	84	43	Private (2 homes)	Operating
6	Lake Fenwick Supply 26425 Lake Fenwick Rd. Kent, WA	T22N R4E Sec. 27 1/4SE 1/4NE	B	165		Private (9 homes)	Operating
11A	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 21 1/4NE 1/4NW	B	36 (Dug)	9	Unused	Covered Operable
11B	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 21 1/4NE 1/4NW	B	(Dug)		Unused	Unknown
12	(b)(6) [redacted]	T22N R4E Sec. 21 1/4SW 1/4SW	C	125	3	Unused	Unknown
13	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 22 1/4SW 1/4SE	C	160	50	Private (1 home)	Operating

Table N-1. (Continued)

Well #[1]	Owner/Property Address	Location	Information[2] Level	Well Depth (ft)	Depth to Water (ft)	Present Use	Condition
15	(b)(6) Kent, WA	T22N R4E Sec. 27 1/4NE 1/4NE	B	120		Unused	Operable.
16	(b)(6) Kent, WA	T22N R4E Sec. 27 1/4NE 1/4NE	B	153	121	Unused	Unknown.
19	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4NW 1/4NW	B	27	3	Lawn Care	Operating.
20	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4SW 1/4NW	C	265	57	Unused	Covered. Condition Unknown.
22	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4SW 1/4NE	B	27	9	Unused	Covered. Operable.
25	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4NE 1/4SW	C	96	35	Unused	Covered. Condition Unknown.
26	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4NE 1/4SW	C	30		Unused	Operable.
28	(b)(6) Kent, WA	T22N R4E Sec. 28 1/4NE 1/4SW	C	11	4	Unused	Covered. Operable.

Table N-1. (Continued)

Well #[1]	Owner/Property Address	Location	Information[2] Level	Well Depth (ft)	Depth to Water (ft)	Present Use	Condition
31A	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 29 1/4NE 1/4SE	C	45	32	Unused	Covered. Operable.
31B	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 29 1/4NE 1/4SE	C			Unused	Operable.
31C	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 29 1/4NE 1/4 SE	B			Unused	Operable.
31D	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 29 1/4NE 1/4 SE	C	42		Unused	Covered. Condition Unknown.
37	(b)(6) [redacted] Kent, WA	T22N R4E Sec. 21 1/4NW 1/4SE	C	200		Unused	Covered. Operable.
38	Marcus Whitman Church 2130 S. 248th Kent, WA	T22N R4E Sec. 21 1/4NE 1/4SW	D			Unused	Covered. Operable.
39	Water District #75 Well #9 P.O. Box 68100 Seattle, WA	T22N R4E Sec. 5 1/4SE 1/4SE	A	362	72	Municipal	Operating.
40	Water District #75 Well #10 P.O. Box 68100 Seattle, WA 98188	T22N R4E Sec. 9 1/4NE 1/4NE	A	485	202	Municipal	Operating.

Table N-1. (Continued)

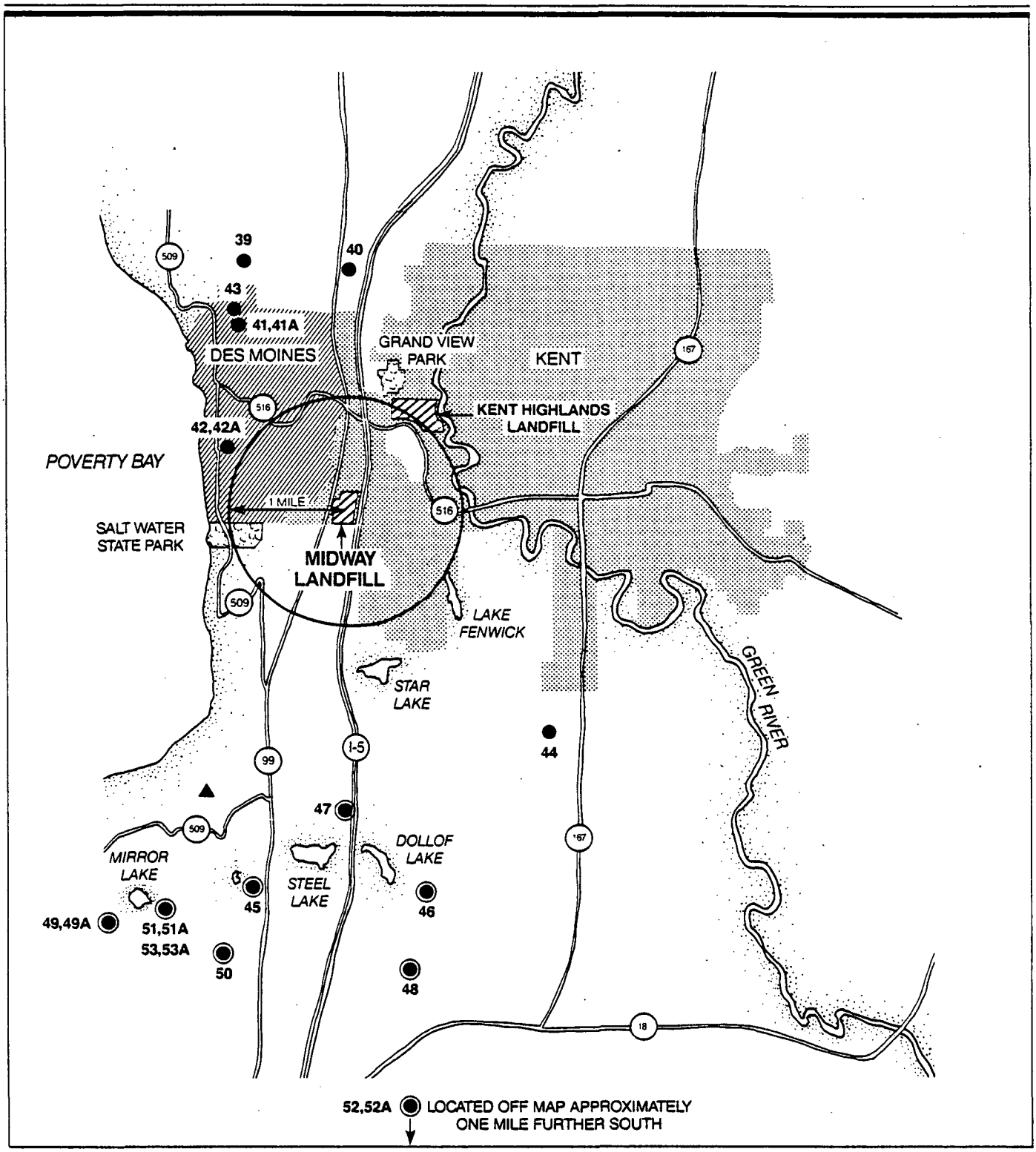
Well #[1]	Owner/Property Address	Location	Information[2] Level	Well Depth (ft)	Depth to Water (H)	Present Use	Condition
41&41A	Water District #54 922 S. 219th St. Des Moines, WA	T22N R4E Sec. 8 1/4NW 1/4SE	B A	41=328 41A=244	41A=46	Municipal	Operating.
42&42A	Masonic Home of Washington 23660 Marine View Dr. Zenith, WA	T22N R4E Sec. 17 1/4SW 1/4SE	B	42=1000 42A=200		Privately Owned. Class 2.	Operating.
43	(b)(6) Des Moines, WA	T22N R4E Sec. 8 1/4NW 1/4SE	B	105	65	Privately Owned. Class 2.	Operating.
44	Logandale Water Assoc. 28543 68th Ave. S. Kent, WA	T22N R4E Sec. 35 1/4SW 1/4SW	B	181		Privately Owned. Class 2.	Operating.
45	Federal Way Sewer and Water Well #7 P.O. Box 4249 Federal Way, WA	T21N R4E Sec. 8 1/4SE 1/4SW	B	228		Municipal	Operating.
46	Federal Way Sewer and Water Well #8-64	T21N R4E Sec. 10 1/4SW 1/4SE	A	280	175	Municipal	Operating.
47	Federal Way Sewer and Water Well #9-64	T21N R4E Sec. 4 1/4NE 1/4SE	A	400		Municipal	Operating.
48	Federal Way Sewer and Water Well #10-64	T21N R4E Sec. 15 1/4NE 1/4SW	A	455	280	Municipal	Operating.

Table N-1. (Continued)

Well #[1]	Owner/Property Address	Location	Information[2] Level	Well Depth (ft)	Depth to Water (H)	Present Use	Condition
49&49A	Federal Way Sewer and Water Well #17&17A	T21N R4E Sec. 18 1/4NE 1/4NW	A	17=205 17A=180	17=62 17A=72	Municipal	Operating.
50	Federal Way Sewer and Water Well #18	T21N R4E Sec. 17 1/4SW 1/4SW	A	182	99	Municipal	Operating.
51&51A	Federal Way Sewer and Water Well #20&20A	T21N R4E Sec. 7 1/4SE 1/4SE	A	20=368 20A=236	20=137 20A=112	Municipal	Operating.
52&52A	Federal Way Sewer and Water Well #22&22A	T21N R4E Sec. 34 1/4SE 1/4 SW	A	22=360 22A=240		Municipal	Operating.
53&53A	Federal Way Sewer and Water Well #23&23A	T21N R4E Sec. 7 1/4SW 1/4SE	A	23=820 23A=217	23=128 23A= 81	Municipal	Operating.

1 Well numbers have been assigned as part of this inventory. The wells are listed in sequential order. Missing numbers in a sequence represent wells that are no longer in existence or operable.

2 A - Well logs available, location verified
B - Field verified, no well logs available
C - Information obtained by a secondary source
D - Assumed, location unknown



N

SCALE IN MILES

0 1 2

42,42A 43,44 Privately Owned Public Supply Wells

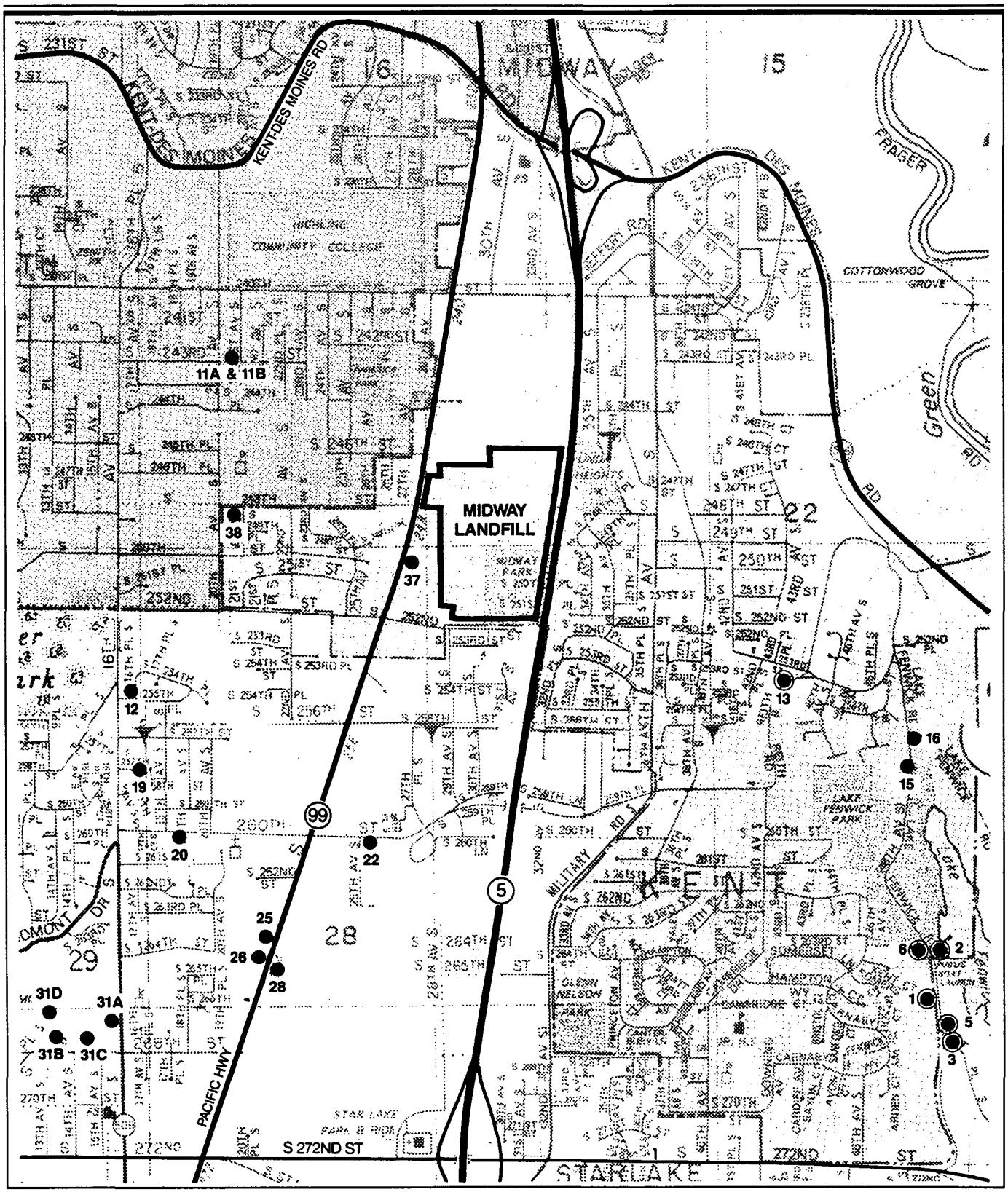
▲ Water District #56 No Wells, Springs Used as Water Source

Federal Way Sewer and Water

39,40 Water District #75 2 Wells in Construction

41,41A Water District #54 2 Wells in Use, 1 New Well Proposed at Same Location

Figure N-1. Location of public water supply wells.



SCALE IN FEET

0 1,000 2,000

N

● Wells Presently Being Used for Human Drinking Supplies

● Wells Not Currently in Use for Human Drinking Supplies

Figure N-2.
Private wells, being utilized or capable of being utilized that are located within a one mile radius of the landfill site.

ATTACHMENT 1

WELL DATA FOR MIDWAY
BENEFICIAL USE SURVEY

1/4 NE 1/4 SE SEC 27 T 22 N R 4 E
County KING Quad

Parametrix, Inc. Well #1

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address [redacted] Seattle, WA
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 137 Completed Depth 137
Static Water Level (Eleva.) 79 ft Date 5-3-79

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Domestic Only - 1 home

Well Driller Northwest Pump & Drilling Co.
Address 3245 Auburn Wy S. Auburn, WA
Date Drilled
started 5-2-79 completed 5-3-79
Method Used: Rotary
Log filed: No Yes ✓
Permit No.

SKETCH (Identify location, access to well)

Inside pump house - approximately 25 ft. from the northwest corner of the house.

WELL LOG

	FROM (ft)	TO (ft)
brown sand & gravel	0	77
brown till	77	98
brown silty sand	98	113
brown till	113	134
water bearing sand & gravel	134	137

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield) Bailer 20 gal/min, 22 ft drawdown after one hour.
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing Welded 6" diam. from 0 - 137 ft.
Gravel Pack No
Screen/Perforations No / No
Seals
Surface Seal Sealed to 13 ft. with bentonite and cement
Pump Submersible

COMMENTS No water supply problems even in dry summers.

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 (b)(6) Address (b)(6)

(2) LOCATION OF WELL: County King — NW ¼ NE ¼ Sec 22 T 22 N., R 4 E 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 137 ft. Depth of completed well 137 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 137 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 & 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 79 ft. below top of well Date 5/3/79
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 44 gal./min. with 22 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
brown sand & gravel	0	77
brown till	77	95
brown silty sand	95	113
brown till	113	135
water bearing sand & gravel	134	137

Work started 5/2/79 19__ Completed 5/3/79 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 Northwest Pump & Drilling Co. (Person, firm, or corporation) (Type or print)
Address 3245 Auburn Way South, Auburn,
[Signed] R. B. DeKemper (Well Driller)
License No. 0097 Date 5/4/79 19__

(USE ADDITIONAL SHEETS IF NECESSARY)

INVENTORY
WELL #1

S. F. No. 7156—OS—(Rev. 4-71).

1/4 SE 1/4 NE SEC 27 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #2

Water Well Data

Property Address (b)(6) Kent WA
Owner (b)(6)
Address SAME AS Above
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 39 Completed Depth 39
Static Water Level (Eleva.) 17 ft Date 6-9-83

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Domestic - 1 home

Well Driller Northwest Pump & Drilling Co.
Address 3245 Auburn Wy. S. Auburn, WA 98002
Date Drilled
started 6-9-83 completed 6-9-83
Method Used: Rotary
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

well located in back yard.

WELL LOG

	FROM (ft)	TO (ft)
topsoil, brown, dry	0	2
sand & gravel brown & dry	2	11
glacial till, brown & dry	11	34
water bearing sand & gravel	34	39

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield) Bailer 25 gal./min. with 8 ft drawdown after 1 hour.
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 6" diameter welded casing 0-39 ft
Gravel Pack NO
Screen/Perforations NO / NO
Seals
Surface Seal Bentonite and cement to 18 ft
Pump

COMMENTS

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 (b)(6) Address (b)(6), Kent, WA

(2) LOCATION OF WELL: County KING — SE ¼ NE ¼ Sec 27 T 22 N, R 5 E 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 39 ft. Depth of completed well 39 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 39 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 & 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 17 ft. below top of well Date 6/9/83
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 25 gal./min. with 8 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
topsoil, brown, dry	0	2
sand & gravel, brown, dry	2	11
glacial till, brown, dry	11	34
water bearing sand & gravel	34	39

Work started 6/9/83 19.. Completed 6/9/83 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 NORTHWEST PUMP & DRILLING CO. (Person, firm, or corporation) (Type or print)

Address 3245 Auburn Way South, Auburn, WA 9800

[Signed] R. B. Dell (Well Driller)

License No. 0097 Date 6/13/83 19..

INVENTORY WELL #2

(USE ADDITIONAL SHEETS IF NECESSARY)

1/4 NE 1/4 SE SEC 27 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #3

Water Well Data

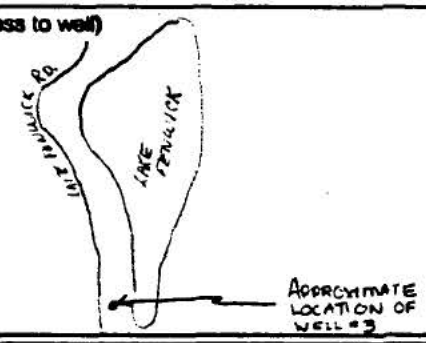
Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 30 Completed Depth 30
Static Water Level (Eleva.) 6 ft. Date 9-14-83

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use Domestic (1 home)

Well Driller MORRIS DRILLING Co.
Address 7215 132 Av SE
Renton, WA 98056
Date Drilled
started 9-12-83 completed 9-14-83
Method Used: Cable
Log filed: No Yes ✓
Permit No.

SKETCH (Identify location, access to well)



WELL LOG

	FROM (ft)	TO (ft)
Sand, gravel & rocks	0	3
Gravel, rocks & yellow clay	3	20
Brown sand	20	25
Brown till	25	28
Coarse sand & gravel	28	30

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield) Bailer 7 gal/min with 3 ft drawdown after 3 hours.
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 6" diam welded From 0-30 ft
Gravel Pack No
Screen/Perforations No / No
Seals Bentonite to 18 ft.
Surface Seal
Pump

COMMENTS Water is good.

: Original and First Copy with
partment of Ecology
ond Copy — Owner's Copy
rd Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 10

Permit No. ....

) OWNER: Nam (b)(6) Address (b)(6) Auburn, Wa. 98002

) LOCATION OF WELL: County King — NE ¼ SE ¼ Sec 27 T 22 N., R 4 E W.M.

ring and distance from section or subdivision corner

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

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

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

) DIMENSIONS: Diameter of well 6 inches.
Drilled 30 ft. Depth of completed well 30 ft.

) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 30 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 None
Type: H.P.

8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
tatic level 6 ft ft. below top of well Date 9-14-83
rtesian 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 7 gal./min. with 3 ft. drawdown after 3 hrs.
Artesian flow g.p.m. Date 9-14-83
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 and Rocks	0	3 ft
Gravel Rocks & yellow-clay	3	20 ft
Brown Sand	20	25 ft
Brown Silt	25	28 ft
Coarse Sand & Gravel	28	30 ft

RECEIVED
SEP 20 1983
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Work started 9-12 1983. Completed 9-14 1983

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 Morris Drilling Co. (Person, firm, or corporation) (Type or print)

Address 7215-122 Ave - SE Renton Wa. 98056

[Signed] Thomas J Morris (Well Driller)

License No. 0327 Date 9-14 1983

INVENTORY WELL # 3

(USE ADDITIONAL SHEETS IF NECESSARY)

Parametrix, Inc. Well #5

1/4 NE 1/4 SE SEC 27 T 22N R 4E
County KING Quad

Water Well Data

Property Address SEE DESCRIPTION BELOW
Owner HAYETT WATER SYSTEM
Address 20212 Lk. Fenwick Rd. S.
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 84 Completed Depth 84
Static Water Level (Eleva.) 43 Date 4-22-81

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Two homes on well now
Max. capacity is 7 lots

Well Driller Northwest Pump & Drilling Co.
Address 3245 Auburn Wy S.
Auburn, WA 98002

Date Drilled
started 4-21-81 completed 4-22-81
Method Used: Rotary
Log filed: No Yes ✓
Permit No. GI-228161

SKETCH (Identify location, access to well)

Lot #18
255 ft from the west line and 15 ft. from the North line of the NE 1/4 of the SE 1/4 of section 27.

WELL LOG

	FROM (ft)	TO (ft)
sand, brown, dry, silty	0	23
sand: gravel, brown	23	41
sand, dry, brown	41	53
water bearing sand occ. gravel	53	57
silty sand: clay, occ. gravel, blue	57	62
clay, brown, seams of sand	62	84

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield) Bailer: 20 gal/min with 12 ft. drawdown after 1 hour.
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION

Casing 6" diam welded from 0-84 ft
Gravel Pack No
Screen/Perforations Screens: 6" diam., slot size .020, from 75 to 83 ft.
Seals
Surface Seal bentonite and cement to 18 ft.
Pump Berkeley Submersible

COMMENTS

...ment of Ecology
...nd Copy — Owner's Copy
...d Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. _____
Permit No. G1-22661

OWNER: Name NORTHWEST HOMES OF BELLEVUE Address 1420 Jones Ave NE., Renton, WA 98055

LOCATION OF WELL: County KING — NE ¼ SE ¼ Sec 27 T 22 N. R 4E W.M.
...ng and distance from section or subdivision corner

PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

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

DIMENSIONS: Diameter of well 6 inches.
Drilled 84 ft. Depth of completed well 84 ft.

CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 84 ft.
Threaded [ ] " Diam. from ft. to ft.
Welded [X] " 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 JOHNSON
Type stainless Model No.
Diam. 6 Slot size .020 from 83 ft. to 75 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 & cement
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? Depth of strata
Method of sealing strata off

PUMP: Manufacturer's Name
Type: H.P.

WATER LEVELS: Land-surface elevation above mean sea level.... ft.
...atic level 43 ft. below top of well Date 4/22/81
...rtesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level
...as a pump test made? Yes [ ] No [ ] If yes, by whom?
...ield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

...ecovery 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
...aller test 20 gal./min. with 12 ft. drawdown after 1 hrs.
...rtesian flow g.p.m. Date
...emperature 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, brown, dry, silty, dry	0	23
sand & gravel, brown	23	41
sand, dry, brown	41	53
water bearing sand, occ. gravel	53	57
silty sand & clay, occ. gravel, blue	57	62
clay, brown, seams of sand	62	84

Work started 4/21/81 19 Completed 4/22/81 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 NORTHWEST PUMP & DRILLING COMPANY
(Person, firm, or corporation) (Type or print)
Address 3245 Auburn Way South, Auburn, WA 98002
[Signed] R. B. DeCamp
(Well Driller)
License No. 0097 Date 4/27/81 19

INVENTORY WELL #5

(USE ADDITIONAL SHEETS IF NECESSARY)

1/4 SE 1/4 NE SEC 27 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #6

Water Well Data

Property Address 26425 Lake Fenwick Rd.
Owner Lake Fenwick Supply - Ervin F. Calvert
Address 1209 So. 229th Des Moines 98188
Tenant

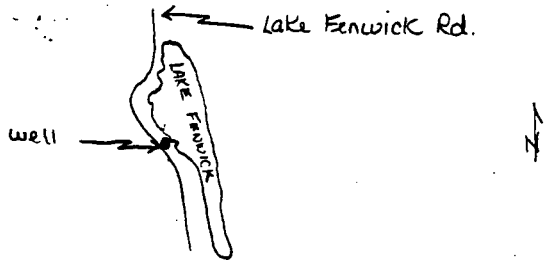
Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 165 Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Service 9, Population 27

Well Driller
Address

Date Drilled
started completed 10-13-80
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)



WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Average Water Use 3375 gal./d
Maximum 6750 gal./d
Capacity 20 gpm or 28.8 Thou./Gal./d.

1/4 NE 1/4 NW SEC 21 T 22 R 4
County KING Quad

Parametrix, Inc. Well #11A

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 36 ft (DUG) Completed Depth
Static Water Level (Eleva.) 9 ft. Date 9-17-62

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED FOR 10 YEARS

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)
Directly behind the house in the driveway.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Pipe is broken off and pump removed. It was a good producing well. Never tested

1/4 NE 1/4 NW SEC 21 T 22 R 4
County KING Quad

Parametrix, Inc. Well #11 B

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address [redacted]
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth (?) Dug Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use Not Presently Used

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

At north back corner of the house.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Well was still in use 8 years ago for watering. When in full use it would sometimes "run slow". Not tested.

1/4 SW 1/4 SW SEC 21 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #12

Water Well Data

Property Address (b)(6) ?
Owner
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 125 ft (Dug) Completed Depth
Static Water Level (Eleva.) 3 ft Date 1-20-61

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Unknown
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

(b)(6)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 41" diam.
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS According to a neighbor this well was capped ~18 years ago and has a large rock next to or on top of it. Its current condition is unknown.

1/4 SW 1/4 SE SEC 22 T 22 R 4
County KING Quad

Parametrix, Inc. Well #13

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 180 ft Completed Depth
Static Water Level (Eleva.) ~ 50 ft water Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Domestic

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

50 ft. behind the house

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 6" steel
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS No production problems.

1/4 NE 1/4 NE SEC 27 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #15

Water Well Data

Property Address (b)(6)
Owner (b)(6)
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 120 ft Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)
(b)(6)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Well hasn't been used for 10 years. Still operable. Four houses used to use it.

1/4 NE 1/4 NE SEC 27 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #16

Water Well Data

Property Addr (b)(6) [redacted]
Owner
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 153 Completed Depth
Static Water Level (Eleva.) 121 Date 1-18-61

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Unknown
Present Use NOT IN USE

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Located at foot of driveway, 200 ft. south of the section line.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield) Yields 10 gpm (1961)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 6" diam.
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Only used well for 3 years. Quit using because it kept plugging up and had too much iron. Well is covered but casing isn't pulled. Does not recall whether the well was filled.

1/4 NW 1/4 NW SEC 28 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #19

Water Well Data

Property Address (b)(6)
Owner (b)(6)
Address (b)(6)
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 27 (Dug) Completed Depth
Static Water Level (Eleva.) 3 Date 1-20-61

INTENDED USE
Domestic Industrial
Irrigation ✓ Test
Municipal Monitoring
Other (explain)
Well Condition Operating
Present Use Lawn care

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

(b)(6)

← N

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 48" diam
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Just moved into the house in August. Used the well for watering their lawn and had no problems with it

1/4 SW 1/4 NW SEC 28 T 22N R 4E
County KING Quad

Parametrix, Inc. well #20

Water Well Data

Property Address (b)(6)
Owner (b)(6)
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 265 ft Completed Depth
Static Water Level (Eleva.) 57 Date 1-20-61

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Unknown
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)
Located in wooded lot behind the yard.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 8-6" diam
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Not used for over 30 years. It's capped but it is not known whether it is filled or not

1/4 SW 1/4 NE SEC 28 T 22 R 4
County KING Quad

Parametrix, Inc. well #22

Water Well Data

Property Address (b)(6)
Owner (b)(6)
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 27 ft (Dug) Completed Depth
Static Water Level (Eleva.) 9 Date 1-20-61

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Between house and 260th

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 42" diam.
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Hasn't been used for over 20 years. It used to run low during the summer. Well is not filled in but it is covered with a cement top.

1/4 NE 1/4 SW SEC 28 T 22N R 4E
County KING Quad

Parametrix, Inc. well #25

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address [redacted]
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 96 ft Completed Depth
Static Water Level (Eleva.) 35 ft Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Unknown
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 8" diam
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Hasn't been used in over 15 years. It is covered. There are 3 houses on the lot (or their property?) and the well is near one of the other houses.

1/4 NE 1/4 SW SEC 28 T 22N R 4E
County KING Quad

Parametrix, Inc. well #26

Water Well Data

Property Address (b)(6) [redacted]
Owner
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth ~30 ft * Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

South side of house

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 6" diam (Lazier 1969)
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS * There is a discrepancy between the depth the owner stated and the depth in Lazier's 1969 report which was 250 ft.

Well hasn't been used since water district #75 came in. It used to dry up in the summer. Well has not been filled - it has equipment put with a house built over it.

1/4 NE 1/4 SW SEC 28 T 22N R 4E
County KING Quad

Parametrix, Inc. well #28

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 11 ft Completed Depth
Static Water Level (Eleva.) 4 ft. Date 1-23-61

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Covered
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Back yard

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing 30" diam.
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS well not used since 1960. They didn't use the water for consumption because it was contaminated by a dog Kennel next door. The well is not filled in but is covered.

1/4 NE 1/4 SE SEC 29 T 22N R 4E
County King Quad

Parametrix, Inc. Well #31A

Water Well Data

Property Address ~ (b)(6)
Owner (b)(6)
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 45 ft Completed Depth
Static Water Level (Eleva.) 32 ft. Date 1-26-61

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

located in back lawn.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing 3/4" diam
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Well is covered but not permanently capped. Not Filled. Well was pumped out once but refilled immediately.

1/4 NE 1/4 SE SEC 29 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #31B

Water Well Data

Property Address (b)(6) [redacted]
Owner
Address (b)(6) [redacted]
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

In back yard next to the Creek.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Well is not being used but has not been filled or capped. The well did not produce enough water.

1/4 NE 1/4 SE SEC 29 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #31C

Water Well Data

Property Address (b)(6) KENT
Owner
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Operable
Present Use NOT USED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Used it for all purposes from 1964-1972. Tested it twice annually always tested O.K.", until 1971 (increase in coliforms). In 1972 water district #75 came in so only used it for watering the lawn etc. Discontinued all use after 1980. "Inexhaustible supply". Well is not filled or covered.

1/4 NE 1/4 SE SEC 29 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #31 D

Water Well Data

Property Addre (b)(6) [redacted]
Owner
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 42 ft. Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Unknown
Present Use Unused

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Located near the northeast corner of the house.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Has a lid.

1/4 NW 1/4 SE SEC 21 T 22 N R 4 E
County KING Quad

Parametrix, Inc.

Well #37

Water Well Data

Property Address (b)(6) [redacted]
Owner (b)(6) [redacted]
Address [redacted]
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth ~ 200 ft * Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Covered but not filled
Present Use UNUSED

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS * It takes 3-4 seconds for a rock to hit the bottom.
It's been at least 10 years since its been used. Current owner never used it and had no information on taste, capacity, or quality

Parametrix, Inc.

Well #38

1/4 NE 1/4 SW SEC 21 T 22 N R 4 E
County KING Quad

Water Well Data

Property Address 2130 S. 248th
Owner Marcus Whitman Church
Address 2130 S. 248th
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition Capped and covered
Present Use Unused

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Exact location on property is unknown.

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS The church session has granted permission to test the well. They thought they knew its location but are now unsure.

1/4 SE 1/4 SE SEC 5 T 22 N R 4 E
County KING Quad

Parametrix, Inc. Well #39

Water Well Data

Property Address SEE LOCATION DESCRIPTION
Owner WATER DISTRICT #75 Well #9
Address PO. Box 68100 Seattle, WA 98188
Tenant

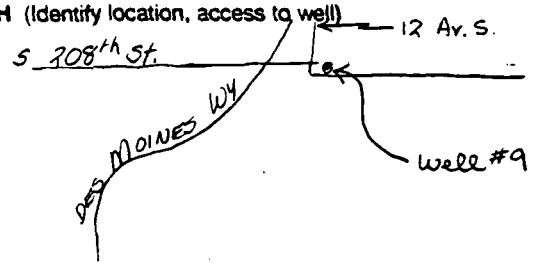
SEE ATTACHED INFO.
Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 383 ft. Completed Depth 362 ft.
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)



WELL LOG ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHED INFO

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHED INFO.

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

Second Copy -- Owner's Copy
Third Copy -- Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. G1-24214P

(1) OWNER: Name King County Water Dist.#75 Address PO Box 68100, Seattle, Wa. 98188

(2) LOCATION OF WELL: County King — ¼ NE ¼ Sec 8 T 22 N, R 4E 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) Des Moines Well
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rev Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 24 - 18 inches.
Drilled 383 ft. Depth of completed well 362 ft.

(6) CONSTRUCTION DETAILS: casing is all .375 wall
Casing installed: 24 - Diam. from +4 ft. to 314 ft.
Threaded ☐ 18 - Diam. from 292 ft. to 312 ft.
Welded ☒ 18 - Diam. from 358 ft. to 363 ft.
d slip packer installed @ top of upper 18" pipe
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 UOP Johnson
Type Watermark SS Model No. -
Diam. 18 Slot size .150 from 312 ft. to 358 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: ¼ x 1/8
Gravel placed from See Note 3 to 383 ft.

Surface seal: Yes ☒ No ☐ To what depth? +1 to 30 ft.
Material used in seal neat cement grout
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.... 188 ft.
Static level 72 ft. below top of well Date 7-6-83
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? SEI
Yield: 3200 gal./min. with 213 ft. drawdown after 24 hrs.
Note: Static level @ start of test on 4-11-83 was 80 ft..

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

Time	Water Level	Time	Water Level	Time	Water Level
0	293	60	168	300	145
30	183	75	165	450	138
45	170	95	162	1320	130

Date of test 4/11 to 13/83
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 ☐ by owner

(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
Well log on attached sheet		

Notes:
(1) The ground level immediately arou the well has been raised. The depths casing locations are referenced from original ground level which was approximately one foot lower than that existing at time of well completion.
(2) The well was drilled 38" diameter to 30 ft.; 32" diameter to 372 ft.; and 18" diameter to 383 ft.
(3) Gravel was placed up to 294 ft. between the 18" screen section casing and the 24" casing and up to 250 ft. between the 24" casing and the bore ho
(4) Bentonite pellets were placed fro 250 ft. to 247 ft.
(5) Mason Sand was placed from 247 ft to 245 ft.
(6) Sand cement grout was placed from 245 ft. to 30 ft.

Work started 2-22 19 83 Completed 7-6 19 83

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 Schneider Equipment, Inc.
(Person, firm, or corporation) (Type or print)
Address 21881 River Road N.E., St. Paul, O 971
[Signed] Stephen J. Schneider (Well Driller)
License No. 643 Date 7-13 19 83

(USE ADDITIONAL SHEETS IF NECESSARY)

INVENTORY
WELL # 39

(10) WELL LOG: No. 8305

King County Water District #75

Des Moines Well

NE ¼, Sec. 8, T22N, R4F, WM

Material	From	To
Sand, brown, med. w/ some gravel	0	9
Sand, brown, coarse-fine	9	21
Gravel, 2" minus	21	23
Clay, gritty, brown & grey	23	28
Clay, grey, gritty, occasional gravel	28	31
Gravel, 4" minus	31	36
Clay, grey	36	59
Clay, grey w/ some gravel	59	61
Clay, grey	61	106
Sand, very coarse, & gravel (3" minus)	106	115
Clay, grey, silty	115	132
Sand, med-fine & gravel, 2" minus	132	139
Gravel, 2" minus	139	142
Clay, grey	142	147
Gravel, 1½" minus	147	151
Sand, grey, med-coarse, some gravel	151	156
Sand & gravel, grey, coarse & 1" minus	156	166
Gravel & sand, 1" minus & grey coarse	166	182
Gravel, 3" minus & some grey coarse sand	182	199
Clay, grey	199	201
Gravel, 6" minus & some coarse grey sand	201	210
Clay, multi-colored & multi-textured w/ gravel	210	250
Clay, grey w/ gravel	250	258
Cobbles, boulders, gravel & clay, grey	258	263
Gravel & cobbles w/ clay, grey	263	270

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DE
INVENTORY
WELL #39

No. 8305

(10) WELL LOG: (cont'd)

King County Water District #75
Des Moines Well
NE ¼, Sec. 8, T22N, R4E, WM

Material	From	To
Clay, grey w/ gravel and occasional cobbles	270	303
Clay, blue-grey w/ gravel, soft	303	312
Gravel, 3" minus w/ some blue clay	312	314
Gravel, 3/4" minus w/ some coarse multi-colored sand	314	322
Gravel, 3/4" minus w/ some med-coarse sand	322	334
Gravel, 1½" minus w/ some coarse sand	334	353
Gravel, 3/4-½" minus w/ sand, coarse	353	360
Gravel, 2" minus & fine-coarse grey sand	360	371
Clay, silty, grey	371	383

RECEIVED

INVENTORY
WELL #39

1/4 NE 1/4 NE SEC 9 T 22N R 4E
County KING Quad

Parametrix, Inc. Well #40

Water Well Data

Property Address SEE SKETCH BELOW
Owner Water District #75 Well #10
Address
Tenant

SEE ATTACHMENT

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 485 Completed Depth
Static Water Level (Eleva.) Date

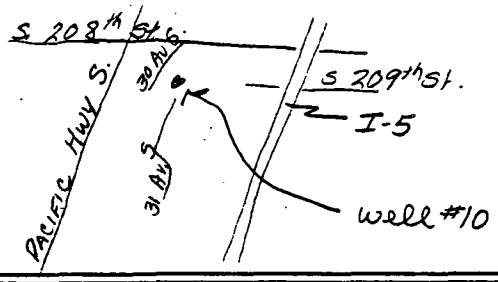
INTENDED USE

Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)



WELL LOG ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE

No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHMENT

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

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 King County Water Dist.#75 Address P. O. Box 68100, Seattle, Wa 98188

(2) LOCATION OF WELL: County King — ¼ SE ¼ Sec 9 T 22 N., R 4E 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) Angle Lake

New well ☒ Deepened ☐ Reconditioned ☐ Rev

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

(5) DIMENSIONS: Diameter of well Abandoned inches.

Drilled 500 ft. Depth of completed well 0 ft.

(6) CONSTRUCTION DETAILS: See details notes

Casing installed: 30 " Diam. from 1 ft. to 36 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐ In drill pipe

Type of perforator used Mills knife

SIZE of perforations ¾ in. by 2 in.

455 perforations from 179 ft. to 293 ft.

30= perforations from 77 ft. to 154 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: pea

Gravel placed from 311 ft. to 500 ft.

Surface seal: Yes ☒ No ☐ To what depth? 4-36 ft.

Material used in seal neat cement grout

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 ~332 ft.

Static level 183 ft. below top of well Date 4-28-83

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? SEI

Yield: 465 gal./min. with 105 ft. drawdown after 3½ hrs.

See Notes

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

Time	Water Level	Time	Water Level	Time	Water Level
0	288	10	208		
1	211	15	207		
5	209	20	206		

Date of test 4-28-83

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 ☐ by owner

(USE ADDITIONAL SHEETS IF NECESSARY)

(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
Well log on attached sheet and Notes		

(Details) Notes:

(1) Well was drilled 38" diameter to 36 ft., 30" casing installed from -1' to 36' and 7 to 7½ yds neat cement grout pumped between the 38" bore and 30" casing from 36' t 4'.

(2) Well was then drilled 18" diameter from 36 ft to 400': a temporary 8" casing was installed to test the quantity and quality of the lower aquifer and the annular space back filled with pea gravel to 285 ft. then with native clay and bentonit from 285' to approximately 250 ft.

(3) The lower aquifer was then test pumped and water samples taken (se items 8 & 9) while the annular spa above the clay/bentonite plug was kept full of water.

(4) After test pumping, the 8" casing removed and the hole was reamed to 26" diameter to 302 ft.; whereupon the hole caved in around the drill tools. The bottom of the bit was raised to 300 ft. before the rig was unable to move it further.

(5) Numerous attempts were made to remove the caved material from the annulus but the hole continued to slough and it was decided to aband the well

(cont'd attached sheet

Work started 3-30 19 83 Completed 6-30 19 83

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 Schneider Equipment, Inc. (Person, firm, or corporation) (Type or print)

Address 21881 River Rd NE, St. Paul, Or. 97137

[Signed] Stephen J. Schneider (Well Driller)

License No. 643 Date 7-16 19 83

INVENTORY WELL #40

Ard Copy — Driller's Copy

STATE OF WASHINGTON

Permit No. 01-42172

(1) OWNER: Name King County Water Dist.#75 Address P. O. Box 58100, Seattle, Wa. 981

(2) LOCATION OF WELL: County King — ¼ SE ¼ Sec 9 T 22 N., R 4E W

Bearing and distance from section or subdivision corner 20' South of previously abandoned well

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

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

New well ☒ Deepened ☐ Reconditioned ☐

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

Rev

(5) DIMENSIONS: Diameter of well 20-12 inches. Drilled 496 ft. Depth of completed well 485 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 30" Diam. from 0 ft. to 115 ft.
Threaded ☐ 20" Diam. from +3 ft. to 415 ft.
Welded ☒ 12" Diam. from See Note (2) 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 UOP Johnson
Type Watermark SS Model No. -
Diam. 12 PS Slot size See Note (2) from to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: ¼ xx 1/8
Gravel placed from See Note (3) ft.

Surface seal: Yes ☒ No ☐ To what depth? See Note
Material used in seal See Note (8)
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.... 332 ft.
Static level 202 ft. below top of well Date 8/30/83
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? SEI
Yield: 2955 gal./min. with 166 ft. drawdown after 28½ hrs.

Note: Static @ start of test - 224 ft.

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
2	328½	15	311½	60	297
5	321½	20	308½	90	293
10	315	30	304	120	290

Date of test 8/2-3/83
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 ☐ by Owner

(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
Well log on attached sheet		

(8)

RECEIVED
OCT 03 1983
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Work started 5/27 19 83 Completed 9/15 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 Schneider Equipment, Inc. (Person, firm, or corporation) (Type or print)

Address 21881 River Rd NE, St. Paul, Or. 97

[Signed] Stephen J. Schneider (Well Driller)

License No. 643 Date 9/28 19

INVENTORY WELL #40

(USE ADDITIONAL SHEETS IF NECESSARY)

TCV 050-1-20

SE ST 22N 4E

No. 8306

KING COUNTY WATER DISTRICT NO. 75

Angle Lake Abandoned Well

(10) WELL LOG:

Material	From	To
Gravel, cobbles & clay (fill)	0	4
Peat	4	14
Hardpan clay, grey	14	16
Gravel, 6" minus	16	19
Gravel, cobbles, boulders w/ some grey clay	19	31
Clay, grey w/ occasional gravel	31	57
Gravel, 8" minus & clay, grey	57	76
Gravel, 5" minus	76	78
Clay, grey w/ brown streaks	78	81
Sand, coarse w/ some gravel	81	85
Gravel, 1½ minus w/ sand, coarse	85	90
Sand, med-fine	90	97
Gravel & sand, 3" minus, cemented	97	144
Gravel & sand, 3" minus	144	184
Clay, brown	184	187
Clay, blue-grey	187	217
Clay, grey, sandy	217	218
Gravel, 3" minus w/ some grey clay	218	219
Gravel, 3/4 minus & fine sand w/ layers of clay, grey	219	223
Sand, medium w/ some gravel, ½" minus	223	224
Clay, grey w/ some gravel	224	225
Sand, med-fine, black	225	226
Sand, medium, w/ some coarse sand & gravel	226	228
Sand, medium, w/ trace of gravel	228	230
Sand, coarse w/ some gravel 3/4 minus	230	231
Gravel, 2" minus w/ sand, coarse-fine	231	232
Gravel, 3" minus w/ sand, coarse-medium	232	240
Gravel, 4" minus w/ sand, coarse-fine	240	255
Gravel, 3" minus w/ sand, coarse & some clay, grey	255	257
Clay, grey	257	367
Clay, grey w/ occasional gravel	367	405
Gravel, coarse sand, & green clay	405	410

RECEIVED
JUL 20 1983
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

INVENTORY
WELL #40

KING COUNTY WATER DISTRICT NO. 75

Angle Lake Abandoned Well

Material	From	To
Clay, grey w/ gravel	410	413
Gravel, 1" minus w/ clay, grey	413	415
Gravel, 2" minus & coarse sand w.b. v. slight cemented	415	434
Gravel, 1" minus w/ clay, fine sandy	434	440
Gravel, 2" minus & coarse sand w.b. v. slight cemented	440	454
Gravel, 2" minus w/ clay	454	458
Gravel, 2" minus w/ coarse sand	458	459
Gravel, 1" minus w/ clay	459	466
Clay, grey w/ gravel & cobbles	466	468
Gravel, 2" minus w/ coarse sand w.b.	468	482
Sand, coarse & gravel w/ clay.	482	484
Clay, grey, sandy	484	487
Clay, grey, soft	487	500

(Details) Notes Continued

(6) The hole below the bit was first cleared of material to 311 ft. The drill pipe was perforated and then cut off at 179 ft. Neat cement grout was then pumped from inside the drill pipe from 311 to 170 ft. The drill pipe was then pulled up to approximately 156 ft. when it locked up. The drill pipe was then perforated up to 77 ft. and cut off again. Neat cement grout was then pumped from 170 ft. to the top of the 30" casing as the upper part of the drill pipe was removed. The balance of the hole was covered with native fill.

(7) Tools left in the hole and their locations are:

18" pilot bit	298'-300'
26" hole opener	293'-298'
24" stabilizer	275'-293'
6" flanged drill pipe	179'-275'
6" flanged drill pipe	77'-156'

(8) Construction of a new well was started approximately 20 ft. South of this abandoned hole.

JUL 20 1933

DEPARTMENT OF ARCHIVES

INVENTORY WELL #40

1/4 NW 1/4 SE SEC 8 T 22N R 4E
County KING Quad

Parametrix, Inc. Wells #41 & 41A

Water Well Data

Property Address SEE Sketch Below
Owner Water District #54 (2 wells)
Address 922 S. 219th St. Des Moines, WA
Tenant

SEE ATTACHED INFO.

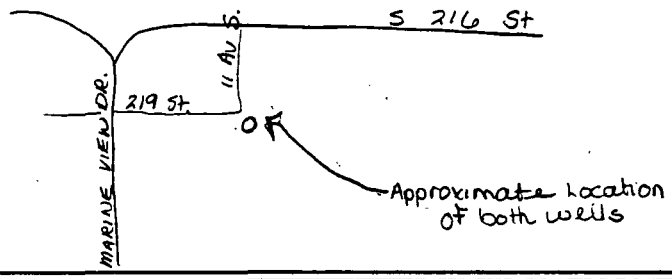
Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Well #4 328' Well #5 244' Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use Pop. 3,900

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)



WELL LOG
ATTACHED For Well #5

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHED INFO

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHED INFO

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

STATE OF WASHINGTON

Permit No. 91-050011

(1) OWNER: Name KING COUNTY WATER DISTRICT #54 Address 922 South 219th STREET, DES MOINES 98198

(2) LOCATION OF WELL: County KING — NW ¼ SE ¼ Sec. 6 T. 22 N., R. 4E 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).... 5

New well ☒ Deepened ☐ Reconditioned ☐

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

(5) DIMENSIONS: Diameter of well 12 inches. Drilled 245 ft. Depth of completed well 244 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from +3 ft. to 212.5 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 COOK

Type 304 STAINLESS Model No. ____

Diam. 10" Slot size .100 from 212.6 ft. to 218 ft.

Diam. 10" Slot size .100 from 223 ft. to 238.25 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 NA

Type: ____ H.P. ____

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 175 ft.

Static level 46.3 ft. below top of well Date 5-6-82

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? Mueller + Rod

Yield: 500 gal./min. with 55 ft. drawdown after 5½ 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
10 min	74'				
30	69'				
90	61'				

Date of test 5-7-82

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

Artesian flow ____ g.p.m. Date ____

Temperature of water 50.4° 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	8
BLUE CLAY	8	70
GRAY SILTY SAND	70	90
SILTY BLACK AND GREEN SAND	90	
AND GRAVEL		117
GRAY SILTY SAND AND GRAVEL	117	128
BLACK AND GREEN SAND	128	
AND GRAVEL		135
GRAY SILTY SAND AND GRAVEL	135	156
BLACK AND GREEN SAND	156	
AND GRAVEL (WATER BEARING)		202
GRAY SAND WITH SOME GRAVEL	202	208
BLACK AND GREEN SAND AND	208	
GRAVEL (WATER BEARING)		236
DENSE BLUE-GREEN CLAY AND	236	
SAND AND GRAVEL WITH PEAT		
TOTAL DEPTH		245

RECEIVED JUN - 8 1982 WILLIAMS, PERN & ASSOC., INC.

Work started 4/6, 1982 Completed 5/15, 1982

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 Mueller Drilling (Person, firm, or corporation) (Type or print)

Address 4020 S 170 Seattle

[Signed] H. Mueller (Well Driller)

License No. 0930 Date 6-2, 1982

INVENTORY WELL #41

(USE ADDITIONAL SHEETS IF NECESSARY)

1/4 SW 1/4 SE SEC 17 T 22N R 4E
County KING Quad

Parametrix, Inc. Wells #42 : 42A

Water Well Data

Property Address 23660 Marine View DR. (Well #2)
Owner Masonic Home of Washington
Address 23660 Marine View DR.
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Well #1 1000' Well #2 200' Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Class 2 Monitoring
Other (explain)
Well Condition
Present Use Domestic Pop. 125

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

1/4 NW 1/4 SE SEC 8 T 22N R 4E
County KING Quad

Parametrix, Inc. 1020 11 #43

Water Well Data

Property Address SEE SKETCH BELOW
Owner (b)(6)
Address
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 105' Completed Depth
Static Water Level (Eleva.) 65 Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use Class 2 Pop. 350

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

(b)(6)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

1/4 SW 1/4 SW SEC 35 T 22 R 4
County KING Quad

Parametrix, Inc. Well #44

Water Well Data

Property Address SEE LOCATION DESCRIPTION
Owner Logandale Water Assoc.
Address 28543 68th Av. S.
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 181 ft. Completed Depth
Static Water Level (Eleva.) Date

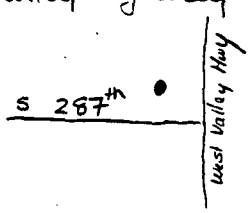
INTENDED USE
Domestic ✓ Industrial
Irrigation Test
Municipal Monitoring
Other (explain)
Well Condition
Present Use 21 houses

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

Near intersection of S. 287th St. and West Valley Highway



WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS Sampling for coliform bacteria once per quarter

1/4 SE 1/4 SW SEC 8 T 21 N R 4 E
County KING Quad

Parametrix, Inc. Well #45

Water Well Data

Property Address S 320th & 4th Av. S. (Well #7)
Owner Federal Way Sewer and Water
Address P.O. Box 4249 Federal Way WA 98003
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 228 Ft. Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use CAPACITY 240

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

1/4 SW 1/4 SE SEC 10 T 21N R 4E
County KING Quad

Parametrix, Inc. Well #4L

Water Well Data

Property Address S 321st & 44th Av. S. (Well # 8-64
Owner Federal Way Sewer and Water
Address PO Box 4249 Federal Way, WA 98003
Tenant

SEE ATTACHMENT

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 280 ft. Completed Depth
Static Water Level (Eleva.) 175 Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use Capacity: 225

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (identify location, access to well)

WELL LOG ATTACHED

FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHMENT
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

Well

STATE OF WASHINGTON

Application No. 6469

Permit No.

(1) OWNER:

Name WATER DIST. #64

Address 30815-18th Ave So
FEDERAL WAY WA

(2) LOCATION OF WELL:

County KING Owner's number, if any

NW¼ NW¼ NE¼ Section 15 T. 21 N. R. 4E W.M.

Bearing and distance from section or subdivision corner

301.3E 2.44 S

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:

Threaded ☐ Welded ☐

12" Diam. from -0- ft. to 280 ft. Gage
Diam. from ft. to ft. Gage
Diam. from ft. to ft. Gage

(7) PERFORATIONS:

Perforated? ☐ 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.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS:

Well screen installed ☐ Yes ☐ No

Manufacturer's Name Johnson Inc.

Type Model No.

Diam. 10" Slot size 70 Set from 268 ft. to 278 ft.

Diam. Slot size Set from ft. to ft.

(9) CONSTRUCTION:

Was well gravel packed? ☐ Yes ☐ No Size of gravel:

Gravel placed from ft. to ft.

Was a surface seal provided? ☐ Yes ☐ No To what depth? ft.

Material used in seal

Did any strata contain unusable water? ☐ Yes ☐ No

Type of water? Good Depth of strata

Method of sealing strata off

(10) WATER LEVELS:

Static level 175-6 ft. below land surface Date 6/25/62

Artesian pressure lbs. per square inch Date

Water is controlled by (Cap, valve, etc.)

(11) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? L.R. Gauc

Yield: 239 gal./min. with 30 ft. drawdown after hrs.

100 36.8 13

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
4:01	234 ft.	4:24	20.0
4:08	32.14	4:30	25.0
4:14	31.4		
4:19	30.07		

Date of test June 25 1962

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

Artesian flow g.p.m. Date

Temperature of water 54 Was a chemical analysis made? ☐ Yes ☐

(12) WELL LOG:

Diameter of well 12 inches.

Depth drilled 280 ft. Depth of completed well 278'6" ft.

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
Topsoil	-0-	10
Sandy fine clay	10	20
Sandy fine hardpan	20	25
Dry gravel	25	32
Sand & gravel	32	50
Hardpan	50	72
Bluish clay	72	102
Hardpan	102	237
Coarse sand	237	245
Sandy hardpan	245	265
Coarse sand	265	278
Fine clay	278	280

Work started May 29 19 62 Completed June 26 19 62

(13) PUMP:

Manufacturer's Name LAYNE & BOWLER

Type: TURBINE H.P. 50

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 [illegible] (Person, firm, or corporation) (Type or print)

Address 601 Le-Lon-Wa N.E. Tacoma, Wa.

[Signed] [illegible] (Well Driller)

License No. Date Oct. 1 19

(USE ADDITIONAL SHEETS IF NECESSARY)

INVENTORY
WELL #46

S. F. No. 7336—(Rev. 9-62)—8-62—5M. 75168.

Parametrix, Inc.

Well #47

1/4 NE 1/4 SE SEC 4 T 21 N R 4E
County KING Quad

Water Well Data

Property Address I-5 and 298th (well #9-64)
Owner Federal Way Sewer and Water
Address P.O. Box 4249 Federal Way WA 98003
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 400 ft. Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE

Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use Capacity: 425

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

Attached

	FROM (ft)	TO (ft)

WELL OBSERVATIONS

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE

No Yes ✓ Attached
SEE CITY FILES

WELL CONSTRUCTION

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

INVENTORY
WELL #47

Federal Way Sewer and Water Well #9-64
Drilled by L. R. Gaudio, 1963.
Altitude 455 ft. Casing: 10-inch to 357 ft.
10-inch 30-slot screen, 357-375 ft.

	Thickness (Ft)	Depth (Ft)
Hardpan, rocks, large	7	7
Hardpan	88	95
Sand, dry, brown	9	104
Sand, blue	8	112
Clay, sandy, blue	17	129
Sand, blue	2	131
Gravel, cemented	27	158
Hardpan	28	186
Clay, gravelly	9	195
Hardpan	25	220
Sand, blue	4	255
Sand and gravel	5	260
Sand, blue	30	290
Hardpan	11	301
Clay, blue, gravelly	9	310
Hardpan	25	335
Sand and gravel, water-bearing	41	376
Sand and gravel, finer, and blue silt	1	377

From: Cline, D.R., Availability of Groundwater in the Federal Way Area, King County, Washington: USGS Open File Report, 1969.

1/4 NE 1/4 SW SEC 15 T 21N R 4E
County KING Quad

Parametrix, Inc. Well #48

Water Well Data

Property Address 38th Av. S. and S. 331st (Well #10-64)
Owner Federal Way Sewer and Water
Address P.O. Box 4249 Federal Way, WA 98003
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth 455 Ft. Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use CAPACITY: 450

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG

	FROM (ft)	TO (ft)
Diagram on File @ Robinson and Noble Inc. 5915 Orchard St. W. Tacoma, WA 98467		

WELL OBSERVATIONS
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached
SEE CITY FILES

WELL CONSTRUCTION
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

1/4 NE 1/4 NW SEC 18 T 21 N R 4E
County KING Quad

Parametrix, Inc. Well #49 : 49A

Water Well Data

Property Address S 320th St and 10th Av. SW (Well # 17 : 17A)
Owner Federal Way Sewer and Water
Address P.O. Box 4249 Federal Way, WA 98003
Tenant

SEE ATTACHMENT

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth #17 205 ft. #17A 180 ft. Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use CAPACITY: 1,000 each

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG
ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHMENT

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

Second Copy — Owner's Copy
Third Copy — Driller's Copy 21/4E/18/C

STATE OF WASHINGTON

21/04-10 Permit No. G1-00484P

(1) OWNER: Name KING COUNTY WD 124 Address FEDERAL WAY

(2) LOCATION OF WELL: County KING — NE NW ¼ Sec 18 T. 21 N., R. 4E W.M.

Bearing and distance from section or subdivision corner (North-central part of 18)

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

(4) TYPE OF WORK: Owner's number of well (if more than one) 17

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

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled 201 ft. Depth of completed well 190'-5" ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from 0 ft. to 138 ft.
Threaded ☐ 8" Diam. from 183 ft. to 190.5 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 PS Slot size 20 from 136 ft. to 141 ft.
Diam. 8 PS Slot size 40 from 141 ft. to 183 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: "TRACTION"
Gravel placed from 136 ft. to BTM ft.

Surface seal: Yes ☐ No ☒ To what depth? ft.
Material used in seal
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 62.3 ft. below top of well Date 6/17/70
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? R&N
Yield: 1200 gal./min. with 40.7 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
ON FIRE					
T = 317,000	MEINZER				

Date of test 6/17/70
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 silt & sand	0	10
Brn gravly till	10	65
Gray-brn slt, sand, gvl	65	84
Medium sand, well sorted, gray - w/ftr	84	158
Med & crse sand w/ gvl - w/ftr	158	184½
Slt & clay - gray, firm	184½	201

Work started 5/26, 1970 Completed 6/17, 1970

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 John B. Noble (Person, firm, or corporation) (Type or print)

Address for LR GAUDIO CO.

[Signed] Geologist (Owner)

License No. ROBINSON & N
10828 Gravelly
Tacoma, Wash.

INVENTORY WELL #49

Third Copy -- Driller's Copy 21/4E/18/C **STATE OF WASHINGTON** Permit No. K100453

(1) OWNER: Name KING CO WD #124 Address FEDERAL WAY

(2) LOCATION OF WELL: County KING NE ¼ NW ¼ Sec 18 T 21 N., R 4E W.M.

Bearing and distance from section or subdivision corner (93 ft east of well 17)

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

(4) TYPE OF WORK: Owner's number of well (if more than one).... 17 A

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

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled 205 ft. Depth of completed well 204 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12 " Diam. from 0 ft. to 153 ft.
Threaded ☐ 8 " Diam. from 197 ft. to 204 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 PS Slot size 20 from 151 ft. to 156 ft.
Diam. 8 PS Slot size 50 from 156 ft. to 197 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: "TRACTION"
Gravel placed from 150 ft. to BTM ft.

Surface seal: Yes ☐ No ☒ To what depth? ft.
Material used in seal
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.... 329 ft.
Static level 71.5 ft. below top of well Date 7/31/70
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? REN
Yield: 102 gal./min. with 34 ft. drawdown after 5 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
ON FILE					
		T=159,000	MEINZER		

Date of test 7/31/70
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 & silt	0	10
Till - brn-gray	10	96
Sand w/ clay layers	96	105
Sand, medium, gray - w/ ft	105	170
Sand - med & crse, gray - w/ gravel w/ ft	170	199
Silt & clay - gray, firm	199	205

Work started 6/24, 1970. Completed 7/31, 1970

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 GAUDIC DRILLING CO (Person, firm, or corporation) (Type or print)

Address TACOMA

[Signed] [illegible] GEOLOGIST

License No. ROBINSON & 10328 Gravel Tacoma, Was

INVENTORY WELL #49A

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 2256 OS (Rev. 4-71)

1/4 SW - 1/4 SW SEC 17 T 21N R 4E
County KING Quad

Parametrix, Inc. Well #50

Water Well Data

Property Address S. 333rd and 5th Av. S. (Well #18)
Owner Federal Way Sewer and Water
Address PO Box 4249 Federal Way, WA
Tenant

Land Surface Elevation SEE ATTACHMENT
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHMENT

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

...ed Copy — Driller's Copy

STATE OF WASHINGTON

Permit No. GL-20545

(1) OWNER: Name KING COUNTY W.D. 124 Address

(2) LOCATION OF WELL: County KING SW ¼ SW ¼ Sec. 17 T 21 N., R. 4E 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) 18

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

(5) DIMENSIONS: Diameter of well DRILLED 20" CSG REMOVED inches.
Drilled 182 ft. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16 " Diam. from 0 ft. to 140 ft.
Threaded ☐ 12 " Diam. from 166 ft. to 178 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 304 SS
Type Model No.
Diam. 12 PS Slot size 60 from 140 ft. to 166 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: 4X8
Gravel placed from 20 ft. to 182 ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal CONCRETE
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 320 ft.
Static level 99.1 ft. below ~~top of well~~ L.S. Date 11/9/78
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? R&N INC
Yield: 950 gal./min. with 25 ft. drawdown after 24 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
		T ~ 220,000 gpd/ft			
ON FILE					
ROBINSON NOBLE & CARR INC					

Date of test 11/8/78
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 47 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
TILL	0	16
BRN S&G w/ SLT MATRIX	16	60
BRN SNDY TILL OVER GRAVELLY TILL	60	110
BRN MED-CRSE SND w/ VARYING AMT GVL	110	141
MED-CRSE SND w/ 30% GVL	141	168
MED-FINE SND	168	182
* NOTE: ALL DEPTHS REFERENCED TO L.S. AT TIME OF DRILLING. GRADE SUBSEQUENTLY RAISED APPROX 9 ft AND CASING EXTENDED		
LOG PREPARED BY ROBINSON, NOBLE & CARR GEOLOGISTS		
SEP 2 1980		

Work started 10/23 1978 Completed 11/10 1978

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 STORY/ARMSTRONG DRLG (Person, firm, or corporation) (Type or print)

Address PUYALLUP WA

[Signed] (Well Driller)

License No. OC12 INVENTORY WELL #50

(USE ADDITIONAL SHEETS IF NECESSARY)

F. No. 7356—OS—(Rev. 4-71).

1/4 SE 1/4 SE SEC 7 T 21N R 4E
County KING Quad

Parametrix, Inc. Wells #51 & 51A

Water Well Data

Property Address 31627 1st Av. S. (Well #20 & 20A)
Owner Federal Way Sewer and Water
Address PO Box 4249 Federal Way WA
Tenant

SEE ATTACHMENT

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG
ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT
WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No Yes ✓ Attached ✓

WELL CONSTRUCTION SEE ATTACHMENT
Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

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. [illegible]
Permit No. .....

(1) OWNER: Name King County Water District 124 Address P.O. Box 4249, Federal Way, WA 98003

(2) LOCATION OF WELL: County King — SE ¼ SE ¼ Sec. 7 T. 21 N., R. 4E W.

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) 20
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20 inches.
Drilled 368 ft. Depth of completed well 366 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20" Diam. from 0 ft. to 309 ft.
Threaded ☐ 12" Diam. from 279 ft. to 309 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. 304 SS
Diam. 12" Slot size 130 from 309 ft. to 349 ft.
Diam. 12" Slot size .050 from 349 ft. to 359 ft.
12" .130 359 ft 364 ft

Gravel packed: Yes ☒ No ☐ Size of gravel: pea
Gravel placed from 279 ft. to 366 ft.

Surface seal: Yes ☒ No ☐ To what depth? 40 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 .... 340 ft.
Static level 137 ft. below top of well Date 4/30/79
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? Robinson & Noble, Inc.
Yield: 2010 gal./min. with 2.3 ft. drawdown after 24 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 4/30/79
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
till	0	100
gray pebbly sand	100	157'
sand and gravel	157	178'
brown pebbly sand	178	195
gray medium sand with gravel	195	224
sand and gravel	224	234'
gray silty clay	234	270
brown sand and gravel	270	310
coarse gravel and sand	310	363'
gravel and silty sand	363	368'

Work started 3/14, 1979. Completed 5/3, 1979

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 John Armstrong, Storey & Armstrong Dr
(Person, firm, or corporation) (Type or print)

Address 10715 66th Ave., Puyallup, WA 98371

[Signed] Mackey Smith (Well Driller) Robinson & Noble, In 10138 Gravelly Lake Dr. Tacoma, WA 984

License No. 0012 Date 1/29, 198

INVENTORY WELL #51

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

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 King County Water District 124 Address P.O. Box4249, Federal Way, WA 98003

(2) LOCATION OF WELL: County King — SE ¼ SE ¼ Sec. 7 T. 21 N., R. 4E 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) 20A

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

(5) DIMENSIONS: Diameter of well 16" inches.
Drilled 236 ft. Depth of completed well 230 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16" Diam. from 0 ft. to 190 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. 304 SS
Diam. 12 Slot size 060 from 190 ft. to 230 ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: 4 x 8
Gravel placed from 20 ft. to 236 ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 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 .... 340 ft.
Static level 112 ft. below top of well Date 5/22/79
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? Robinson & Noble, Inc.

Yield:	gal./min. with	ft. drawdown after	hrs.
805	13½	.1	
955	17½	7	
"	"	"	"

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 5/22/79
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
till	0	100'
gray pebbly sand	100	157'
sand and gravel	157	178'
brown pebbly sand	178	195'
gray medium sand with gravel	195	224'
sand and gravel	224	234'
gray silty clay	234	236'

Work started 5/3 19 79 Completed 5/23 19 79

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 John Armstrong
Storey & Armstrong Drilling
(Person, firm, or corporation) (Type or print)
Address 10715 66th Ave. S. Puyallup, WA 98371

[Signed] Mackey Smith (Well Driller) Robinson & Noble, Inc. 10318 Gravelly Lake Dr. Tacoma, WA 98499

License No. 0012 Date 1/29 19 80

INVENTORY WELL #51A

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7336—OS—(Rev. 4-71).

1/4 SE 1/4 SW SEC 34 T 21N R 4E
County KING Quad

Parametrix, Inc. Wells #52 & 52A

Water Well Data

Property Address S. 384th and 39th Av S. (well # 22 & 22A)
Owner Federal Way Sewer and Water
Address PO Box 4249 Federal Way, WA
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG
DIAGRAMS ON FILE

	FROM (ft)	TO (ft)
C. Robinson and Noble, Inc.		
5915 Orchard St. W.		
Tacoma, WA 98467		

WELL OBSERVATIONS SEE ATTACHMENT

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS
(observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION SEE ATTACHMENT

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

1/4 SW 1/4 SE SEC 7 T 21N R 4E
County KING Quad

Parametrix, Inc. Wells # 53 & 53A

Water Well Data

Property Address S. 316th and 4th Av. SW (Well # 23 & 23A)
Owner Federal Way Sewer and Water
Address PO Box 4249 Federal Way, WA
Tenant

Land Surface Elevation
Datum on Reference
Elevation Determined by
Top of Casing Elevation
Drilled Depth Completed Depth
Static Water Level (Eleva.) Date

INTENDED USE
Domestic Industrial
Irrigation Test
Municipal ✓ Monitoring
Other (explain)
Well Condition
Present Use

Well Driller
Address

Date Drilled
started completed
Method Used:
Log filed: No Yes
Permit No.

SKETCH (Identify location, access to well)

WELL LOG ATTACHED

	FROM (ft)	TO (ft)

WELL OBSERVATIONS SEE ATTACHMENT

WELL LOGGING (type, reference)
PUMPING TESTS (type & yield)
WATER LEVEL MEASUREMENTS (observer, date, level)

WATER QUALITY ANALYSES AVAILABLE
No ✓ Yes Attached

WELL CONSTRUCTION SEE ATTACHMENT

Casing
Gravel Pack
Screen/Perforations
Seals
Surface Seal
Pump

COMMENTS

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

Well 23

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name King County Water District 124 Address P.O. Box 4249 Federal Way Wa 98

(2) LOCATION OF WELL: County King NE¼ - SW¼ SE¼ Sec. 7 T. 21 N., R. 4E 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) 4 Deep

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

(5) DIMENSIONS: Diameter of well 20"/16"/8" inches.
Drilled 820 ft. Depth of completed well 538 ft.

(6) CONSTRUCTION DETAILS: 20" removed

Casing installed: 20" Diam. from 1.5 ft. to 377 ft.
Threaded ☐ 16" Diam. from +2 ft. to 451 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 UOP Johnson
Type Watermark Stainless Model No.
Diam. 10 P.S. Slot size 35 from 504 ft. to 535 ft.
Diam. 16 P.S. Slot size 35 from 451 ft. to 471 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel Sand
Gravel placed from 538 ft. to 415 ft.

Surface seal: Yes ☒ No ☐ To what depth? 78 ft.
Material used in seal
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 310 ft.
Static level 128.3 ft. below top of well Date 6-22-84
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? Robinson & Noble
Yield 1570 gal./min. with 87 ft. drawdown after 24 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 6-22 & 23-84
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 sand and gravel in clay matrix	1.5	94
Brown med. to crs. sand with some gr.	94	203
Gray medium to crs sand, some gravel	203	223
Gray fine to med. silty sand with some wood fragments and peat	223	230
Gray silty fine to v. fine sand with varying amounts of wood fragments	230	374
Gray silty clay	374	443
Gray clay with abundant cobbles	443	452
Brown thinly bedded sand with some gravel layers	452	476
Gray-brown fine to medium sand	476	503
Brown medium to coarse sand	503	535
Gray silty clay	535	670
Gray silt and clay	670	717
Gray clay with some gravel	717	725
Gray silty fine sand	725	820

Prepared by:
Robinson and Noble Inc.
Tacoma Wa.

Mike Krautkramer

Work started Mid-April 19 84 Completed July 5 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 Hokkaido Drilling and Dev. Co. (Person, firm, or corporation) (Type or print)

Address Graham Wa.

[Signed] INVENTORY WELL # 53

License No.

(USE ADDITIONAL SHEETS IF NECESSARY)

APPENDIX O

REVIEW OF PUBLIC HEALTH ISSUES

TECHNICAL MEMORANDUM

TO: Parametrix, Inc.

FROM: Environmental and Occupational Health Associates and Ronald Fessenden, M.D., M.P.H.

RE: Health Effects of the Midway Landfill

DATE: May 2, 1986

The purpose of this memo is to address certain public health issues relevant to the Midway Landfill that are not treated in detail in the EIS or in other recent studies. These issues include the determination of whether symptoms reported by residents in the landfill vicinity are actually being caused by the landfill; the effect of odor on health; and potential stress-related effects associated with living in the vicinity of the landfill.

II. DETERMINATION OF CAUSE AND EFFECT

1. 1983 Health Department Survey

On July 11, 1983, the Seattle-King County Department of Public Health released the results of a survey that attempted to determine whether there is any unusual disease or pattern of illness which may be attributed to the Midway Landfill. The survey, which was distributed door-to-door to 173 residents in the vicinity of the landfill, requested information from each household member on health problems believed to be associated with the landfill and any medical treatment received for these problems. The survey also included a consent form for release of information from the

family physician. A copy of the survey form and the news release providing survey results is included in Appendix 1. A total of 74 surveys (42.7%) were returned and usable, representing 197 people living in the vicinity of the landfill. Of those individuals represented, 46.7% reported symptoms in the following decreasing order of frequency: respiratory problems, eye problems, headache, nausea, and allergy. Individuals represented by 28% of the survey forms returned consented to follow-up contact of private physicians by Health Department officials. The existence of health conditions reported on the survey forms was confirmed by the physicians contacted.

Health Department officials concluded that the level of confirmed symptoms reported in the survey did not represent an unusual pattern of illness that could be attributed directly to the landfill. However, Dr. Jesse Tapp, Director of Public Health, stated to the survey participants in his follow-up letter dated July 11, 1983, that "it is not to say that the landfill has had no influence on people's health. The odor that came from the landfill was obnoxious and upsetting. Such an odor and resulting aggravation may have made some symptoms from ordinary illnesses more noticeable, and may have interfered with normal patterns of breathing and relaxation" (Appendix 1).

Though this survey was a reasonable attempt to gather baseline health data from residents living near the Midway Landfill, it cannot be used to quantify, confirm or deny the relationship between reported symptoms and proximity to the landfill. This is not to say that in the absence of such data, no cause and effect relationship exists, but only that this survey cannot provide data on which to establish such a relationship (1). This type of small area analysis must be interpreted with caution and used only to generate hypotheses, since it is very difficult to relate past exposure incidents to present symptoms or illnesses (2).

It is reasonable to assume that the 42.7% respondents to the survey represented a disporportionately higher percentage of individuals with

symptoms than what would have been expected from the total population receiving surveys. Those persons who were interested in responding to the survey most likely had illnesses or symptoms which they associated with living close to the landfill. This observation, coupled with the fact that no unusual pattern of symptoms or disease could be documented in those responding, gives weight to the argument that no direct cause and effect relationship exists between the symptoms reported on the survey and proximity of one's home to the Midway Landfill.

It should be noted that the selection of the 173 homes for survey distribution included homes to the north, west and south of the landfill. However, in the years since the survey was taken, the majority of home evacuations, and homes in which increased methane gas levels have been found, occur in the area east of I-5 and the landfill (3). No surveys were taken outside of the immediate landfill area or in communities with similar environmental conditions, which could have served as a control group population.

2. Fred Hutchinson Cancer Research Center Epidemiologic Data

Data made available from the Fred Hutchinson Cancer Research Center was reviewed for census tracts 288 and 290 in the Midway Landfill vicinity. (Appendix II). A comparison of observed and expected cancers diagnosed between 1974 and 1983 included the following cancer types: Non-Hodgkin's Lymphoma (NHL); Acute Lymphocytic Leukemia (ALL); Chronic Lymphocytic Leukemia (CLL); and pancreatic cancers. The data shows no increase in the observed/expected ratio (O/E) for these types of cancers except for ALL. In fact, the O/E ratio is less than 1.0 for all types of cancer reviewed except for ALL. One case of ALL occurred compared with 0.78 cases expected during this 10-year period. Given the relatively small population in the two census tracts, and the low incidence of cancers expected, little can be concluded from the data regarding cause and effect relationships.

3. Discussion of Cause and Effect Determination

Surveys such as the one conducted by the Seattle-King County Department of Health, and epidemiologic data on observed versus expected illnesses in a given area, are useful in determining whether an unusual pattern of illness, and thus an apparent health hazard, exists. However, they are of limited usefulness in attempting to relate illnesses to specific environmental factors.

The reasons for the difficulty in demonstrating cause and effect relationships include inadequate measurements of toxic contaminants; differences in individual susceptibility and response to the same dose of a particular contaminant; and the difficulty in determining if and when people with symptoms were actually exposed to a contaminant.

Due to these difficulties, in combination with the small at-risk population in the vicinity of the Midway Landfill, it is likely that even the best-designed case study that included a control group population would produce inconclusive results. Although mass screening through physical examination or laboratory examination of tissue may provide some useful information, such screening is generally unacceptable to the public. Furthermore, it would still be difficult to relate observed symptoms to past exposures.

In summary, insufficient data is available from which to draw conclusions about the relationship between living in the vicinity of the landfill and certain documented symptoms and illnesses experienced by nearby residents. In light of the difficulties involved in determining cause and effect relationships, the most effective course of action with regard to public health issues would be continued monitoring of landfill gas, groundwater, and surface water, to determine if there are known health risks associated with the landfill; and taking appropriate corrective action should health risks be identified.

EFFECT OF ODOR ON HEALTH

As discussed on page II-46 of the Draft EIS on the Midway Landfill Closure Plan, residents in the vicinity of the landfill have complained to the Puget Sound Air Pollution Control Agency about unpleasant odors associated with the site. Analysis of samples of unlit flare gas indicate that reduced sulfur compounds, including hydrogen sulfide, probably account for many of the odor complaints. In addition, other compounds such as butanoic acid esters (which combine with water to form butanoic acid), terpenes, and mercaptans may be present at levels sufficient to cause community odor problems.

How and why people detect odors is much debated. However, there is no correlation between unpleasant odor and toxicity. For example, the butanoic acid mentioned above is highly odorous, but of low toxicity. The Seattle-King County Department of Public Health noted that complaints received by Puget Sound Air Quality Control Agency regarding odor levels correlated with the health complaints received by the department. Healthy persons may respond to an unpleasant odor in a psychological manner that triggers a physiological response, such as headaches and nausea. Therefore, the unpleasant odor associated with the landfill may explain many of the health complaints of nearby residents.

STRESS-RELATED EFFECTS

Although the presence of methane gas does not pose a direct health risk to residents living near the Midway Landfill, the knowledge that potentially explosive accumulations of methane may force evacuation of their homes and businesses contributes to individual stress levels. The odor problem, by interfering with normal patterns of breathing and relaxation, may also result in increased stress.

Persons who are at-risk -- meaning those persons who are already suffering from stress from conditions not relating to the landfill -- may show more of an effect from the emotional strain of living near the landfill. For example, persons suffering from allergies, asthma, or neurodermatitis (rashes due to "nerves"); persons who are elderly; or pregnant women, are at higher risk of suffering from stress-related symptoms. These symptoms would not necessarily be due to emissions from the landfill, but rather to stress related to living near it. Typical stress-related symptoms include increased severity of allergies, asthma and rashes, or the onset of such symptoms in previously healthy persons.

REFERENCES

1. Ibrahim, Michael A. Epidemiology and Health Policy. Aspen Systems Corporation (1985), pp. 40-42.

2. Ibid., p. 44.

3. Mausner, Judith, S., MD, and Anita K. Bahn, ScD, MD, Epidemiology - An Introductory Text. W.B. Saunders Company, Philadelphia (1974), pp. 139-145.

Appendix 1

Seattle-King County / DEPARTMEN
400 Yesler Way Seattle, Washingto

RECEIVED JUL 11 1985

JESSE W. TAPP, M.D., M.P.H.
Director of Public Health

FOR FURTHER INFORMATION:
Ben Leifer 587-2798

NEWS RELEASE

July 11, 1983
FOR IMMEDIATE RELEASE

MIDWAY LANDFILL SURVEY RESULTS

A recent survey by the Seattle-King County Department of Public Health did not identify any unusual disease or pattern of illness which could be attributed to the Midway Landfill in Kent. "Survey responses, representing 197 people, suggest that symptoms reported by some nearby residents are due to commonly occurring illnesses which may have been aggravated by the offensive landfill odors," said Dr. Jesse Tapp, Director of the Health Department.

The overwhelming consensus from the surveys is that the landfill odor was upsetting and obnoxious, and that it interfered with the quality of life for many residents. Air sample tests indicate that the sources of smell are traces of hydrogen sulfide (this creates the rotten egg odor) and mercaptans, which are the same bad-smelling compounds also used for recognition of natural gas leaks. Mercaptans smell bad even in very small amounts, but they are otherwise harmless. Hydrogen sulfide can irritate eye tissue, but the traces that have been measured around the landfill are far below the levels that cause eye problems. "The Health Department agrees with the residents that the odors may have interfered with normal patterns of breathing and relaxation," states Dr. Tapp. "Fortunately, the landfill odors are temporary and correctable. We have been working closely with Seattle's Solid Waste Utility to prevent recurrence of this problem," he said.

(MORE)

District Service Centers:

CENTRAL
1500 Public Safety Bldg
Seattle 98104
587-2755

Environmental Health Services
172 20th Ave
Seattle 98122
587-4632

NORTH
10501 Meridian Ave N
Seattle 98133
363-4765

COLUMBIA HEALTH CENTER
3722 S Hudson
Seattle 98118
587-4650

SOUTHWEST
10820 8th Ave S W
Seattle 98146
244-6400

EAST
2424 156th Ave N E
Bellevue 98007
885-1278

SOUTHEAST
Renton
3001 N E 4th St
Renton 98056
228-2620

Auburn
20 Auburn Ave
Auburn 98002
852-8400

NEWS RELEASE July 11, 1983

Twenty-one (21) of 173 surveys granted the Health Department written permission to contact the physicians of residents reporting health symptoms. In talking with these physicians, the existence of the reported health conditions was confirmed, but it was learned that the patterns of reported illnesses correspond to the common variety of conditions seen in medical practice. The physicians did not report any unusual illness or problem thought to be different from the complaints typically seen among their patients. The usual pattern of illness is confirmed by national health statistics (SOURCE: "Patients' Reasons for Visiting Physicians" and "The National Ambulatory Medical Care Survey," both from the U. S. Department of Health and Human Services, 1977-79.) In summary, the illnesses reported do not require a special explanation or suggest a link with the residents' proximity to the landfill. It is likely, however, that the obnoxious odor and stress factors may be responsible for aggravating some common symptoms; understandably, people have felt angry and exasperated.

The Health Department plans to continue sampling the air and water in and around the landfill to detect any possible harmful substances, and to continue requiring the elimination of negative and nuisance conditions. According to Dr. Tapp, "Conditions have, in fact, recently improved at the landfill with the pumping and treatment of the 'black lagoon'." In a letter to the residents who returned a survey, Dr. Tapp also expressed appreciation to those who participated in the Health Department survey, and for honestly sharing their concerns.

DATA SUMMARY

173 surveys distributed (door-to-door) to households, May 19 & 20, 1983
76 surveys returned by mail (self-addressed, stamped envelopes provided)
74 surveys usable (2 surveys were returned blank) (These represent 197 people)
25 surveys reported no one in those households experiencing any health problem attributed to the landfill (these 25 surveys represent 62 people)
49 surveys reported symptoms among some household members (these surveys represent 135 people; of the 135 people in these surveys:
- 92 people were listed as experiencing symptoms
- 43 people did not report symptoms

TOTALS: 105 people reported no symptoms
92 people reported symptoms

Of the 92 people listing symptoms, these conditions were reported in the following order of frequency:

Respiratory problems; eye problems; headache; nausea; allergy. (A variety of other miscellaneous symptoms were also reported by one or two individuals.)

Attachment: Blank copy of survey

-0-

Seattle-King County / DEPARTMENT OF PUBLIC HEALTH
400 Yesler Way Seattle, Washington 98104 (206) 587-4600

May 19, 1983

JESSE W. TAPP, M.D., M.P.H.
Director of Public Health

For further information:
Wally Swofford - 587-2722

BACKGROUND INFORMATION

There have been concerns that there may be substances emanating from the Midway Landfill that could be associated with health problems reported by some area residents. All testing ordered to date by the Seattle-King County Department of Public Health has not identified any substances that could be associated with these reported health problems, which include respiratory problems and eye burning. However, the Public Health Department is distributing a door-to-door questionnaire to approximately 120 residents who live immediately adjacent to the landfill, asking for information on health problems or symptoms they may have experienced. The questionnaire, which also asks for permission to contact the resident's physician, will be used to further investigate whether the Midway Landfill poses a health hazard. Residents are asked to complete and return the survey to the Public Health Department by May 31, 1983, and have been promised that individual responses will be confidential. Overall survey results which do not identify individuals will be shared as soon as they are available.

-0-

Attachment: Survey

District Service Centers:

CENTRAL
1500 Public Safety Bldg.
Seattle 98104
587-2755

Environmental Health Services
172 20th Ave
Seattle 98122
587-4632

NORTH
10501 Meridian Ave. N.
Seattle 98133
363-4765

COLUMBIA HEALTH CENTER
3722 S. Hudson
Seattle 98118
587-4650

SOUTHWEST
10820 8th Ave S.W
Seattle 98146
244-6400

EAST
2424 156th Ave N.E.
Bellevue 98007
885-1278

SOUTHEAST
Renton
3001 N.E. 4th St.
Renton 98056
228-2620

Auburn
20 Auburn Ave
Auburn 98002
852-8400

Appendix 1-4

Seattle-King County / DEPARTMENT OF PUBLIC HEALTH
400 Yesler Way Seattle, Washington 98104 (206) 587-4600

JESSE W. TAPP, M.D., M.P.H.
Director of Public Health

May 17, 1983

Dear Resident:

We are concerned about reports that some people may be experiencing health problems as a possible result of materials in the Midway landfill. You are probably aware that the Department of Public Health, along with other agencies, is investigating whether the landfills pose a hazard. In order to assist us in this investigation, we would like to know if you have any health problems that you believe are caused by the landfill.

We would like to ask you to describe any symptoms or health problems you or a member of your household have which you feel have been caused by the landfill during the past six months. If you do report any problems, we would also like your permission to contact your doctor so that we can gather more information about your condition. All the information given to us will remain strictly confidential. Please complete and return the attached survey in the enclosed envelope as soon as possible, and no later than May 31, 1983. We urge you to respond regardless of how much information you are able to provide.

Thank you for your cooperation. If you respond, we will let you know the results of our investigation.

Sincerely,

Jesse W. Tapp

JWT:BL:k
Attachment

District Service Centers:

CENTRAL
1500 Public Safety Bldg
Seattle 98104
587-2755

Environmental Health Services
172 20th Ave
Seattle 98122
587-4632

NORTH
10501 Meridian Ave N
Seattle 98133
363-4765

COLUMBIA HEALTH CENTER
3722 S Hudson
Seattle 98118
587-4650

SOUTHWEST
10820 8th Ave S.W
Seattle 98146
244-6400

EAST
2424 156th Ave N E
Bellevue 98007
885-1278

SOUTHEAST
Renton
3001 N E 4th St
Renton 98056
228-2620

Auburn
20 Auburn Ave
Auburn 98002
852-8400

SURVEY

Name of person completing this form: _____

Address: _____

Phone: _____

2. Names and ages of all people in your household:

3. Do any household members have any health problems believed to be caused by the Midway landfill? ☐ Yes ☐ No

If yes, please describe these symptoms or health problems which have developed within the past six months:

Name	Problem or symptom	Approx. date problem began	Does this person still have this problem?	What have you done about this problem, if anything?

4. Due to this problem, has any family member listed in #3 seen a doctor, or other health professional, or visited a hospital within the past six months?

☐ YES ☐ NO--→ Why not? _____

IF YES, which family member saw the doctor?

What were the approximate dates of the doctor visits?

What treatment did the doctor recommend?

5. Please complete and sign below if we may contact your doctor:

Doctor's name: _____

Address: _____

Phone: _____

(If you have seen more than one doctor in the last six months, please give us the above information for each doctor seen. If family members have seen different doctors, please list the doctor seen by each member.)

I hereby grant permission to the Seattle-King County Department of Public Health to contact my doctor(s) listed above for purposes of investigating possible health effects of the Midway landfill and other disposal sites. I hereby authorize and request that all doctor(s), medical personnel, and hospitals furnish and release any or all relevant medical information pertaining to me to the Seattle-King County Department of Public Health or their investigator(s). I hold my doctor(s) harmless from all liabilities of any nature from conducting and cooperating in this investigation.

Please sign here: _____

Name (please print): _____

Date: _____

6. If you have any other comments, please share them here.

Seattle-King County / DEPARTMENT OF PUBLIC HEALTH
400 Yesler Way Seattle, Washington 98104 (206) 587-4600

JESSE W. TAPP, M.D., M.P.H.
Director of Public Health

July 11, 1983

Dear Resident:

Thank you for responding to my May 17th survey investigating possible health effects of the Midway Landfill. As promised, this letter is to share with you the findings and results of that survey.

My staff distributed 173 surveys to households in your neighborhood; 76 were returned (2 were blank). There were 74 usable responses, and 25 households, representing 62 people, reported no health effects attributed to the landfill, when asked if they believed their proximity to the landfill had contributed to any health problems. The other 49 survey responses reported a variety of symptoms among some household members. These 49 surveys represented 135 household members, and 92 of these people reported one or more health conditions. In total, these surveys reveal that 105 people did not believe they had experienced health effects due to the landfill, while 92 people reported health problems.

Of the 92 people reporting health problems, 21 respondents grante written permission to contact the doctor of the person(s) with the condition. I, or another physician staff member, called the doctors named in these surveys.

The doctors we talked with confirmed the reported symptoms, but did not report any unusual type of illness. These health problems correspond to the common variety of symptoms seen in medical practice. In other words, the reported symptoms, which included cough, headache, nausea, allergy, eye irritation, and respiratory complaints, are normally and commonly present in the community, especially in winter and spring. The doctors did not observe any illnesses they thought were different from the usual pattern they see among their patients. This pattern of common illness is confirmed by national health statistics.

That is not to say that the landfill has had no influence on people's health. The odor that came from the landfill was obnoxious and upsetting. Such an odor and resulting aggravation may have made some symptoms from ordinary illnesses more noticeable, and may have interfered with normal patterns of breathing and relaxation.

While such an odor is offensive, it would not by itself be hazardous. Air samples so far have revealed that the sources of smell are traces of hydrogen sulfide (the rotten egg odor) and from mercaptans, which are the same

bad-smelling compounds also used for recognition of natural gas leaks. Mercaptans smell bad even in very small amounts, but they are otherwise harmless. Hydrogen sulfide can irritate eye tissue, but the traces that have been measured around the landfill are far below the levels that cause eye problems. Fortunately, landfill odors are temporary and correctable. We have been working closely with Seattle's Solid Waste Utility to prevent the recurrence of these objectionable problems.

Air and water sampling for possible harmful substances will continue, as will the elimination of negative and nuisance conditions. While the survey did not reveal any unusual illness, I appreciate the concern and frustration that many of you expressed, and your candidly sharing this information with us.

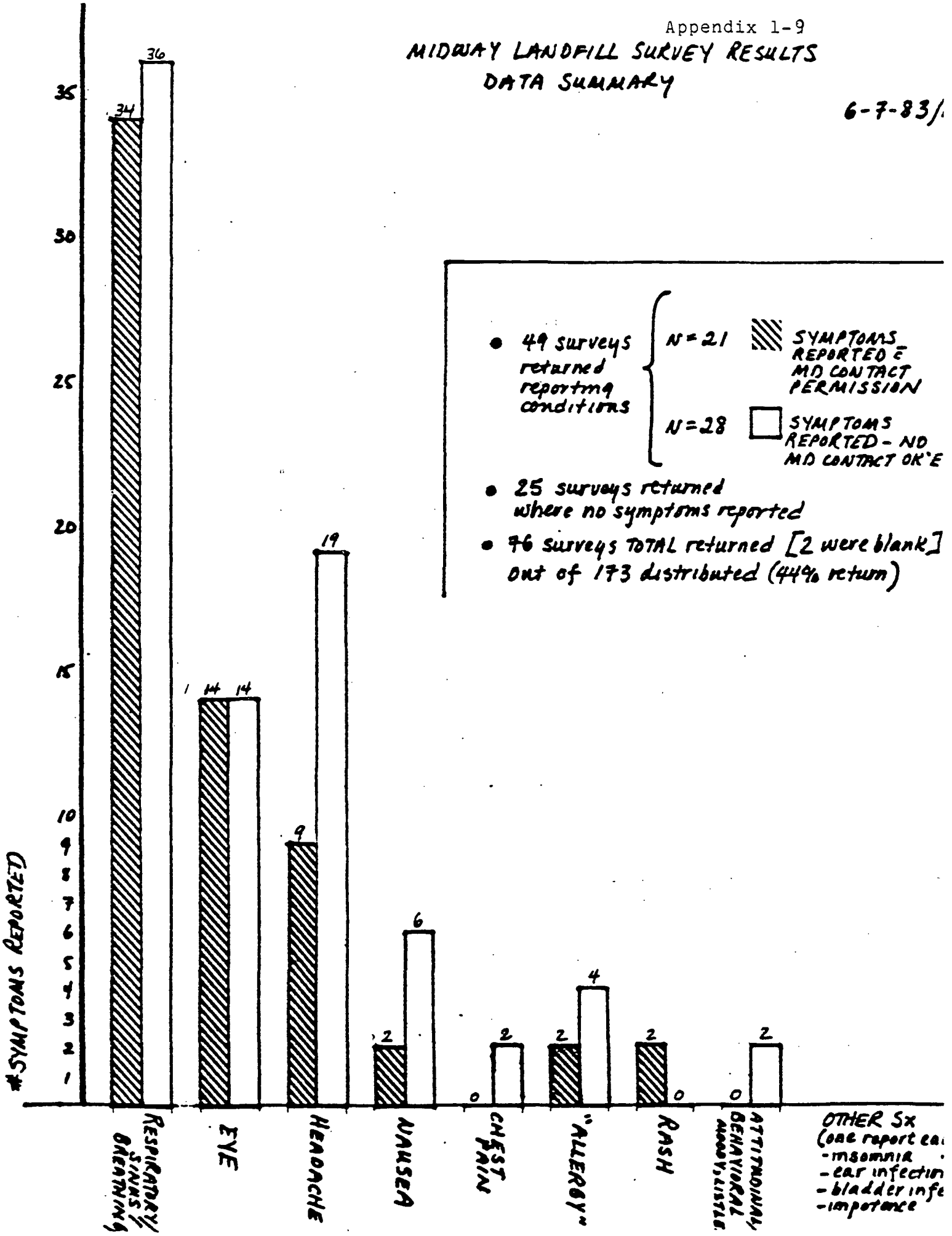
Sincerely,

Jesse W. Tapp

JWT:BL:nr

MIDWAY LANDFILL SURVEY RESULTS
DATA SUMMARY

6-7-83/



Appendix II

THE FRED HUTCHINSON CANCER RESEARCH CENTER

Cancer Surveillance System
(206) 292-2920

1124 Columbia Street
Seattle, Washington 98104

10/31/85

Jesse:

Here are the results produced by the CSS R.A. for Tracts 288 and 290 and King County. Please call me if you have any questions.

Shane.

Note to Lynn Robinson: 11/5/85

this is the source of the cancer registry data for Census tract 290. We requested #288 also for comparison and show #288 on our table too. #288 is north of Des Moines and quite comparable in health status to #290, adjacent to the Midway site

Shane

KING COUNTY
OBSERVED AND EXPECTED CASES
FOR CANCERS DIAGNOSED 1974-83*

	Observed	Expected	O/E
Pancreas	1,181	1,135.3	1.04
**NHL	1,370	1,320.3	1.04
**ALL	111	137.0	.81
**CLL	385	380.2	1.01

*Expected cases based on age-specific incidence rates for 13-county CSS registration area. Figures are for both sexes combined.

**NHL = Non Hodgkin's Lymphoma
**ALL = Acute Lymphocytic Leukemia
**CLL = Chronic Lymphocytic Leukemia

CENSUS TRACT #290
OBSERVED AND EXPECTED CASES
FOR CANCERS DIAGNOSED 1974-83*

	Observed	Expected	O/E
Pancreas	8	8.61	.93
**NHL	9	9.20	.98
**ALL	1	.78	1.28
**CLL	3	3.08	.97

*Expected cases based on age-specific incidence rates for 13-county CSS registration area. Figures are for both sexes combined.

**NHL = Non Hodgkin's Lymphoma
**ALL = Acute Lymphocytic Leukemia
**CLL = Chronic Lymphocytic Leukemia

HEALTH STATUS INDICATORS
1981 - 1983

	BIRTHS (Rate/ 1000)	DEATHS (Rate/ 1000)	CANCER DEATHS (Rate/ 100,000)	IMMATURE BIRTHS (Rate/ 1000 Births)	MAL-FORMATIONS (Rate/ 1000 Births)	INFANT DEATHS (Rate/ 1000 Births)
1981						
King County 1,309,800**	18,376 (14.0)	9,244 (7.1)	2,092 (159)	903 (49.1)	139 (7.6)	178 (9.7)
CT#288 8,895* (51% female)	128 (14.4)	61 (6.9)	16 (180)	5	1	1
CT#290 8,220* (51% female)	135 (16.4)	65 (7.9)	8 (97)	3	0	1
1982						
King County 1,311,400**	18,811 (14.3)	9,714 (7.4)	2,175 (165)	902 (48.0)	146 (7.8)	173 (9.2)
CT#288	134 (15.0)	60 (6.7)	11 (123)	3	0	1
CT#290	160 (19.4)	65 (7.9)	15 (182)	5	1	1
1983						
King County 1,315,800**	18,533 (14.1)	9,749 (7.4)	2,225 (169)	1,006 (54.3)	106 (5.7)	154 (8.3)
CT#288	137 (15.4)	84 (9.4)	15 (168)	10	1	0
CT#290	145 (17.6)	59 (7.2)	10 (122)	12	0	2

---

* 1980 Census
** OFM Estimate

HSI(JWT)
REVISED 10/11/85

Appendix III

City of Seattle
Charles Royer, Mayor

King County
Randy Revelle, Executive

Seattle-King County Department of Public Health
Bud Nicola, M.D., M.H.S.A., Director

January 6, 1986

Mr. Richard Owings, Director
Solid Waste Division
Engineering Department
City of Seattle
Sesattle, WA 98104

Dear Rich:

For the past few months, we have been trying to reach consensus on the action levels for methane in houses around Midway Landfill. Recently, representatives of the Department of Ecology, Kent Fire Department, your utility and the Health Department reached agreement. These criteria are substantially the same as we have been using since last August.

GAS ACTION LEVELS INSIDE HOMES/BUSINESSES

(Methane Gas Readings Taken From the Highest Concentrations Found in a Building Unless Otherwise Noted)

0-50 ppm	Consider Ambient Air; Normal Condition
50-100 ppm	Monitor as Frequently as Staff Size Permits
100-500 ppm	Monitor Daily
500 ppm and up	Monitor Daily, Seal Cracks, Highlight Home on Data Sheet, Request Owner to Ventilate
1000 ppm and up	Verify with 2nd Meter and Methane Unit, Seal Cracks, Install Alarm, Fan, Monitor Daily, Notify Health Department and Kent Fire Dept.
5000 ppm and up in atmosphere	Evacuate, Call 911
10000 ppm and up in wall or small confined space	Evacuate, Call 911
40000 ppm and up	Point Source, Evacuate, Call 911

Because the decision to evacuate is far more serious than other decisions, it deserves special note. Whenever levels are found which meet the criteria for evacuation, the Health Department (business hours) or the Fire Department (after business hours) should be called. The inspector should explain the situation and describe any mitigating circumstances (see attached list by Pete Kmet for examples). At that point, the Health or Fire Department will make a decision. If the decision is to evacuate, a uniformed Fire Department employee should be called by the investigator. If possible, your staff should explain to evacuees that there is a great deal of media interest in their evacuation. We can provide them a list of media contacts. Unless told otherwise, we will keep their name and address confidential.

We are very happy to finalize these criteria. They provide the field staff with the definitive guidelines needed to interpret methane data and they give us flexibility to reach the unusual situation.

Very truly,

Chuck Kleeberg, Director
Environmental Health Division

CK:rb
Att.

cc: Marvin Berg, Assistant Chief
Kent Fire Department
Mark Edens, Seattle Solid Waste Utility
Gale Starr, Seattle Solid Waste Utility
David Bradley, Washington State Department of Ecology

Received 4/30/86

EVALUATION OF POTENTIAL HEALTH EFFECTS ASSOCIATED WITH OFF-SITE GAS EXTRACTION SYSTEMS AT THE MIDWAY LANDFILL

Ad Hoc Committee* on Midway Landfill Hazards
Department of Environmental Health
School of Public Health and Community Medicine
University of Washington
Seattle WA 98195

April, 1986

*David L. Eaton, Ph.D. (Chair), Peter Breysse, M.S., David A. Kalman, Ph.D., Sanford Horstman, Ph.D., Sheldon D. Murphy, Ph.D., Jerry Ongerth, Ph.D., John Wilson, M.D.

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

School of Public Health and Community Medicine
Department of Environmental Health, SC-34

April 22, 1986

Mr. David Bradley
Hazardous Waste Cleanup Program
State of Washington, Department of Ecology
Mail Stop PV-11
Olympia, WA 98504-8711

Dear Mr. Bradley:

As agreed in my letter of February 13, an ad hoc Committee of this department was appointed to review the available information with respect to health risks associated with operating off-site extraction systems, at the Midway Landfill. The report of this committee chaired by Dr. David Eaton, is attached. The areas of expertise represented by the members of this committee include toxicology, industrial hygiene, chemical engineering, environmental chemistry and occupational medicine. The report is a concensus report of the committee. All committee members recognized the very limited information available concerning the specific conditions at the Midway Landfill, and I should reemphasize that the report reflects our analysis and views based upon <u>currently</u> <u>available</u> information.

Sincerely yours,

Sheldon D. Murphy

Sheldon D. Murphy, Ph.D.
Professor and Chairman

SDM:sg

EVALUATION OF POTENTIAL HEALTH EFFECTS ASSOCIATED WITH OFF-SITE GAS EXTRACTION SYSTEMS AT THE MIDWAY LANDFILL

Ad Hoc Committee* on Midway Landfill Hazards
Department of Environmental Health
School of Public Health and Community Medicine
University of Washington
Seattle WA 98195

April, 1986

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The migration of methane gas from the Midway landfill site has become a perplexing public health issue. Although the explosive and flammability hazards associated with methane gas are well known, there appear to be some misconceptions about potential toxicity associated with methane gas, as well as concerns relating to other potentially toxic gases in extraction well emissions. The following report addresses potential human health hazards associated with these gases. The evaluation is severely limited by the small amount of qualitative and quantitative information on gas emissions from this site. However, there does appear to be adequate data from which to draw some general conclusions.

I. The Available Information

At the present time, quantitative information on gaseous emissions from the Midway landfill gas extraction wells is available from three sources:

1). Flare gases analyzed and reported in "Chemical Hazards in Gaseous Emissions from Municipal Landfills, Seattle WA", September, 1985, Environmental Health Special Investigation EHSI 85-001, Department of Environmental Health, University of Washington, Seattle. (on-site flare gas emissions; Appendix 1)

2). Midway Landfill Gas Air Sampling, reported to Mr. Dave Bradley, Washington Department of Ecology, in correspondence from Dr. David Kalman, dated 4 January, 1986 (site-perimeter extraction well composition, Appendix 2).

3). Department of Labor and Industries, report S&H #348125 "Industrial Hygiene Laboratory Results", samples collected 12/23/85; reported to WDOE by Eric Tabb, Industrial Hygienist, and made available to us by Mr. Dave Bradley. (monitoring well and residence samples, Appendix 3).

To the best of our knowledge, these are the only relevant quantitative data available to us for this evaluation. (This same information is also contained in part in the Midway Landfill Closure Plan - Environmental Impact Statment and Technical Appendices, 1986, City of Seattle Engineering Department, Solid Waste Utility). An evaluation of key components identified in these reports follows.

Two major gases, methane and carbon dioxide, are routinely emitted from landfills. In addition, numerous other potentially toxic gases and vapors may be emitted in smaller quantities. This evaluation will proceed by discussing individually each gas identified in the emissions. Where appropriate and available, we have included current recommended occupational and ambient air standards for the pollutants in question.

Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs) refer to airborne concentrations under which it is believed that nearly all workers may be repeatedly exposed day after day (8 - 10 hr per day, 40 hr work week) without adverse effect. Because of wide variation in individual susceptibility, a small percentage of workers may experience discomfort from substances at or below the defined limits; a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness. These limits are intended for use in the practice of industrial hygiene and should be interpreted and applied only by individuals with experitise and training in this area. These limits are not intended for use or

modification for use in the evaluation of community air pollution problems.

The American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE) has adopted a standard entitled "Ventilation for Acceptable Indoor Air Quality". Where available, these values have been provided for specific compounds of interest. For chemicals not covered by the ASHRAE standards, acceptable exposure levels may be estimated from the OSHA PEL standards. For applications to the general population, ASHRAE recommends the concentration of a given contaminant should not exceed 10% of the occupational standard (ASHRAE, 1976).

A. Methane

The explosive and flammable potentials associated with methane gas are well known. Methane is not toxic and is classified as a simple asphyxiant (i.e., at very high concentrations will cause suffocation by displacing oxygen in breathing air). An explosion hazard is not generally present until the concentration of methane in air reaches at least 4.5%. Although the imminent explosive hazard associated with accumulation of methane gas in poorly ventilated spaces should not be underemphasized, there are **essentially no other health hazards associated with methane gas**. At concentrations far in excess of the explosive level (generally in excess of 50%), methane may replace oxygen in the air to the extent that anoxia (lack of oxygen) and asphyxiation occur. If the methane levels, and proportionate levels of other inert landfill gases, are prevented from reaching explosive levels in enclosed spaces, then the opportunity for asphyxiation will not arise.

B. Carbon Dioxide (CO_2)

Although CO_2 levels have not been indicated in any data provided for this review, it is probable that it is present in relatively high concentrations in gaseous emissions from the landfill. CO_2 is not generally considered a toxic substance, but abnormally high concentrations in breathing air may result in adverse health effects. CO_2 is a major by-product of all biological metabolism, including bacterial decomposition of garbage as well as normal human metabolism. It is present in alveolar (deep lung) air at a concentration of 5.3%, and in exhaled breath at a concentration of 3.6% (Guyton, 1971). Normal atmospheric air contains only about 0.04% CO_2. "Dry" ice is composed of 100% CO_2, and may release rather large quantities of CO_2 gas into confined spaces.

Because CO_2 is primarily responsible for physiological stimulation of respiratory centers, excessive concentrations in the blood, which may result from exposure to relatively high concentrations in breathing air, will result in transient but significant adverse effects. At 3% in breathing air, CO_2 is weakly narcotic, and may produce alterations in hearing and an increase in blood pressure and pulse. Because of the effects on pulse and blood pressure, individuals with pre-existing cardiovascular disease may be particularly susceptable to CO_2 concentrations in the range of 3-5%. Excessive stimulation of the respiratory centers occurs at 5% (50,000 ppm), and can result in signs of overstimulation (urgency in breathing, elevation in blood pressure and pulse) after 30 min of exposure at this level. Exposure to CO_2 at 7-10% in breathing air is extremely uncomfortable and can produce unconsciousness in a few minutes. As CO_2 is rapidly eliminated from the body by exhalation and conversion to bicarbonate in the blood, removal of the exposed individual to "fresh" air will result in rapid and complete recovery from symptoms. There are no known

or suspected adverse effects associated with repeated exposures to non-symptomatic levels (e.g. < 1-2%) of CO_2.

The current OSHA PEL for CO_2 is 5000 ppm. The NIOSH recommended TLV is 10,000 ppm (1%), with a 10 minute ceiling of 30,000 ppm (3%). The concentration of CO_2 immediately dangerous to life or health is 50,000 ppm (5%).

C. Benzene

Benzene is widely used in many industrial processes, and can present significant human health problems in the occupational environment. At concentrations in excess of 20,000 ppm in breathing air, benzene is rapidly fatal, producing convulsions, coma and death after 5-10 minutes of exposure. After 30 minutes of exposure to concentrations of about 7,500 ppm, acute intoxication and irritation of the mucous membranes are readily evident (Table 1). Although acute intoxications can occur at these high concentrations, the major occupational concern, and the only concern at exposure levels of benzene possible from the Midway landfill, are associated with chronic exposure to benzene.

Repeated exposure to benzene at concentrations from 25 to 100 ppm has resulted in toxic effects on the bone marrow, including aplastic anemia (lack of red blood cell development), leukemia and other bone marrow disorders. Because there has been an increased risk of leukemia in workers occupationally exposed to benzene, it is recognized by most regulatory agencies as a confirmed human carcinogen. The current OSHA workplace regulation (Permissible Exposure Level, PEL) for benzene is 10 ppm, with a 10 min ceiling value of 50 ppm. However, this level is viewed by many occupational health scientists to not be adequately protective of worker health. NIOSH recommends a 10 minute ceiling level of 1

ppm. OSHA established an emergency PEL of 1 ppm in 1980, but this was overturned by the U.S. Supreme Court, based largely on economic arguments which suggested that such a low level was unfeasible, and that there was insufficient evidence demonstrating an unreasonable risk at the current PEL of 10 ppm. Based on additional evidence, OSHA is again proposing a 1 ppm standard for benzene.

Current scientific theory suggests that there is no absolutely safe level of exposure to any human carcinogen. However, because benzene occurs widely at low concentrations in the general environment, it is useful to compare exposure levels of benzene in Midway Landfill gas extraction well emissions to those of benzene in **ambient air**. Such a comparison may help to put the potential risks of chronic benzene exposure via landfill gas extraction well emissions in perspective with other common sources of benzene exposure.

Based on the data cited previously, the highest concentrations of benzene in effluent gases occurred in the flare gas samples obtained on-site, and ranged from 2.7 - 13.6 ppm, approximately at the level of the occupational PEL for benzene. (Table 1). Concentrations of benzene in gaseous emissions from vent wells located off-site at the perimeter of the landfill were from 0.008 to 0.025 ppm. An extensive study of indoor air sponsored by the Environmental Protection Agency (Zweidinger *et al.*, 1983; Wallace *et al.*, 1985; Pellizzari *et al.*, 1985) reported the **average** ambient indoor air concentration of benzene to be from 0.003 to 0.010 ppm with levels in excess of 0.025 ppm not uncommon. Average ambient **outdoor** air concentrations were generally lower than indoor air by about a factor of 2. Thus, it appears that the concentrations of benzene detected in **perimeter** (off-site) vent wells were approximately equivalent to levels found routinely in indoor air (Table 1).

The lower values of benzene relative to methane in the perimeter wells is not unexpected because, in contrast to methane, benzene will strongly adsorb to organic material in soil and thus would not migrate in the same proportion as methane away from the landfill. This is supported by the limited data available. As the concentrations of benzene in vent gas off-site are not in excess of ambient indoor levels of benzene, and because at least a 6000 fold dilution of benzene in air would result 40 - 70 meters distant from the gas vent, it is extremely unlikely that emissions of benzene from the extraction wells add significantly to the background level of benzene exposure. There is no process that would cause benzene to accumulate to any significant extent in enclosed areas where methane has been discovered (e.g. basements of residences), because the proportion of benzene in migrating landfill gases represents the upper limit of benzene in air from landfill sources. Limited sampling of residences has failed to find benzene even where relatively high levels of methane have been found, although the detection limits (0.1 ppm) were not adequately low to detect statistically significant increases above background benzene concentrations.

Because of the relatively low levels of benzene emitted from the gas vents (compared to other common environmental releases, e.g. gasoline vapors, auto exhaust, etc.; see Carcinogens Assessment Group, 1979) and the large dilution that results upon disperison into the environment, it is unlikely that ambient air monitoring for benzene or other organic vapors would produce any significant information about the contribution of landfill vent gas emissions to ambient levels of volatile organics such as benzene.

D. Hydrogen Sulfide (H_2S):

H_2S is a gas of high acute toxicity; at concentrations in excess of 2000 ppm, death will result within 20 min, and concentrations in excess of 300 ppm may result in unconsciousness after 20 min of exposure (Table 2). H_2S is a highly irritating gas, and relatively low concentrations (10 - 25 ppm) may result in irritation of the eyes, headache, loss of appetite and dizziness after prolonged exposure (in excess of several hours; NIOSH, 1977). The current WISHA PEL is 10 ppm, which is a factor of 2 lower than the federal OSHA PEL of 20 ppm. NIOSH recommends an exposure level of 10 ppm as a ceiling for a 10 minute exposure period. ASHRAE has adopted an indoor air quality guideline for H_2S of 0.03 ppm.

Although there is little quantitative data to suggest that chronic exposure to low levels (e.g. < 0.1 ppm) of H_2S represent a health threat, in one reported instance of urban air pollution an increase in reports of eye irritation, sore throat and sleep disturbances was noted. The concentrations of H_2S in this episode varied from 0.002 to 8 ppm over a period of 2 months. The authors concluded that concentrations of H_2S below 1 ppm may result in eye and respiratory tract irritation, may have adverse effects on sleep and appetite, and at low concentrations may pose a danger to individuals with heart or lung disease (NTIS PB 227 486, 1964, as cited in NIOSH, 1977). The relative contribution to the observed health effects of other air pollutants and/or interactions of other pollutants with H_2S was not discussed.

There are few reports indicating background levels of H_2S in the urban environment. However, because it is commonly formed and released in a variety of industrial processes, in auto exhaust and cigarette smoke, and by natural processes associated with decay of organic matter, it is likely to be present commonly at low levels in our environment. Because H_2S has a very strong, disagreable odor which is detected by most people at very low concentrations (0.005 ppm is often cited as the odor threshold), it is usually

detected long before hazardous levels are reached. However, high concentrations of H_2S may result in rapid fatigue of the ability to smell it, and some individuals are congenitally unable to smell it; thus one should not rely on the lack of this odor as an indication that it is not present at hazardous levels, especially in the work-place where high concentrations could occur. Conversely, because the odor threshold is very low in most individuals, the presence of the characteristic "rotten eggs" odor is not necessarily indicative of H_2S concentrations that may be hazardous. While exposures to low concentrations of H_2S are not likely to produce toxic effects in the traditional sense, some individuals may experience nausea and loss of appetite because of the obnoxious odor detectable at very low concentrations.

The concentration of H_2S in flare gas samples taken from the Midway landfill ranged from 1 - 18 ppm. These levels are clearly above the odor threshold, and approach levels that have been associated with irritation of the eyes and mucous membranes. H_2S is a highly reactive substance and will combine with water, forming insoluble sulfides and acid sulfates. For this reason, it does not migrate effectively through moist soil, and would not be expected to occcur in vent gases off-site much beyond the landfill area. This has generally been confirmed in the limited samples of off-site vent gas that have been analyzed for H_2S. In each of four samples of off-site vent gas analyzed, H_2S was below the limit of detection of 0.1 ppm. H_2S was also not detectable in any of the residential basement gas samples collected, although again the detection limit (1 ppm, based on a different field method with a higher limit of detection than used in the laboratory study cited previously) was inadequate for measurement of low levels that could conceivably occur.

E. Aromatic Hydrocarbons (other than benzene)

Aromatic hydrocarbons other than benzene (e.g. toluene and xylenes) have also been identified in gaseous emissions from the vent gases, but generally at concentrations below what have been identified routinely in ambient air (Table 3). At the concentrations identified in the vent gases (< 0.024 ppm), there are no known or suspected adverse health effects that could arise from chronic exposure to toluene or xylene. Because of their widespread use as solvents in paints, varnishes, glues and other household products, exposure from vent gas emissions could be expected to be totally insignificant relative to these other common sources.

F. Methylene Chloride

Methylene chloride was identified in samples generally in the range of 0.1 - 0.5 ppm (Table 3). These values are considerably above ambient levels (0.001-0.004 ppm), but are generally far below levels associated with any known adverse health effect. The current OSHA PEL for methylene chloride is 500 ppm; the American Conference of Governmental Industrial Hygienists (ACGIH) recommends a TLV of 100 ppm, and ASHRAE recommends an indoor level of 42 ppm. Recent evidence has suggested that at high doses methylene chloride may be carcinogenic in experimental animals, and thus it is possible that acceptable exposure levels, including the OSHA PEL, will be reduced. The relevance of these studies to low dose exposures in humans has been challenged on a pharmacokinetic basis because the high doses used in the animal studies (2,500 and 4,000 ppm 8 hr/day, 5 day/week for lifetime) resulted in dose-dependent metabolism that was different than occurs at lower doses (Reitz *et al.*, 1986). In light of several negative studies at somewhat lower doses, the carcinogenicity of methylene chloride is still at issue.

G. Trichloroethylene

Trichloroethylene (TCE) was also identified in off-site vent gases at a concentration of 0.005 - 0.05 ppm. These values are far below concentrations known to produce any adverse health effects in humans, and are generally within the range reported for ambient indoor levels of TCE (Table 3; Zweidinger et *al.*, 1983; Wallace *et al.*, 1985). Lifetime feeding studies of TCE have resulted in excess liver tumors in mice, but not rats, and thus TCE is generally classified as a potential human carcinogen (NIOSH, 1978). Although a number of epidemiologic studies have examined the carcinogenic potential for TCE in humans, at present it is not possible to draw definite conclusions from these data because of the very limited power of the studies. However, because some studies did report elevated, though not statistically significant, proportionate mortality ratios (PMRs) for some types of cancer in TCE (and other chlorinated hydrocarbons) exposed workers (Blair, *et al.*, 1979; Milham, 1983), further studies are necessary before a definitive conclusion on the carcinogenicity of TCE in humans can be made.

The current OSHA PEL for TCE is 100 ppm (8 hr time-weighted average), whereas NIOSH recommends a limit of 25 ppm, and ASHRAE recommends an indoor level not to exceed 3 ppm for 30 minutes, or 0.9 ppm for 24 hr.

H. Acetone

Acetone was identified in some vent gas samples at relatively low concentrations (Table 3). Acetone is considered one of the safest of all organic solvents, and exposure to acetone at the levels identified pose no conceivable health risks. The current

PEL for acetone is 1000 ppm, based largely on irritation of the eyes and mucous membranes at this high concentration.

I. Vinyl Chloride

Recent data, which have not been analytically verified and thus are not included in the appendices to this report, have indicated that vinyl chloride may be present in gaseous emissions from vent wells. Vinyl chloride monomer (VCM) is recognized as a human carcinogen based on epidemiologic studies in worker populations with relatively high levels of exposure. Although the precise concentration of VCM in Midway landfill vent well gases has not been verified, it appears that the concentration range is from 0.004 to 1 ppm. The EPA has estimated the carcinogenic potency of VCM to be roughly equivalent to that of TCE. This comparison is difficult, however, because the potency factor determined for VCM is based on human epidemiologic data, whereas the potency factor for TCE is estimated from laboratory animal (mouse) studies. To assess the potential health significance of VCM in the landfill gases, it will be important to further ascertain the actual concentrations of VCM in vent gas. The current Federal OSHA PEL is 1 ppm, with an action level of 0.5 ppm. All workers exposed to VCM concentrations above the action level are required to undergo medical surveillance.

II. Public Health Significance of Chemicals Identified

The preceding section has discussed the concentrations of various gases found in vent gas associated with the Midway landfill, and has provided some background information on the known or suspected toxicologic effects of these gases. Interpretation of these values for public health significance requires numerous

assumptions, as outlined in the following section.

A. Factors and assumptions used to interpret air analysis data.

1). The completeness and reliability of the analytical data:

To date, relatively little external review or inter-laboratory verification of air measurements has occurred. This need is currently being addressed though contracts between WDOE and commercial laboratories. Continued attention needs to be directed at ensuring the accuracy of field sampling and measurements, and in characterizing the potential variation in contaminant levels in off-site emission sources resulting from meterological, geographic, or other variable conditions. The present data appear to be consistent with reports of other landfill sites, and are internally consistent. For the present purposes, the reported levels are presumed to be valid.

2). Variation in gas composition between on-site and off-site (perimeter vent wells and residential samples) gaseous emissions:

For all gaseous emissions other than methane, considerably lower levels are found in off-site vent wells relative to on-site vent wells. This is not surprising, as the underground transport of these gases provides many opportunities for the relative composition of chemical mixtures to change. This change in composition reflects environmental distribution processes that are predictable based on fundamental chemical properties of the individual agent(s).Thus, selective reduction in relative concentrations would be expected for those components that: (a) are of lower volatility; (b) are of higher water solubility; (c) have

reactive chemistry; (d) have chemical affinity for solids and/or organic components of soil. According to these criteria, methane should be the least affected of all of the gases found in on-site samples. Therefore, the reduction of minor components such as benzene, H_2S and chlorinated organic compounds relative to methane is expected. For this reason, the samples most appropriate to represent off-site emissions of migrating landfill gas are those taken in off-site (community) extraction wells. It is a theoretical, albeit unlikely, possibility that the capacity of soil to remove components of migrating gas could become saturated, resulting in increases in contaminant levels relative to methane over time. This provides additional rationale for continued surveillance of extraction well gas composition.

3). Dilution factors for gas extraction well emissions:

It is important to realize that the majority of data on which this analysis is based represent samples taken directly from the vent wells, and thus represent the absolute maximum concentrations that could be expected to occur. There are two different considerations necessary for interpretation of these data: 1) that exposure occurs via inhalation of the vented gas after it is dispersed into the surrounding atmosphere, and 2) that extraction well effluents represent the upper limits of potential gas concentrations that might accumulate in enclosed spaces (e.g. garages or basements). For each of these conditions, dilution of the migrating landfill gases will occur.

To consider dilution of vent well emissions, available data on emission rates, stack height and other physical parameters of the vent wells were used to construct air dispersion models (appendix 4). These models have predicted that, under

"worst-case" atmospheric conditions, a minimum dilution factor of about 6000 to 7000 for emission gases in breathing zone air would result at a point 40 to 70 meters from the stack (appendix 4). At distances closer or further away than this, the dilution factors are considerably greater. This means, for example, that if benzene were emitted from the vent well at a concentration of 0.025 ppm (80 $\mu g/m^3$; the highest concentration found in off-site vent wells), the concentration of benzene from this source in breathing air would not be greater than 0.003 ppm (0.01 $\mu g/m^3$), which is approximately equal to the "normal" ambient concentration of benzene in outdoor air. In most instances (e.g. other distances from the source or different gas flow velocities and temperatures), this dilution factor is 3-10 times greater than the 7000-fold dilution factor used for this calculation (appendix 4).

The second circumstance, where stack emissions are used to represent the maximum gas concentration theoretically obtainable in enclosed spaces, does not readily lend itself to air dispersion modeling because of many site-specific variables. However, as **enrichment** of potentially toxic gases relative to methane is not possible, one can estimate the upper level of these gases that could occur in confined areas. If **all** of the room air were replaced with landfill gas (e.g. assume **no** air exchange, which is extremely unlikely) then the upper limit of exposure to potentially toxic gases is simply the highest concentration of each particular gas found in the off-site vent wells. However, total room air replacement with landfill gas would result in an essentially anoxic environment and thus repeated or prolonged exposure under such highly improbable circumstances would not be possible. Under these extreme conditions, assuming a concentration of methane of 45% in landfill gas, an absolute upper limit of 0.025 ppm for benzene, less than 0.1 ppm for H_2S, 0.47 ppm for methylene

chloride, and 0.05 ppm for TCE can be estimated.

A more meaningful worst-case estimate can be considered using information on the highest methane gas levels reported in enclosed spaces. The highest indoor methane concentration reported is approximately 10 fold less (*i.e.* ~ 5%) than the methane concentration in vent well emissions. Thus, it appears that under the worst-case conditions consistent with the possibility of repeated or prolonged exposure, concentrations of benzene, H_2S and TCE would be considerably less than about 0.01 ppm, and methylene chloride below 0.050 ppm, if methane concentrations were held below the explosive level of 4.5%. This upper level concentration of 0.01 ppm will be used to make some general statements about the health significance of these landfill gases.

B. Upper level risk estimation for potentially carcinogenic chemicals:

It is apparent from the available data and previous discussion that, with the possible exception of secondary effects (*e.g.* loss of appetite) due to obnoxious odors and possible respiratory stimulation from accumulation of CO_2 in enclosed spaces, acute health effects from the potentially toxic gases identified in the landfill extraction well emissions are extremely unlikely to occur. However, several chemicals which are classified as confirmed or suspected human carcinogens have been identified in the landfill gas emissions. As there theoretically is no absolutely safe level of exposure to a carcinogen, some discussion of the significance of these gases to potential future human health impacts is warranted.

The EPA has developed a risk assessment model for predicting cancer risks associated with low level exposures to potentially carcinogenic chemicals. Using available scientific data, the EPA has

constructed a set of values for numerous potential carcinogens, referred to as "Unit Risk" factors, which can be used to judge the upper levels of cancer risk that might be associated with lifelong exposure to the chemical (Anderson, 1983). There are many inherent assumptions in the model, the most important of which are: 1) exposure is defined to occur for 24 hr a day, every day of ones life from age 0 to 70; 2) all of the breathing air is contaminated at the defined level of exposure; 3) the mathematical model used to extrapolate laboratory or epidemiologic data to low doses is conservative, and is intended to represent the upper bounds of risk, rather than an actual expected level of risk. Because of this last assumption, it is most appropriate to look at the calculated level of risk as representing the **upper limit** of anticipated effects, recognizing that the **actual** level of risk (in this case excess cancers) is somewhere between zero and the determined value.

The EPA Unit Risk factor is defined as the upper bound of excess cancers that might result after lifelong exposure to 1 µg of chemical per cubic meter of air (Anderson, 1983). The EPA Unit Risk values for three of the potentially carcinogenic chemicals in question (no value is available for methylene chloride), and the corresponding upper level of risk for lifelong exposure to 0.01 ppm of each of these chemicals identified in landfill gases, are presented in the following table:

Chemical	Unit Risk	1 ppb equiv.	Risk/million	
			0.0025ppm	0.01 ppm
Benzene	7.4×10^{-6}	3.2 µg/m^3	95	237
TCE	4.2×10^{-6}	5.3 µg/m^3	56	223
VCM	4.1×10^{-6}	2.6 µg/m^3	27	107

From these calculations, and making a further conservative assumption that these risks are additive,the maximum additional cancer risk that might result from lifelong exposure to these gases is projected to between 0 and 567 additional cancers per million

exposed to each of these chemicals at 0.01 ppm for a lifetime. If methylene chloride were considered to be a potential carcinogenic threat, then the theoretical upper limit of risk would be increased accordingly. As the **denominator** in this upper limit risk estimation represents only individuals who meet the conditions of exposure (i.e. live in a house containing explosive levels of methane and associated gases daily for 70 years), it is very unlikely that even one additional case of cancer will ever occur in the Midway community as a result of these landfill gases.

It should be recognized that the risk estimates shown above for Midway landfill gases are based on highly unlikely assumptions, and that for any given individual, the chances of developing cancer from exposure to landfill gas are very likely much smaller than these values. For example, if the average concentration of each of these gases were 0.001 ppm (still likely to be an **overestimate** of **average** exposure relating solely to landfill gas), and you lived in the area for 35 years, spending two-thirds of your time at home, then your theoretical risk would be reduced to an upper level of 20 per million. Furthermore, the estimated level of risk, even if viewed as unacceptable, is likely to be insignificant compared to the background cancer risk in the general population. For example, it has been estimated that the lifetime risk of dying from lung cancer for cigarette smokers (pack a day) is about one in 10, and eating 100 charcoal broiled steaks over a lifetime has an estimated additional lifetime cancer risk of about 70 per million. Many other relative risk estimates have been made using similar methods, and generally support the notion that the risk estimates determined for landfill gases are insignificant compared to other common sources of potentially cancer-causing chemicals.

SUMMARY AND CONCLUSIONS

Based on the limited data available, none of the gaseous emissions in the off-site extraction wells at the Midway landfill that have been identified to date, other than methane, appear likely to represent a significant direct threat to the health of the potentially exposed population. Although the available data include the vast majority of known chemicals anticipated to be in landfill gases which might pose a major health concern, it is possible that compounds not analyzed for may be present. As all potentially unidentified compounds are subject to the same dilution factors as described for the identified emissions, it is unlikely that unidentified gases could result in adverse health effects. This conclusion is not intended to minimize the seriousness of the methane gas problem. Periodic sampling and analysis of vent gases for volatile trace organics should be continued to ensure that the preliminary data upon which this report was based accurately reflect the nature of the gaseous emissions associated with the Midway landfill site. Verification of exisiting laboratory data, where needed, should also be obtained.

It is unlikely that ambient air monitoring in the vicinity of the landfill would result in meaningful data, as vent gas concentrations of volatile organics would be diluted to background levels within a very short distance from the effluent source. As the modeling for atmospheric dilution factors (appendix 4) considers "worst-case" atmospheric conditions, ambient air monitoring under inversion conditions also would not likely result in significant differences from background levels. Ambient air samples collected under such conditions may be of use in verifying the predictions of the model.

Consideration should be given to developing a plan of action to identify and respond to the potential failure of vent well pumps so that gaseous emissions do not accumulate in enclosed spaces or poorly ventilated areas during prolonged periods of pump failure.

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TABLE 1

BENZENE

CONCENTRATION	DURATION	EFFECT
20,000 ppm	(5-10 min)	Convulsions, coma, death
7,500 ppm	(0.5 - 1hr)	toxic effects (brain, mucous membranes)
>100 ppm	(Weeks - months)	frequent blood cell changes
25-100 ppm	(months - years)	possible blood cell changes; possible increase in leukemia
2.7 - 13.6 ppm	**FLARE GAS CONCENTRATIONS AT MIDWAY**	
10 ppm	(daily TWA)	"old" Permissible Exposure Level (PEL)
1 ppm	(daily TWA)	Emergency PEL (May, 1977); to be adopted as new PEL.

0.010 ppm average (0.16 ppm, high) ambient indoor air concentration

0.006 ppm average (0.06 ppm high) breath concentration

0.003 ppm average (0.03 ppm, high) ambient outdoor air concentration

0.008, 0.015, 0.025 ppm - 3 CITY GAS VENTS - OFF SITE

0.008 ppm - CITY GAS VENT - OFF SITE - DOWNWIND

0.004 ppm - UPWIND FROM CITY GAS VENT

TABLE 2

HYDROGEN SULFIDE (H_2S)

Concentration	Duration	Effect
2000 ppm	< 20 min	Death
1000 ppm	< 25 min	unconsciousness, convulsions, pulmonary edema
300 - 550 ppm	20 min	unconsciousness, low blood pressure
15 - 25 ppm	-	burning eyes, headache, loss of appetite, dizziness
10 - 15 ppm	4 - 7 hr	conjunctivitis (swelling of membranes around eyes)
10 ppm	daily TWA	WISHA PEL (OSHA = 20 ppm)
1 - 18 ppm	**FLARE GAS CONCENTRATION ON MIDWAY SITE**	
0.002 - 8 ppm	over 2 months	intermittent nausea, headache, sore throat, eye irritation, sleep disturbances. (Air pollution episode in Taure-Hutte, IN)
< 1 (0.005) ppm	approximate odor threshold in most people (other odors may mask H_2S, and individuals often become insensitive to odors after repeated or prolonged exposure)	
< 0.10ppm	**UNDETECTED IN 4 OFF-SITE SAMPLES WITH RELATIVELY HIGH METHANE CONC.**	
	Ambient data not available	

TABLE 3

OTHER GASES IDENTIFIED IN OFF-SITE GAS VENTS

Gas	Vent Conc.	Ambient Conc.	PEL
Methylene Chloride	0.14 - 0.47 ppm	0.001 - 0.004 ppm	500 ppm
Trichloroethylene	0.005 - 0.05 ppm	0.001 - 0.262 ppm	100 ppm
Toluene + xylenes	<0.003-0.024 ppm	0.02 - 0.95 ppm	100 ppm
Acetone	<0.03 - 0.155 ppm	not available	1000 ppm

Appendix 1 -- Excerpt from "Environmental Health Special Investigation: Chemical Hazards in Gaseous Emissions from Municipal Landfills", EHSI 85-001, September, 1985.

Midway Inorganic Gas Results (5/17/85)

	Flare #5	Flare #25
Combustible Gas	34%	36%
CO Detector Tube	10 ppm	30 ppm
H_2S Detector Tube	1 ppm	18 ppm
H_2S Colorimetry	0.9 ppm	17 ppm
HCN Ion Chromatography	<0.33 ppm	<0.03 ppm

Notes: Flare #13 was sampled for organic gases only; no HCN detector tube measurements were made.

Midway Landfill Summary

Source:	Laucks	TOAC	TOAC	TOAC
Location:	Midway	Midway	Midway	Midway
Site:		Flare #5	Flare #13	Flare #25
Date Sampled:		5/17/85	5/17/85	5/17/85

Compounds	Concentration							
	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)
Acetone	0.28	0.67	0.47	1.11	0.27	0.63	0.93	2.22
1,2-Dichloroethane	0.07	0.28	N.D.	N.D.	N.D.	N.D.	0.57	2.29
Benzene	0.02	0.05	5.66	16.97	2.70	8.11	13.57	40.70
Isooctane	N.R.	N.R.	0.83	3.89	0.36	1.67	1.98	9.31
Trichloroethylene	0.05	0.27	N.D.	N.D.	N.D.	N.D.	22.59	122.09
Toluene	0.42	1.57	1.63	6.09	1.95	7.31	37.00	138.58
Octane	N.R.	N.R.	2.45	11.86	1.14	5.51	4.32	20.89
Tetrachloroethylene	0.05	0.34	1.02	6.84	0.73	4.89	1.26	8.47
C_2 Benzenes	0.63+ 0.57	5.22	20.38[1]	88.62	5.18[1]	22.50	43.79[1]	190.40
Nonane	N.R.	N.R.	6.20	32.45	4.17	21.85	6.01	31.49
1,1,2,2-Tetrachloro-ethane	N.R.	N.R.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Limonene	N.R.	N.R.	7.68	42.67	3.83	21.25	5.07	28.17
$C_{11,13,14,15}$)	N.R.	N.R.	2.40	15.26	0.48	3.05	1.20	7.63
Chlorobenzene	<0.01	<0.05	Trace	Trace	N.D.	N.D.	Trace	Trace
Methylene Chloride	0.17	0.59	0.76	2.66	0.46	1.60	3.05	10.65
4-Methyl-2-Pentanone	0.79	3.25	Trace	Trace	N.D.	N.D.	Trace	Trace
2-Butanone	0.13	0.38	Trace	Trace	N.D.	N.D.	Trace	Trace
1,1,1-Trichloroethane	0.17	0.93	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chloroethane	0.04	0.10	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chloroform	<0.01	<0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1-Dichloroethane	0.18	0.73	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dichloroethylene	0.21	0.83	N.D.	N.D.	N.D.	N.D.	Trace	Trace
1,1-Dichloroethylene	0.01	0.04	N.D.	N.D.	N.D.	N.D.	Trace	Trace
1,2-Dichloropropane	0.01	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D. - Not Detected
N.R. - Not Reported
Detection Limit = 0.15 mg/m^3 @ 49 L
[1] C_2 Benzenes include Xylene Isomers & Ethyl Benzene

Appendix 2 -- Data communicated to Mr. Dave Bradley from Dr. David Kalman on January 4, 1986

Midway Landfill Summary

Source:	Laucks	TOAC	TOAC	TOAC	BLACK & VEATCH
Location:	Midway	Midway	Midway	Midway	Midway
Site:		Flare #5	Flare #13	Flare #25	"Area 1"
Date Sampled:		5/17/85	5/17/85	5/17/85	1/23/86

Compounds	Concentration								
	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)	(ppm)	(mg/m^3)	(ppm) (est)
Acetone	0.28	0.67	0.47	1.11	0.27	0.63	0.93	2.22	0.43 +
1,2-Dichloroethane	0.07	0.28	ND	ND	ND	ND	0.57	2.29	
Benzene	0.02	0.05	5.66	16.97	2.70	8.11	13.57	40.70	0.74 +
Isooctane	NR	NR	0.83	3.89	0.36	1.67	1.98	9.31	
Trichloroethylene	0.05	0.27	ND	ND	ND	ND	22.59	122.09	17.8
Toluene	0.42	1.57	1.63	6.09	1.95	7.31	37.00	138.58	7.97
Octane	NR	NR	2.45	11.86	1.14	5.51	4.32	20.89	
Tetrachloroethylene	0.05	0.34	1.02	6.84	0.73	4.89	1.26	8.47	
C_2 Benzenes	0.63+ 0.57	5.22	20.38[1]	88.62	5.18[1]	22.50	43.79[1]	190.40	29.5

("+" indicates probable losses through sorbent tube)

SAMPLE LOCATION	SAMPLE ID	PEL, PPM >>> % STANDARD RECOVERY	<<<<<<<<<<<<<<<<<<<<<<<<<< 1000.0 acetone	500.0 methylene chloride	RESULTS 10.0 benzene	(PPM 100.0 TCE	in 200.0 toluene	AIR) 100.0 xylenes	>>>>>>>>>>>>> 500.0 total FID response
UPPER LIMIT OF QUANTITATION		100.0	0.969	1.671	0.909	0.937	1.037	0.865	1.1
LOWER LIMIT OF QUANTITATION		100.0	0.007	0.034	0.001	0.007	0.006	0.006	0.0
PRIOR (1/10/86) WELL SAMPLE	97-10-2F	80.4	0.589		0.087	0.024	0.037	0.089	0.7
1-FIRE STATION FRONT	97-29-1F	111.4	0.155	0.471	0.025	0.030			*89.8*
DOE DEEP PROBE BACK	97-29-1B	87.9	0.082	0.083	0.009		*0.004*		0.1
2 REPLICATE SAMPLE FRONT	97-29-2F	113.2	0.136	0.236	0.017	0.015			*29.5*
OF SITE #1 BACK	97-29-2B	192.0	0.023		0.012				0.2
3-20059 35th Ave S. FRONT	97-29-3F	178.5	0.098	0.228	0.008	0.005			*154.4*
CITY WELL BACK	97-29-3B	166.2			0.009		*0.003*		0.6
4-MIDWAY AREA 1 FLARE FRONT	97-29-4F	87.4	0.042	0.149	0.059	0.849	•	•	*2139.0*
(replicate analysis of front)	97-29-4Fr	154.1	0.041	0.189	0.071	*0.877*	•	•	*2069.7*
(dilution of front)	97-20-4Fd	75.4					2.682	19.509	239.7
SITE #4 BACK	97-29-4B	94.3	0.018	0.137	0.065	*1.424*	*1.590*		*389.5*
5-MIDWAY FLARE BACKUP FRONT	97-29-5F	103.4	0.133	0.938	0.419	*9.367*	•	•	*446.4*
(replicate analysis of front)	97-29-5Fr	124.1	0.124	0.986	0.421	*9.583*	*1.792*	•	*456.9*
(dilution of front)	97-29-5Fd	80.3				5.946	3.684	9.957	71.9
SITE #5 BACK	97-29-5B	95.1	0.238	0.158	0.192	0.229	0.011	0.016	*8.4*
6-UPWIND AMBIENT AIR FRONT	97-29-6F	114.3	*0.006*		0.004	*0.005*	*0.006*	*0.005*	0.1
25031 35th Ave S BACK	97-29-6B	95.4			0.001	*0.005*	*0.004*	*0.005*	0.2
7-CITY PROBE GAS FRONT	97-29-7F	139.6	0.055	0.229	0.015	0.051	0.024		*1419.9*
25031 35th Ave S. BACK	97-29-7B	106.4	0.084	0.261	0.009	0.023	0.011		*12.0*
8-DOWNWIND AMBIENT FRONT	97-29-8F	179.8	*0.003*		0.008				0.4
25101 35th Ave S. BACK	97-29-8B	91.4			*0.001*		*0.004*		1.2

EXTRAPOLATED (OUT OF RANGE) RESULTS ARE ITALICIZED

Appendix 3 -- Data communicated to Mr. Dave Bradley from Mr. Eric Tabb, Industrial Hygienist for the Department of Labor and Industries, regarding residence sampling results in Midway area.

STATE OF WASHINGTON

DEPARTMENT OF LABOR AND INDUSTRIES

WA Department of Ecology
Kent Highlands Locations

S&H #348125
Eric Tabb, Industrial Hygienist
T-1286

Industrial Hygiene Laboratory Results

At the request of the Washington State Department of Ecology and the Seattle Engineering Department quanitative analyses of gas bag samples were made, taken from various monitoring wells and residences in the Kent Highlands vacinity. The analyses were conducted using gas chromatography at the Olympia Department of Labor and Industries Laboratory.

Sample #1. Hines Residence. Under basement stairs. Collected 12/23/85.
0.092% Methane
No Hydrogen sulfide detected - 1ppm DL
No detectable Benzene (<0.1 PPM)
No other organic vapors detected.

Sample #2. Monitoring well near 3535 So. 252nd. Collected 1/8/86. (Probe #61
3.5% Methane
ND Benzene
No other organic vapor detected.

Sample #3. Woecks Residence. 24820 38th Ave., So. Collected 1/14/86.*
3.8% Methane
ND Benzene
No other organic vapors detected.
Not enough sample for Mercaptan assay.

Sample #4. Miles Residence. 25410 34th Pl. Collected 1/14/86.*
0.12% Methane
No other organic vapor detected.
ND Benzene
Not enough sample for Mercaptan assay.

*At time of report one GC peak is of yet unidentified.

Appendix 4 – Memorandum from L.R. Alfred to Wm. G. Smith detailing air quality modeling for Midway landfill gas extraction well effluent dispersion, dated February 27, 1986. (Black & Veatch Project 11889.403)

MEMORANDUM

State of Washington Department of Ecology
Midway Landfill
Screening Level Air Quality Analysis

B&V Project 11889.403
February 27, 1986

To: Wm. G. Smith (B&V -- Baton Rouge)

From: L. R. Alfred

The following is a revised summary of the air quality screening modeling methodology and results for a single gas extraction well at the Midway Landfill. The modeled source parameters are actual values from the State of Washington Department of Ecology's (DOE) gas extraction well.

MODELING METHODOLOGY

The modeling objective was to use air quality screening modeling techniques to characterize the local air quality impacts during "worst-case" meteorological conditions. The modeling techniques were based on EPA's Volume 10 (Revised) air quality impact procedures plus PTPLU and PTMTP dispersion models. The Volume 10 procedures and PTPLU were the basis for determining the receptor locations and worst-case meteorological data used in PTMTP. The University of Washington also used PTMTP in their previous air quality assessment of the Midway Landfill.

Background Information

The complete title for EPA's Volume 10 document is "Guideline for Air Quality Maintenance Planning and Analysis Volume 10 (Revised): Procedures For Evaluating Air Quality Impact of New Sources, October 1977". Volume 10 provides the basic analysis techniques for estimating the air quality impact of proposed stationary sources. The document identifies simple screening level procedures applicable to gaseous pollutants.

Air Quality Screening Models

PTPLU is a EPA Gaussian point source dispersion screening model for estimating maximum 1-hour concentrations. PTPLU produces 1-hour average pollutant concentrations as a function of wind speed and stability class.

EPA's PTMTP dispersion model calculates pollutant concentrations at a number of user-located receptor points at or above ground-level, from a number of point sources. Source inputs are emission rate, physical height, stack gas exit temperature, flow volume or stack gas velocity and stack diameter, and X-Y coordinate location. The number of receptors, the coordinates of each, and the height above ground of each receptor are also required. Concentrations for a number of hours up to 24 can be calculated and an average concentration over this time period is also calculated. For each hour, the meteorological data required are wind direction, wind speed, stability class, mixing height, and ambient air temperature.

Screening Procedure

The screening analysis was completed in two steps. The first step was to use the simple screening procedures in Volume 10 and results of the PTPLU model to identify the meteorological conditions which produce the highest predicted concentrations for this particular source. Simple screening procedures are typically used to determine if the source will have a significant impact on the local air quality. The procedures incorporate a large degree of conservatism to provide assurance that the predicted concentrations will not be underestimated. The second step was to establish a 24-hour scenario of "worst-case" meteorological data, considering the results from step 1. These data were then used with the PTMTP dispersion model.

Modeled Source Parameters

Table 1 presents the revised modeled source parameters provided by Wm. Gary Smith (B&V - Baton Rouge) to L. R. Alfred in their February 24, 1986 telephone conversation. These parameters are actual values from DOE's gas extraction well located near the Midway Landfill.

Receptors

PTPLU calculates maximum 1-hour concentrations for various meteorological conditions. The PTPLU results indicated that the maximum 1-hour concentrations occur within 100 meters of the source for most meteorological conditions and always within 1000 meters. Therefore for the PTMTP dispersion calculations, the receptors were located along the plume centerline at 10 meter intervals to 100 meters and 100 meter intervals to 900 meters.

The University of Washington had previously assumed receptor heights of 1.7 meters above ground in their air quality assessment of the Midway Landfill. This height simulates the average adult breathing height. Also, when the receptor heights are elevated closer to the plume centerline, higher concentrations are predicted than at ground-level. Receptor heights of 1.7 meters were also included in this analysis.

Meteorology

It was necessary to establish a "worst-case" 24-hour scenario of meteorological data for the PTMTP dispersion calculations. The Volume 10 procedures suggest that stability classes C (slightly unstable) and E or F (stable) conditions with light winds are probable conditions that would result in maximum concentrations for sources with release heights less than 10 meters. The gas extraction well has a modeled height of 9.15 meters (30 feet). However, the PTPLU modeling for this source showed the maximum 1-hour

concentrations to occur with Class A (extremely unstable) conditions. Therefore, in order to construct a "worst case" 24-hour meteorological scenario, the number of hours of stability Class A was maximized. Table 4-3 from Volume 10 shows the maximum durations of stability classes for selected latitudes and dates. For the Midway Landfill latitude, stability class A is shown to persist for only 4 hours. These were included during mid-day (1100 - 1400). The remainder of the 24-hour period was assumed to be Class C (0100 - 1000 and 1500 - 1600) and Class F (1700 - 2400). Based on PTPLU results, the wind speed for Class A hours is assumed to be 1.0 m/s while a value of 2.0 m/s is used for all other stability classes.

The stability class and wind speed were the only meteorological parameters that are assumed to change during the 24-hour period. The following are the other modeled meteorological parameters. These represent conservative worst-case assumptions.

- wind direction = constant direction
- ambient temperature = 283 K
- mixing height = 475 m

SCREENING MODEL RESULTS

Specific pollutant emission rates were not available at the time of this analysis. However, general pollutant dilution factors were determined and can be used to approximate concentrations when specific emission information is available. Table 2 presents the derived dilutions factors associated with predicted 1-hour and 24-hour concentrations for the two cases, 220 cfm and 325 cfm. The dilution factors were calculated from the ratio of initial assumed pollutant concentration at the source to the final calculated concentrations; both expressed in grams per cubic meter.

The model calculated concentrations for both flow cases are generally lower (roughly half for maxima) than those resulting from the previous preliminary modeling. There is a combination of effects leading to this result. If other source parameters including emission rate are held constant, then the taller stack (30 ft) and the hotter plume (302 K) will result in lower concentrations due to a higher plume, while the decreased flow rates (220 cfm and 325 cfm) will produce higher concentrations due to a lower plume. An additional factor, however, leads to even more significant differences between previous and current dilution factors. Even though the emission rate has been held constant at 1.0 gram per second for the model runs, this rate will change with the gas flow rate (assuming an essentially constant emission concentration). The effect of this change with flow rate has been subsequently included in the development of the dilution factors, so that the factors are appropriate for any measured emission concentration at the respective flow rates (220 cfm and 325 cfm).

The dilution factors can be used to determine the estimated concentrations for the two averaging times (1 hour and 24 hours) at the various receptor locations. It should be noted that the lower dilution factors will produce the higher estimated concentrations. The PTMTP model results show the maximum 1-hour and 24-hour concentrations to occur approximately 50 and 80 meters downwind of the source, respectively.

The following is an example of how to obtain concentration estimates using an emission rate and dilution factor. At 50 meters and 220 cfm, the 1-hour dilution factor is 8435 to 1 which means a 1.0 mg/m^3 emission rate corresponds to a predicted concentration of approximately 0.12 $\mu g/m^3$.

$$\frac{1.0\ mg/m^3}{8435} = 0.12\ \mu g/m^3$$

If there are further questions, please contact Larry Alfred (B&V 913-339-2325).

Table 1. MODELED SOURCE PARAMETERS FOR DOE'S GAS EXTRACTION WELL

PARAMETER	ENGINEERING UNITS	MODELING UNITS
Stack Height	30 ft	9.15 m
Stack Diameter	8 inches	0.20 m
Stack Exit Flow		
Case 1	220 cfm	0.104 m^3/s
Case 2	325 cfm	0.1535 m^3/s
Stack Exit Velocity		
Case 1	10.5 ft/s	3.203 m/s
Case 2	15.5 ft/s	4.731 m/s
Stack Exit Temperature	84 F	302 K
Emission Rate	*	1 g/s

*An emission rate of 1 g/sec was used in the model to obtain ambient concentration estimates that were developed into dilution factors for the various receptor distances.

Table 2. PTMTP DISPERSION MODEL RESULTS FOR DOE'S GAS EXTRACTION WELL

	CASE 1 - 220 CFM		CASE 2 - 325 CFM	
RECEPTOR DISTANCE (m)	1-HOUR DILUTION FACOTR	24-HOUR DILUTION FACTOR	1-HOUR DILUTION FACTOR	24-HOUR DILUTION FACTOR
20	60895 : 1	363668 : 1	60043 : 1	358539 : 1
30	13323 : 1	68340 : 1	10832 : 1	56161 : 1
40	8986 : 1	33632 : 1	6800 : 1	25883 : 1
50	8435 : 1	23596 : 1	6158 : 1	17517 : 1
60	8961 : 1	19908 : 1	6406 : 1	14455 : 1
70	10007 : 1	18616 : 1	7060 : 1	13320 : 1
80	11393 : 1	18495 : 1	7966 : 1	13092 : 1
90	12594 : 1	19055 : 1	8878 : 1	13385 : 1
100	12936 : 1	20070 : 1	9059 : 1	14016 : 1
200	25559 : 1	41517 : 1	17484 : 1	28851 : 1
300	47343 : 1	58954 : 1	32235 : 1	43115 : 1
400	41661 : 1	65101 : 1	33984 : 1	48400 : 1
500	35547 : 1	69981 : 1	27500 : 1	51663 : 1
600	34914 : 1	76678 : 1	26153 : 1	55872 : 1
700	36533 : 1	85092 : 1	26798 : 1	61343 : 1
800	39569 : 1	95485 : 1	28661 : 1	68238 : 1
900	43235 : 1	106814 : 1	30993 : 1	75822 : 1

Note: Lower dilution factors result in higher predicted concentrations.

APPENDIX P

CORRESPONDENCE

King County Executive
Randy Revelle
Department of Public Works
Donald J. LaBelle, *Director*

December 5, 1985

Mr. James A. Walker, P.E.
Project Manager
Parametrics Inc.
P. O. Box 460
Sumner, Washington 98390

RE: Surface Water Discharges into the Green River from Midway Landfill Site

Dear Mr. Walker:

Thank you for your November 7, 1985 letter concerning the potential alternative of routing surface waters from the Midway Landfill Site for discharge into the Green River near Kent. We have reviewed the proposal and have the following comments which hopefully will be of assistance in preparing an acceptable Surface Water Management alternative for the Midway Landfill basin.

Green River Management Agreement

Earlier this year, King County and the Cities of Auburn, Kent, Renton and Tukwila adopted an interlocal agreement known as the Green River Management Agreement. The Management Agreement requires the County and Valley cities to cooperatively develop plans and programs to more effectively deal with regional surface water and flood control problems in the lower Green River Valley.

During high river flow conditions which occur annually in the lower basin, the Green River channel has limited capacity to accept additional discharges, either pumped or gravity-drained, without compromising channel freeboard and potentially risking levee overtopping and/or levee failure. As a consequence, the Management Agreement has prescribed limitations on the timing and quantity of these river discharges until such time as the channel is enlarged through a comprehensive levee improvement project.

The Agreement requires that all new pumped discharges into the Green River be limited in operation to periods when the river flow, as measured at the Auburn gage, is less than 9,000 cubic feet per second (cfs). Further, these pumping facilities must be designed with sufficient on-site storage to retain the excess surface flows (non-pumped) for a 100-year flood event on the Green River. The Corps of Engineers estimates the 100-year flood event will result in the river remaining at or above 9,000 cfs for 7 days. Any deviations from these requirements or requests for new drainage capacity into the Green River must be reviewed and approved by the Green River Technical Committee, in accordance with the provisions of the Management Agreement. The Technical Committee is comprised of the Public Works and Planning Directors of the Valley Cities and King County.

9 1985

In order to implement the directives of the Management Agreement concerning pumping and river discharges, the parties to the Agreement are currently preparing a pumping/discharge procedures plan. The procedures plan will establish additional design parameters and operating guidelines for new pumping facilities and gravity outfalls. Under the current draft of the procedures plan, pumping plants and gravity discharges are both limited to the operating conditions and storage requirements specified in the paragraph above.

Surface Water Management Controls

King County's Surface Water Runoff Policy (King County Code 20.50) requiring retention/detention facilities to handle surface water in excess of the peak allowable discharge also has applicability to the Midway Landfill drainage alternative. Some of the general drainage conditions were identified in King County's September 19, 1985 letter on the draft EIS for the Midway Landfill Closure Plan. In addition to the surface water issues raised in that letter, you should also be aware of the following.

Drainage plan requirements specified in King County Code 20.50 and the Storm Drainage Design Manual do not authorize the diversion of surface waters to non-natural discharge points.

> Under no circumstances shall drainage be diverted in the proposed development to points of discharge other than those points receiving drainage prior to the proposed development (Section b - Storm Draingae Design Manual).

In reviewing the unusual circumstances presented by the naturally occurring depression at Lake Mead, it has been King County's administrative policy to consider off-site drainage discharge for like areas provided that the following conditions are satisfied. These conditions are in addition to all other requirements of King County Code 20.50.

1) The drainage outlet for the site shall be determined from a thorough hydrologic analysis of the 100-year 7-day runoff event for the area tributary to the depression. For depressions which no outlet would result from the design storm, the outlet would be established by the water surface elevation of the retained waters in the depression. For depressions whose capacity would be exceeded by the design storm, the outlet would be established at the lowest elevation at which the depression capacity is exceeded.

2) A thorough downstream analysis of the entire drainage course to be used for the diversion must be made to determine its capacity to pass the design storm flows. The analysis must also demonstrate that the proposed diversion will not seriously or adversely impact other water resource conditions including but not limited to: flooding, water quality, fisheries and biological resources, erosion/sedimentation, wetlands, and other riparian resources.

I hope this response has clarified the relationship of the Green River Management Agreement and other County Surface Water regulations with the proposed discharges of surface waters from the Midway Landfill into the Green River. As I mentioned to you by phone, we have tentatively scheduled time on the December 12 Green River Technical Committee (BTC) meeting in Auburn to discuss this issue with the Committee. We are also available to discuss the particulars of this response with you and representatives of the Seattle Solid Waste Utility if you feel that would be beneficial prior to or in lieu of a meeting with the BTC.

If you have any questions concerning this response, please call me or Doug Chin at 344-2619.

Sincerely,

Dave Clark

Dave G. Clark, Manager
River and Water Resource Section
Surface Water Management Division

DGC:per

cc: Paul Tanaka, Deputy Director, Department of Public Works
Joseph J. Simmler, Manager, Surface Water Management Division
ATTN: William Burns, Administrative Assistant
Doug Chin, Engineer
Green River Technical Committee Members

ANDREA BEATTY RINNER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

TECHNICAL MEMORANDUM

February 27, 1986

TO: Midway Landfill File

FROM: Peter Kmet P. Kmet

SUBJECT: Interpretation of Methane Gas Probe Data

NOTE: This interpretation is based on the data available to date (2/24/86) and is subject to revision as additional information is obtained.

EXTENT OF GAS MIGRATION

Gas Probes have been installed at some 90 locations in the vicinity of the Midway Landfill (see Figure 1). Measurements of the methane gas concentrations in these probes is being done periodically (generally every 7-14 days) to determine the extent of gas migration.

These readings show several areas in the vicinity of the Midway Landfill where methane gas has been found in the ground in excess of the lower explosive limit. The readings of greatest concern are those in the shallow probes, as these are reflective of the soils directly beneath homes and businesses. The presence of methane gas deeper in the soil is of concern because it provides a continuing source for gas that is present in the shallow soils.

By far the largest area where methane gas has been found is in the City of Kent's west hill neighborhood, east of the landfill. Here methane has been found in shallow soils in excess of the lower explosive limit over an area several square blocks in size. This area is shown in Figure 2. Several homes have been evacuated in this area. Deeper probes drilled in this area have confirmed the methane gas is present in excess of the lower explosive limit to considerable depth (up to 100 feet deep) in much of this area and beyond (Figure 3). It is believed the methane has migrated easterly from the landfill in the porous sand and gravel soils present at depth and then upward as it seeks a pathway of escape (Figure 4). Some of the deeper probes have detected considerable methane being present while shallow probes at these same locations show only trace levels of methane. This is probably a reflection of the type of soils present near the ground surface. At these locations, the near surface soils have considerable silt and clay content and are wet. This seals the ground surface, minimizing the methane migration upward from the deeper sand and gravel soils.

While the extent of the near surface methane gas migration east of the landfill appears to be defined, additional deep probes are needed to determine the extent of this gas migration at depth. This is especially true northwest and southwest of the landfill.

The next largest area where methane gas has been found in excess of the lower explosive limit is west of the landfill along Highway 99 (see Figure 2). Several businesses have had significant levels of methane in them within this area. Deep probes and extraction wells installed in this area have confirmed methane gas is present at depth in excess of the lower explosive limit.

Methane has also been found in excess of the lower explosive limit in probe 17, a shallow probe west of Highway 99, but it is not known if this is due to the landfill or caused by natural processes in the nearby swamp which could be generating methane too. Methane gas has also been found in probe 10, a shallow probe northwest of the landfill. Initially, it was thought these high readings were due to the presence of contaminants other than methane, as a solvent odor has been reported in this area, apparently due to illegal dumping activities. However, the most recent work has indicated that methane gas is probably present in this probe. This could be due to the Midway Landfill or caused by the swamp or a small dump located in this area. Additional investigations will be needed to determine the source of the methane in probes 10 and 17. Significant levels of methane have not been found in buildings in the vicinity of these probes.

Methane gas has also been found in excess of the lower explosive limit in two other isolated shallow probe locations at considerable distance from the landfills. One (probe 2) is located to the north of the landfill, and the second (probe 63) is located south of the landfill. Again, it is not known if this methane is due to the landfill or caused by natural processes in nearby swampy areas. Additional investigations will be needed to determine the source of the methane. Significant levels of methane have not been found in buildings in the vicinity of these probes.

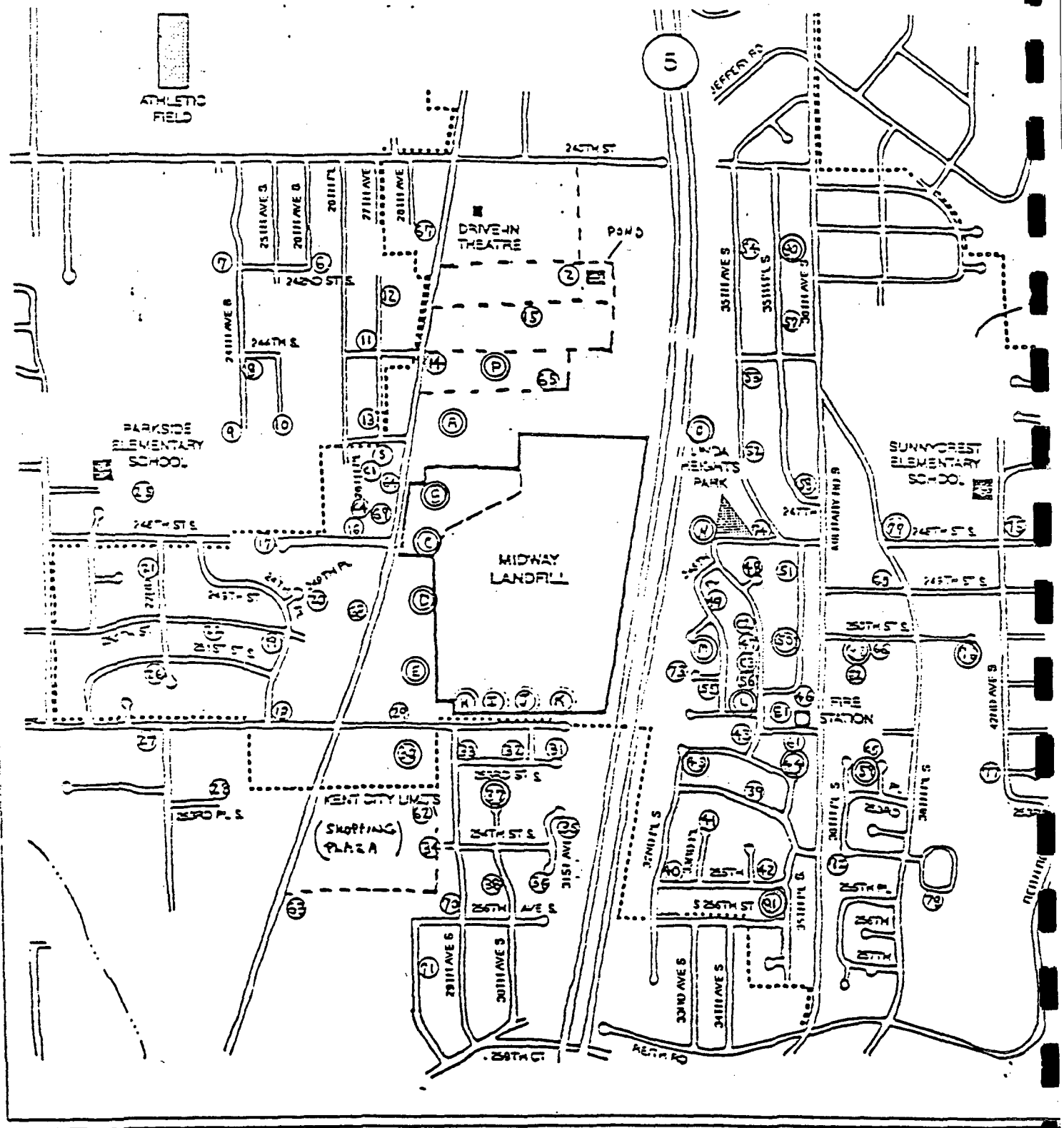
GAS CONTROL SYSTEMS PERFORMANCE

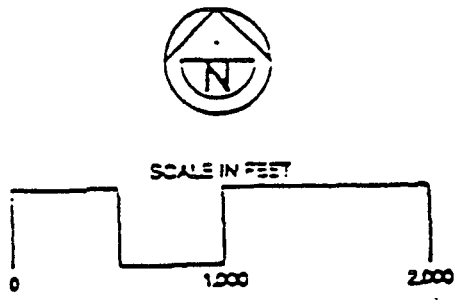
As a result of methane gas being found off-site, the Seattle Engineering Department initiated emergency construction of a gas extraction system on the Midway Landfill this fall. This system has been operating on an interim basis since late December. Continued monitoring of probes (lettered A-P) has confirmed this system has substantially reduced the amount of gas migrating off-site. This is illustrated by Table 1 which summarizes major reductions in methane concentrations that have occurred in probes L, M, N, O on the east side of the landfill since the on-site system has been operating. It is not possible to tell yet if the system has totally eliminated the gas migration since considerable gas is still present in these probes. This gas could be a result of past migration or

could be new gas migrating.

Several extraction wells have also been installed off-site to accelerate venting of the methane found. To date, this has included 2 extraction wells installed west of the landfill by the Seattle Engineering Department (SED) and 5 extraction wells installed east of the landfill (3 by SED, 2 by Ecology) (see Figure 5). These wells have been successful in reducing the concentrations of gas formerly found seeping into the homes and businesses in the vicinity of these wells. Probes in the vicinity of these wells have also shown significant reductions in the gas present. However, the effective zone of influence of these appears to be limited, at most, to a distance of several hundred feet from the wells, indicating additional extraction wells will be needed to extract the gas from the entire area of concern within a reasonable time frame.

PK/sr

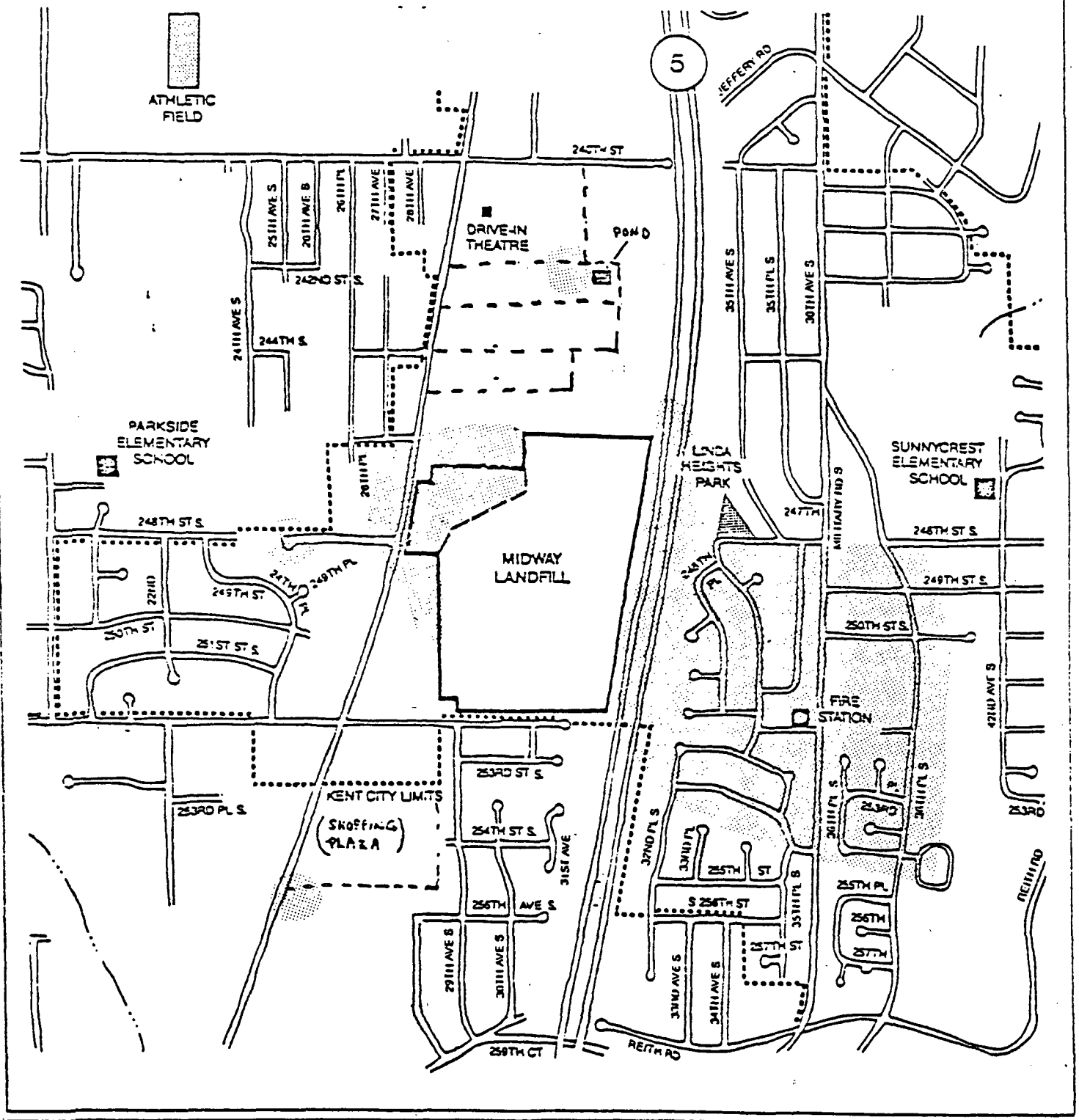




MIDWAY LANDFILL (FIGURE 1)

Off-Site Gas Probes & Wells
(11) Single Level Probes
(43) Multi-Level Probes
(61) Ecology Extraction Well
(61) City of Seattle Extraction Well

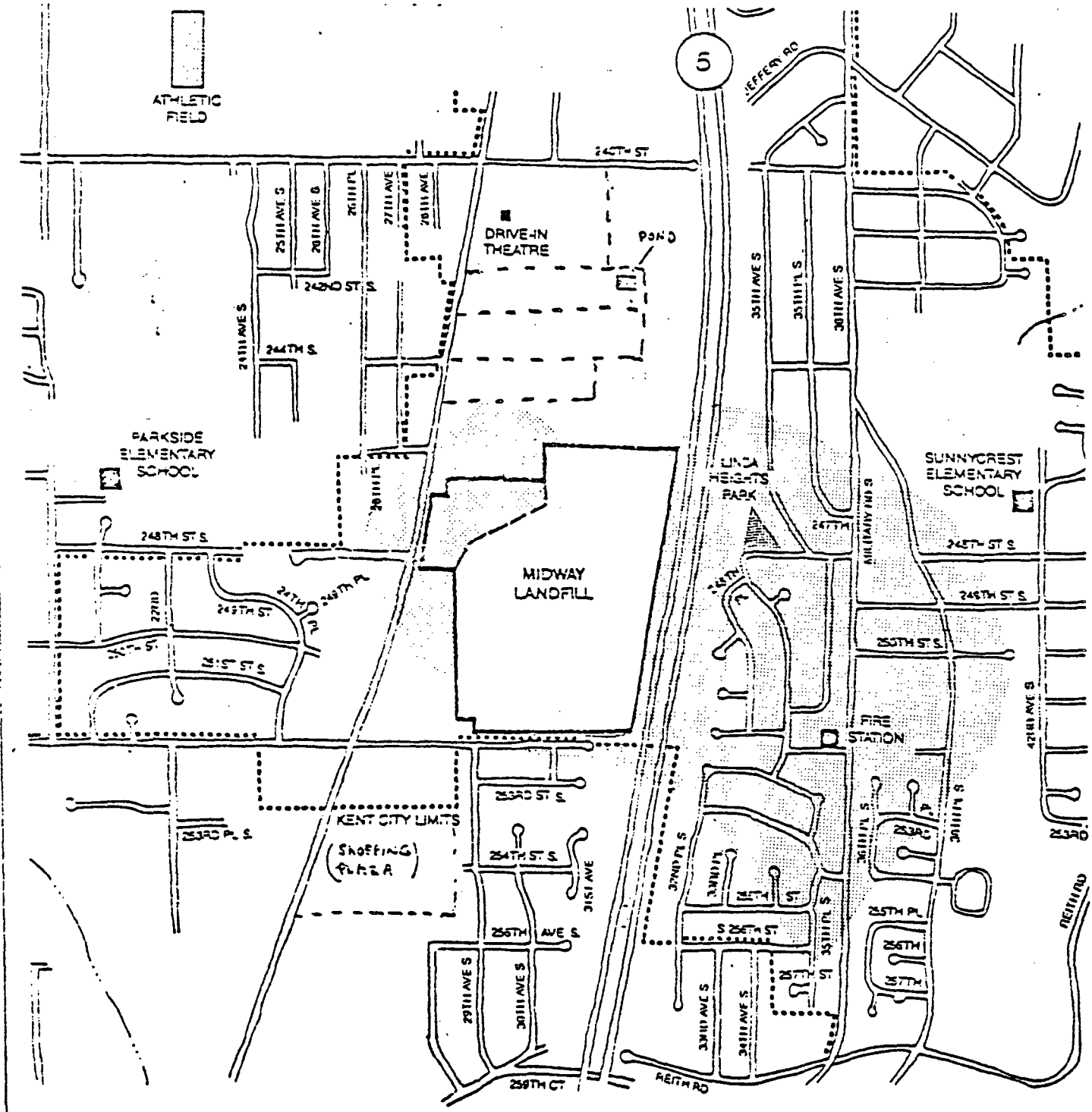
WDOE February 26, 1986
Base Map from Midway EIS



MIDWAY LANDFILL (FIGURE 2)

Areas Where Methane Gas Has Been Found Near the Ground Surface in Excess of the Lower Explosive Limit.

WDOE February 26, 1986
Base Map From Midway EIS



MIDWAY LANDFILL (FIGURE 3)

Areas Where Methane Gas Has Been Found At Depth in the Ground in Excess of the Lower Explosive Limit.

WDOE February 26, 1986
Base Map From Midway EIS

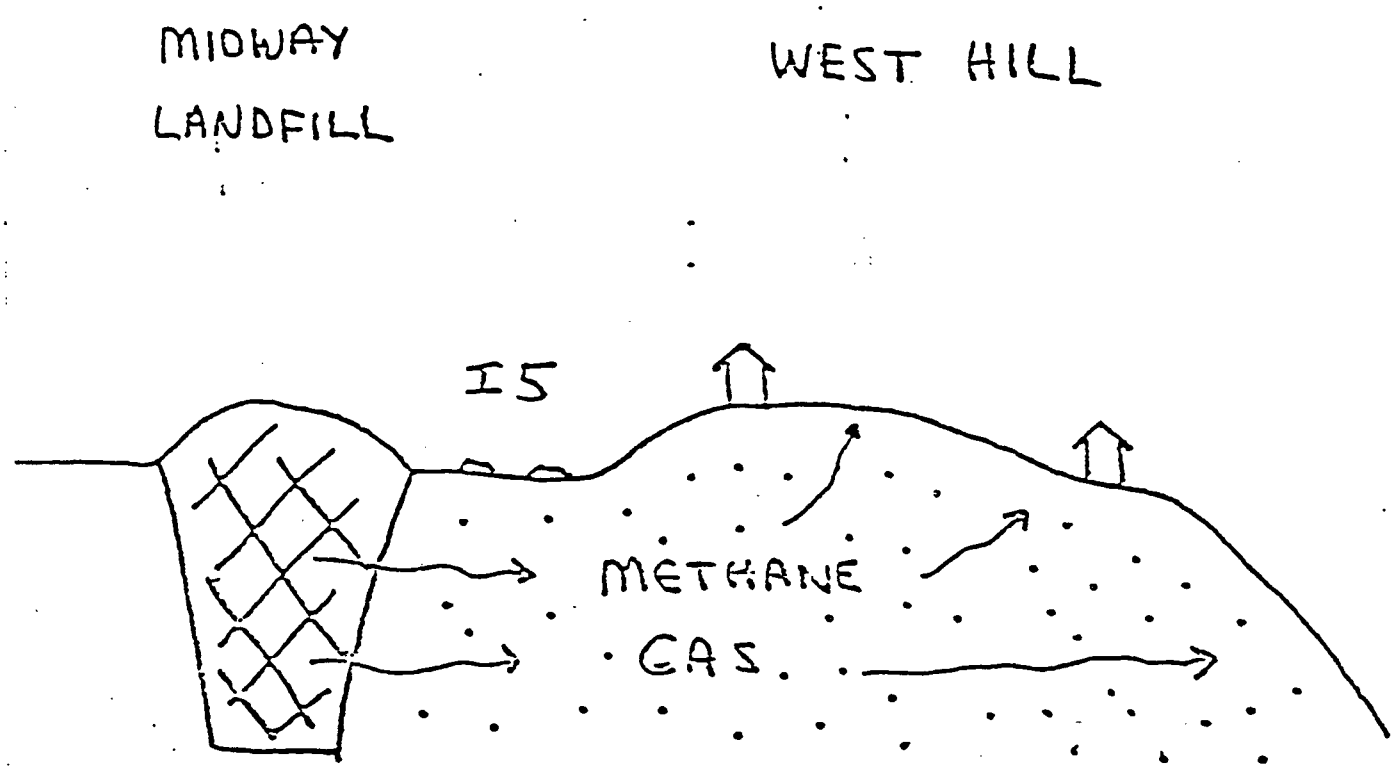


FIGURE 4
(NOT TO SCALE)

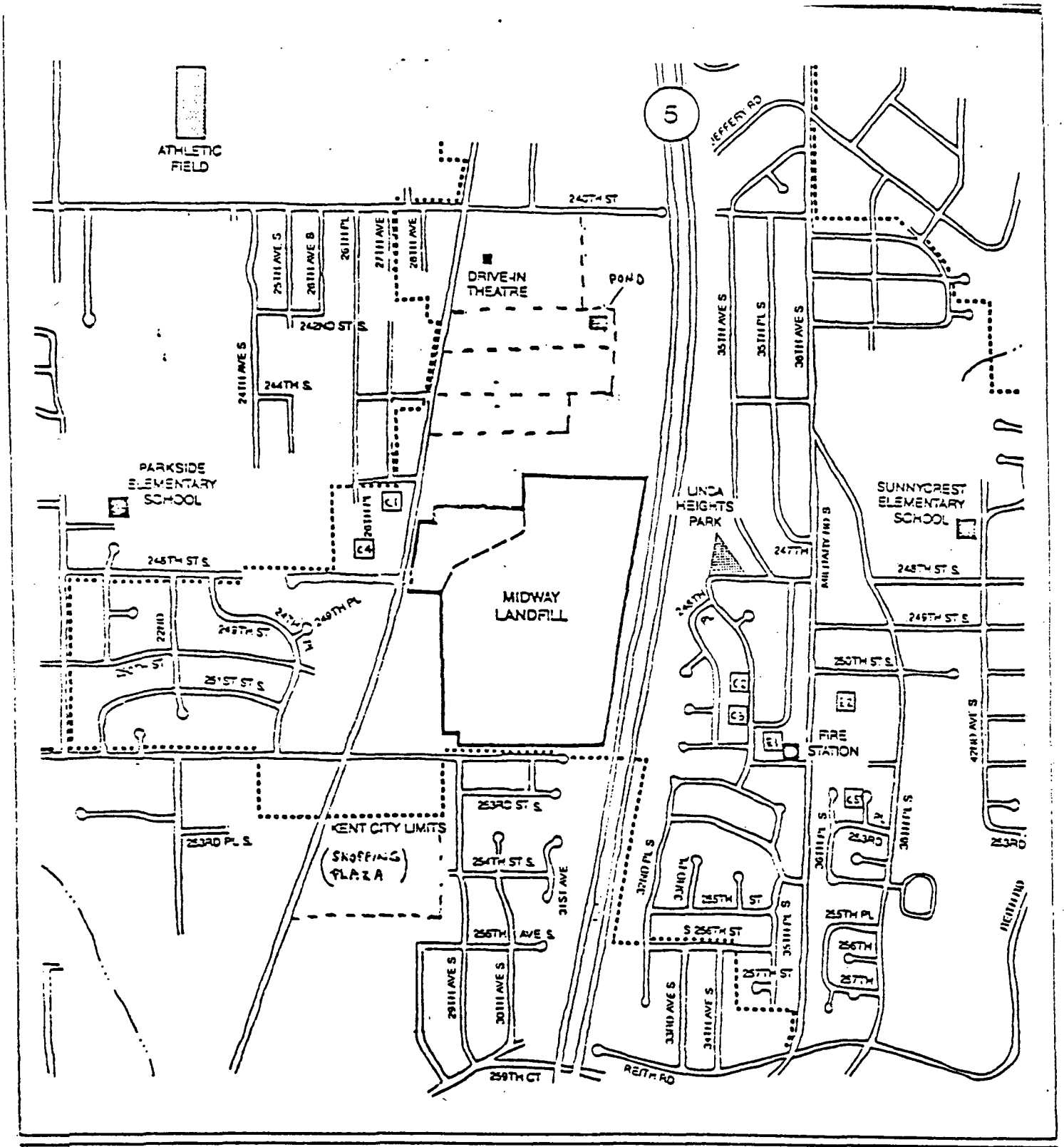
TABLE 1: Comparison of Methane Concentration in Probes L, M, N & O Before and After Midway Landfill Gas Extraction System Operational.

Probe	Average Methane Concentration 6 weeks Prior to Turning On Landfill Gas Extraction System	Average Methane Concentration Since January 1, 1986.	Percent Reduction
L-S	32%	12%	62%
L-M	30%	10%	67%
L-D	44%	19%	57%
M-S	Trace	0%	-
M-M	28%	15%	46%
M-D	36%	13%	64%
N-S	33%	10%	70%
N-M	43%	14%	67%
N-D	24%	16%	33%
O-S	65%	11%	83%
O-M	36%	16%	56%
O-D	20%	6%	70%

(S) = Shallow probe

(M) = Medium probe

(D) = Deep Probe



MIDWAY LANDFILL (FIGURE 5)

Off-Site Methane Gas Extraction Wells

E1 Ecology Well

C1 City of Seattle Well

WDOE February 26, 1986

Base Map from Midway EIS

ANDREA BEATTY RINGER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

December 6, 1985

TO: Midway File

FROM: Pete Kmet P Kmet

SUBJECT: Sanitary Sewer Discharge Along Highway 99

I spoke via phone with Alan Jushenski (344-6708), of the SKCHD on 12/4/85 to find out the status of their investigation of the sewage discharge found along Highway 99.

He indicated they had sampled the storm drain along the east side of Highway 99 at two locations and had obtained the following results:

(1) Storm drain north of Mobile Mansions Mobile Home Park: fecal coliform - 200 MPN/100 mls

(2) Side drain discharging to catch basin in front of the Mobile Home Park: fecal coliform - 6x10 MPN/100 mls.

Based on this they concluded the sewage was coming from the mobile home park and plugged the line to see from where. No one at the park complained of a blocked pipe, so they pulled the plug and tryed using dye to locate the connection. Dye dumped in a sink at the park showed up in the leach field distribution box almost immediately, but was not detected in the storm drain, in the short time they were on-site. They came back a second time and put some dye in the distribution box and checked the storm sewer for dye for a couple of hours, and also for the following day but found none.

In spite of the failure to find dye they feel the source of the problem is the Mobile Home Park. They intend to write a letter to the park asking them to cut off the illegal discharge.

PK:lk

cc: Dave Bradley
Mike Ruef
Jim Oberlander

City of Seattle
Charles Royer, *Mayor*

King County
Randy Revelle, *Executive*

Seattle-King County Department of Public Health
Bud Nicola, M.D., M.H.S.A., *Director*

RECEIVED
'86 JAN 30 A11:05
DEPT. OF ECOLOGY
OLYMPIA, WA.

January 10, 1986

Mr. Bob Kapela
% Mobile Mansions
24426 Pacific Highway South
Kent, Washington 98031

Dear Mr. Kapela:

On January 8, 1986, an investigation was made of your Mobile Home Park at the above address by Paul Robinson from the Health Department, and Jim Oberlander from the State Department of Ecology. It was determined that effluent from your sewage disposal system is being discharged into the storm drain.

It will be necessary for you or a licensed septic tank installer to make application for a permit to repair this system, and effect the repair as soon as possible.

Under no circumstances should this discharge of sewage upon the surface of the ground be permitted for a period of time exceeding thirty (30) days from the above date.

If you have any further questions regarding this matter, please contact Mr. Paul Robinson at 206/344-6708, Tuesday through Friday, between 8:00 and 9:30 A.M.

Sincerely,

J.R.Everest, R.S., Supervisor
Environmental Health Services
Southeast Public Health Center
at Renton

JRE:PR:jab

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

January 15, 1986

TO: Midway Landfill File

FROM: Jim Oberlander J.O.

SUBJECT: Mobile Mansions, Kent, WA
Sewage Discharge
Site Inspection 1/8/86

On 1/8/86 (1430 hrs.), Mike Blum and I met Paul Robinson, Seattle King County Health Department (SKCHD) to inspect this movile home park located at 24426 Pacific Highway South Kent. Late in 1985, WEOE personnel has issolated this general area as the major contributor of sewage into a strom drainage system which discharges into the swamp behind Parkside Elementry School.

Recent field work by SKCHD, including dye tests, plus earlier inspection with dye checks over the years had not confirmed a source. Repeated complaints have been lodged regarding sewage into the swamp area off 248th.

Our starting point was to open a storm water catch basin along Highway 99 at the entrance to this trailer park. A 4" line enters this basin from the direction of the park. A small flow was coming from the pipe. A white sphaerotilus growth, indication of sewage, coats this pipe. It was not raining during our inspection.

Proceding into the park we found and opened a sewage distribution box ("D" box) near a planter island. This is the system SKCHD had dye tested over the years finding no connection with the Highway storm drainage system. The "D" box contained excessive amounts of solids, indicating the septic tank ahead of it was long overdue for pumping.

At this point we were met and introduced ourselves to Don Craft, park manager. Don has only been employed here one week, the property is also under new ownership. The new owner is Bob Kapela (ph. 885-7996). Don gathered the available park utility maps and accompanied us on our inspection. He gave us a copy of the general site plan.

The front sewage system (which had been dye tested earler by SKCHD) discharges from the "Island" "D" box into drainfields located in small grass areas on either side of the entrance.

The laundry room is served by a small sump with pump. The point of discharge/ leach field is unknown. The pump is in need of servicing some flow exit the

the pump and spills around the sump area. The sump also requires removal of "solids". We placed red dye into this sump and activated the pump (1500 hrs).

A middle sewage system serves 13 or 15 mobile homes. Don did not know where the drainfield was located for this large septic tank. We placed yellow dye into this tank at 1315 hrs.

The Back Sewage System serves approximately 19 mobile homes. Effluent from a large septic tank is pumped by either of two pumps up to a spilter system (under tool shed) which distributes this flow into a drainfield system/grass area centered in the park. We dyed the pump chamber and tank red. Leakage at the spiller valves/basin showed red dye. We could not move the spilter gate, which raises the question can the drain fields be alternated as apparently designated. [35 mm photo's were taken during this inspection].

Returning at 2145 hours (after night time house to house methane gas monitoring) accompanied by Paul Ritchie, WDOE, we observed green dyed/sewage effluent entering the Highway 99 storm basin from the pipe which heads into this park. Green dye had been placed into the park's middle sewage system.

On 1/9/86, 0845 hr. I contacted Paul Robinson, SKCHD and told him our dye efforts confirmed one major source and requested he promptly contact the park owner and issue appropriate enforcement. I also call Don Craft to let him know we confirmed the middle tank is a serious problem and that SKCHD would issue directions to the park owner.

Elements that should be addressed with this case are:

1) Appropriate enforcement with a firm schedule to get this problem corrected.

2) An engineered plan reviewing the total sewage system at this facility, including possible connection into a public sewage system.

3) Immediately pump solids from all sewage and laundry tanks.

4) Correct the spillage problem at the laundry room effluent sump.

JO/cp

Enclosures: Photo's
Site Map

cc: Gary Brugger, WDOE, Redmond
Paul Robinson, SKCHD

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

September 10, 1985

TO: Midway Landfill File

FROM: Peter Kmet P. Kmet

SUBJECT: Notes from Inspection Parkside Elementary School

This inspection was held as a followup to the public meeting on September 5, 1985 where a concern was raised that the school grounds may be contaminated by the Midway Landfill. Mike Ruef and I were met at the school by the school principal, Noel Nelson, and Dean Hone and Paul Bray of the Highland School District.

It was explained to us that prior to the school grounds construction, drainage from the wetland crossed the property in a ditch. There was also at least a couple of springs on the grounds. A map was provided showing the topography and drainage at that time. When the school was expanded and the grounds regraded in 1963, a series of catch basins and storm drains were constructed to route drainage through the property and to drain the springs and runoff off the school grounds. A map was provided showing the location of these basins and storm drains.

At times in the past the inlet basin near the wetland has been plugged with leaves or by the neighbor and water has ponded and eventually flowed overland across the school property. In late 1983, there was a concern this water could be contaminated by the Midway Landfill. Greg Gregory of WDOE's Redmond Office was called in to inspect the situation and water samples were taken (spring 1984). The school district also took its own sample. Neither test results could be located in the District's files but Paul Bray said he remembered the test results indicated the water was contaminated by coliform bacteria. The source of this was not determined but the neighbor has horses pastured next to the school grounds and the manure from this field could have been a likely source.

An area of past seepage in the northwest corner of the property was pointed out. No seepage was evident nor was there any staining that would be characteristic of landfill leachate seep. No other areas of seepage were evident at the time of the inspection nor was it indicated any had occurred in the past. When asked, Noel Nelson indicated he was not aware of any unusual outbreaks of illnesses or rashes amongst the children at the school.

I indicated we would review the information obtained from the inspection and determine if any followup sampling would be appropriate.

Based on my preliminary assessment of the situation, there does not appear to be a leachate contamination problem evident at the school grounds. A further inspection should be done of the wetland margins and the general neighborhood to determine if any leachate seeps are evident and, if so, if they could get into the surface runoff that crosses under the school property. If any substantial springs are located, it would be appropriate to include them in the sampling plan for the landfill. As for the school grounds themselves, it would appear appropriate to sample surface runoff of the inlet near the wetland and the outlet as the water leaves the school property. It would also be appropriate to sample any catch basins that collect a substantial spring flow and/or any seeps that might reappear. If evidence of leachate migration is detected in this sampling or should the groundwater monitoring migration study to be done indicate leachate is migratory in a westerly direction, then it may be appropriate to sample soils at the school property as well.

PK/sr

Attachment

cc: Dave Bradley
Mike Ruef
Glynis Stumpf

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

October 10, 1985

TO: Midway Landfill File

FROM: Pete Kmet P. Kmet

SUBJECT: Site Vicinity Inspection on September 23, 1985

This memo reports on the results of our inspection of several areas in the vicinity of the Midway Landfill. The following personnel participated in the inspection:

Pete Kmet - WDOE
Marsha Huebner - City of Des Moines
Greg Bishop - Seattle-King County Health Department
Wayne Turnbery - Seattle-King County Health Department
Jim Henrickson - Seattle-King County Health Department

A list of complaints received by the City of Des Moines was used as the basis for this inspection (see attached).

1. Parkside Elementary School

We were accompanied by the school principal during the inspection of the school property. The grounds were visually inspected for leachate seeps--none were observed. The stormwater drainage system was tested at several locations using a field meter from the health department. The general procedure was to dip the probe into the water of the sampling location and record the readings obtained. Distilled water was used to wash the probe between sampling locations. This same procedure was used at other locations reported later in this memo.

A. Inlet at SW Corner of School Property

pH	6.4
temp	12.5°C
Dissolved Oxygen	7.8 mg/l
Conductivity	500 umhos/cm
Turbidity	1 ntu

No color or odor evident, water flowing

B. Catch Basin in Approximate Center of School Property

pH	7.1
temp	15.2°C
Dissolved Oxygen	8.5 mg/l
Conductivity	500 umhos/cm
Turbidity	12 ntu

Water flowing, no odor evident.

C. Catch Basin at Low End of deadend Side Drain

pH	6.5
temp	15.8°C
Dissolved Oxygen	3.0 mg/l
Conductivity	550 umhos/cm
Turbidity	7 ntu

No flow, stagnant water.

D. Culvert Discharge from School Grounds

pH	7.1
temp	13.4°C
Dissolved Oxygen	8.9 mg/l
Conductivity	500 umhos/cm
Turbidity	3 ntu

Water flowing, no odor or color evident at culvert or within first 100 feet of creek. No staining on rocks either.

E. Pond Inlet at Harvey Grohs

pH	7.1
temp	13.2°C
Dissolved Oxygen	8 mg/l
Conductivity	500 umhos/cm
Turbidity	1 ntu

Water flowing, no odor or color evident. This was upstream of the pond behind the main house.

F. Culvert Behind Businesses Along SR99

pH	7.6
temp	16.5°C
Dissolved Oxygen	6.1 mg/l
Conductivity	500 umhos/cm
Turbidity	15 ntu

Water flowing, gray color, septic odor (sewage?). Lots of debris along bank, including several empty 5-gallon cans of floor finish.

G. Batch Basin Along SR99 Opposite Landfill Entrance

pH	7.3
temp	16.3°C
Dissolved Oxygen	4.0 mg/l
Conductivity	450 umhos/cm
Turbidity	7.0 ntu

Water stagnant, no flow from culvert connected to this catch basin. This basin was on the west side of the highway.

H. Wetland Next to Sharon Dahl's House

pH	7.1
temp	21.6°C
Dissolved Oxygen	4.4 mg/l
Conductivity	450 umhos/cm
Turbidity	5 ntu

Stagnant pocket of water in wetland. Smell like swamp water, dark brown organic color typical of swamp water. Recently disturbed by sewer construction. Workers indicated no unusual odor or contaminated water evident while trenching for sewer in swamp. The sewer construction was halted due to inability to dig deep enought to dig through peat and obtain a firm footing for the sewer line. Sewer line to be rerouted.

Mrs. Dahl indicated a "black seep" occurs between her garage and the neighbor's house when it rains. No seep or odor was evident at the time of the inspection. She indicated several of the homes on that block were under construction before septic tank permits were issued. Several homes could not obtain an adequate "perk" but were permitted anyway. She indicated "someone from the County Health Department" had investigated this seep "three

or four years ago" and thought it was a septic tank failure. A dye test was run on the neighbor's tank but no connection with the seep was found. Mrs. Dahl was very concerned about the health of her children and concerned she cannot sell her house.

I. Wetland in Dan Zeisel's Pasture

pH	6.8
temp	21.6°C
Dissolved Oxygen	4.4 mg/l
Conductivity	450 umhos/cm
Turbidity	5 ntu

Stagnant water in wetland next to pasture. Similar appearance to water next to the Dahl's house. Mr. Zeisel indicated black seepage occurs in his pasture along the edge of the wetland when it is wet out. None was evident at the time of this inspection. Mr. Zeisel's horses have free access to the wetland area and there was horse dropping all through this area. Mr. Zeisel indicated that seepage occurs in another location on his pasture where it is wet. He said he had experienced a rash on his face in the past which he attributed to the contaminated water. He said he had a private well which was recently capped and no longer in use. (Possible sampling point?).

At the conclusion of our inspection, I informed Mrs. Dahl and Mr. Zeisel that I had not seen any visual evidence of leachate at any of the locations we inspected. I indicated the conductivity was somewhat elevated above background and warranted followup sampling to determine what was causing this. I also indicated we would return to reinspect these locations when the wet season began in an attempt to locate the seeps they and others have reported.

PK:bh

cc: G. Stumpf - NWRO
M. Ruef
D. Bradley

Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060

Certificate

Chemistry, Microbiology, and Technical Services

CLIENT: Washington State Department of Ecology
4350 115th Ave. N.E.
Redmond, WA 98052
ATTN: Glynis Stumpf

LABORATORY NO. 93417

DATE: Nov. 15, 1985

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 10/14/85 and identified as shown below:

1) #1 24442 24th Ave. S. G. Stumpf 10/14/85 10:02
2) #2 Parkside Elem. S.W. G. Stumpf 10/14/85 11:00
3) Hwy. 99 Drainage G. Stumpf 10/14/85 11:37
4) Parkside Outfall G. Stumpf 10/14/85 11:37

RECEIVED
NOV 19 1985

TESTS PERFORMED AND RESULTS:

	1	2	3	4
5-day Biochemical Oxygen Demand, parts per million (mg/L)	43.	L/10.	51.	L/10.
Fecal Coliform Count, MPN per 100 mls	17.	300.	G/1600.	50.

	parts per million (mg/L)				
	24442 1	School Toilet 2	Hwy 99 3	20th 4	Method Blank
Alkalinity as CaC03	150.	70.	180.	78.	1.
Total Hardness as CaC03	160.	76.	59.	71.	L/1.
Total Dissolved Solids	400.	200.	240.	200.	---
Total Kjeldahl Nitrogen	8.6	1.9	35.	1.6	1.1
	---	---	---	---	0.8
Nitrate as N	0.08	0.08	L/0.05	0.08	L/0.05
Chloride	24.	8.	23.	9.	1.
Sulfate as S04	2.	55.	21.	78.	L/1.
Total Phosphate as P	1.3	0.62	6.4	0.45	L/0.005
Iron	4.2	0.44	0.27	0.43	L/0.01
Zinc	0.020	0.022	0.077	L/0.002	L/0.002

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Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060

Certificate

Chemistry, Microbiology, and Technical Services

Washington State Department of Ecology

LABORATORY NO. 93417

	parts per million (mg/L)				
	1	2	3	4	Method Blank
Manganese	2.6	0.066	0.061	0.16	L/0.002
Chromium	L/0.002	L/0.002	L/0.002	L/0.002	L/0.002
Copper	0.014	L/0.002	0.021	0.006	L/0.002
Lead	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
Cadmium	L/0.002	L/0.002	L/0.002	L/0.002	L/0.002
Nickel	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
Sodium	22.	36.	44.	35.	---

Key

L/ indicates "less than"
G/ indicates "greater than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:laj

RECEIVED
NOV 19 1985
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

MIDWAY-CONCENTRATIONS IN SOIL

Metal	Midway Samples[1]			Background Concentrations	
	Parkside School NE Corner	Parkside School SW Corner	Parkside Outfall	Kent Valley[2]	National[3]
Cadmium (mg/kg)	0.073 0.072	0.86	0.41	2.9	0.01 - 0.70
Chromium (mg/kg)	22 17	22	15	40	1 - 1000
Copper (mg/kg)	9 11	41	16	73	2 - 100
Lead (mg/kg)	7.2 7.5	62	16	76	2 - 200
Manganese (mg/kg)	300 260	340	750	-	-
Nickel (mg/kg)	25 30	28	25	43	5 - 500
Silver (mg/kg)	0.046 0.036	0.086	0.032	-	.01 - 5.0
Zinc (mg/kg)	35.5 25.7	129	88.1	109	10 - 300

[1] Sampling performed by the Department of Ecology 10/86.

[2] Background metal concentrations for soil in Kent Valley reported in Feasibility Study for Subsurface Cleanup, Western Processing, Kent, Washington, Vol. I, p. 3-35.

[3] Common range of metal concentrations in uncontaminated soils reported in Sims R.C. and Wagner K 1983, pp 226-230.

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

4350 - 150th Ave N.E. • Redmond Washington 98052-5301 • (206) 885-1900

December 18, 1985

MEMORANDUM

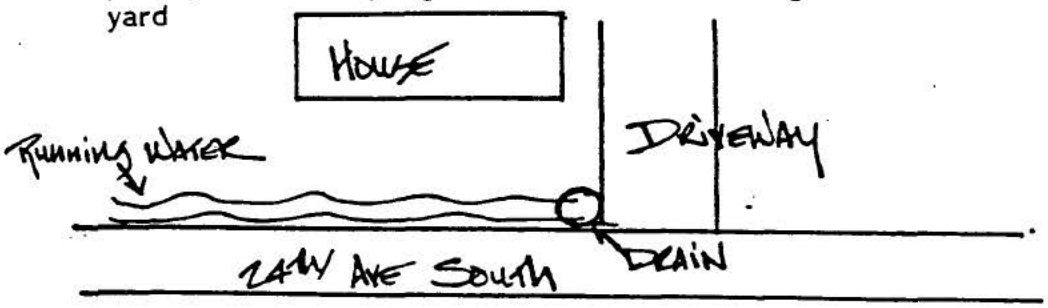
TO: Midway Files

FROM: Glynis Stumpf

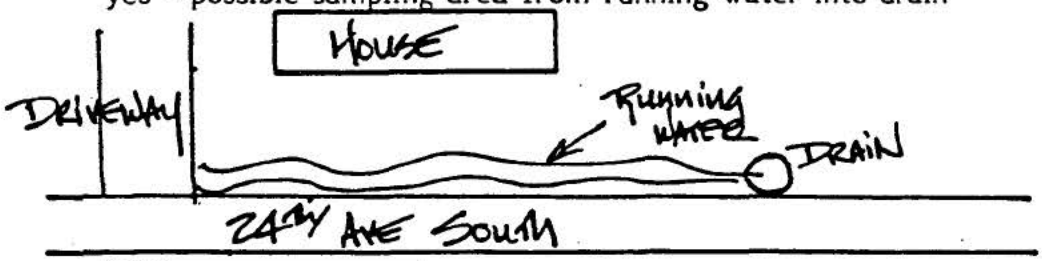
SUBJECT: Wetland Check on December 11, 1985

Identified several possible sampling points west of the 280 foot elevation where topographically it may be logical for leachate springs to emerge. Also cross checked a prior home list and responded to requests for a review by individuals present at the last public hearing (Dec. 4) On this date (Dec. 11), I did not note any visible signs of leachate at the following locations.

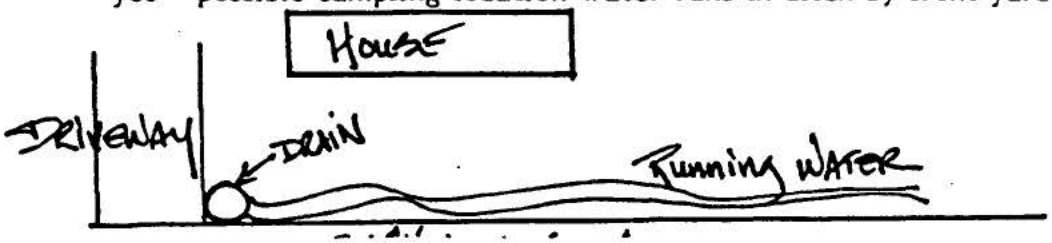
1. (b)(6)
yes - possible sampling area from water running into a drain directly in front yard



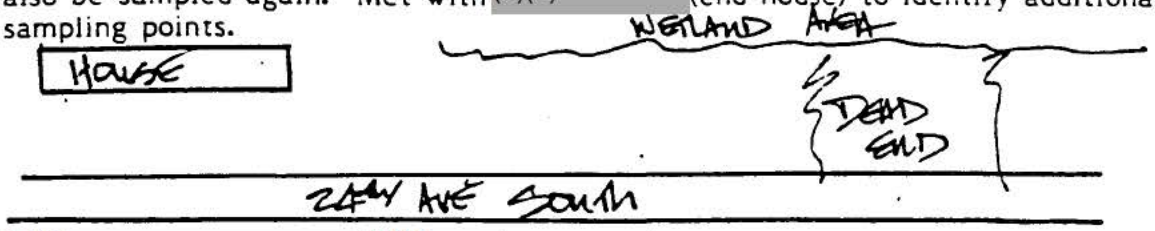
2. (b)(6)
yes - possible sampling area from running water into drain



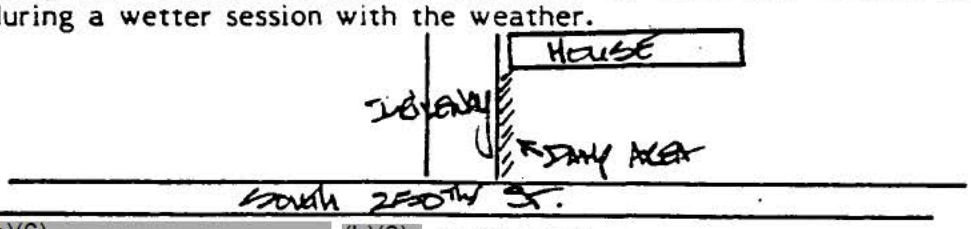
3. (b)(6)
yes - possible sampling location water runs in ditch by front yard into drain



4. (b)(6) This area was sampled on October 14 and could also be sampled again. Met with (b)(6) (end house) to identify additional sampling points.



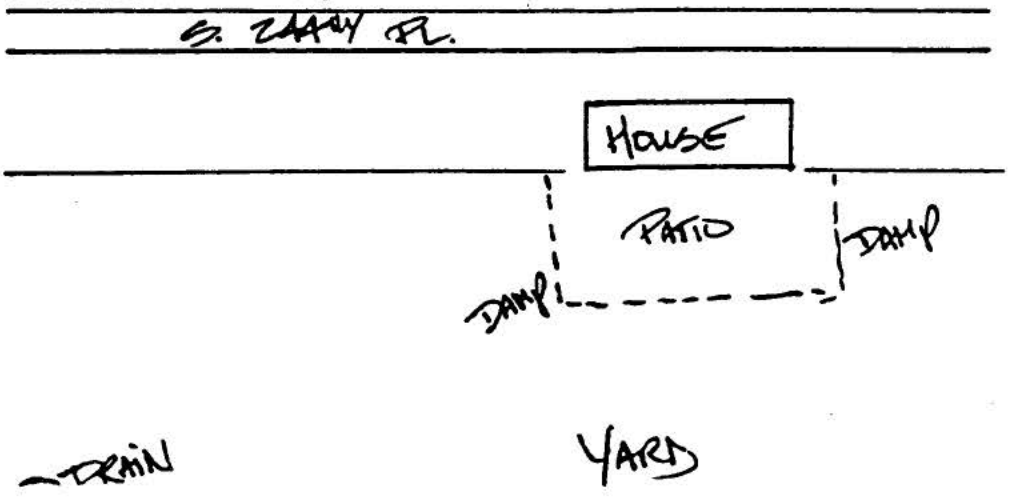
5. (b)(6) (b)(6) Residence). address submitted at public hearing did not see any feasible sampling area - and no one home to query. Low, damp area was located next to the driveway which may become more acute during a wetter session with the weather.



6. (b)(6) (b)(6) Residence)
yes - Potential sampling point located at the corner of patio, but nothing discernible today.

7. Marcus Whitman Pres. Church
yes - could possibly use for sampling. Water has been turning up in area adjacent to driveway. A gully is also present in this vicinity.

8. (b)(6) (b)(6) residence)
House is located on elevated ground and across ..... Creek from Parkland Elementary so area could possibly be sampled for background data. Drain is located in the backyard.



Homes with no discernible moisture on this particular but should be kept track of for future possibilities.

9. (b)(6) [redacted]

10. (b)(6) [redacted]

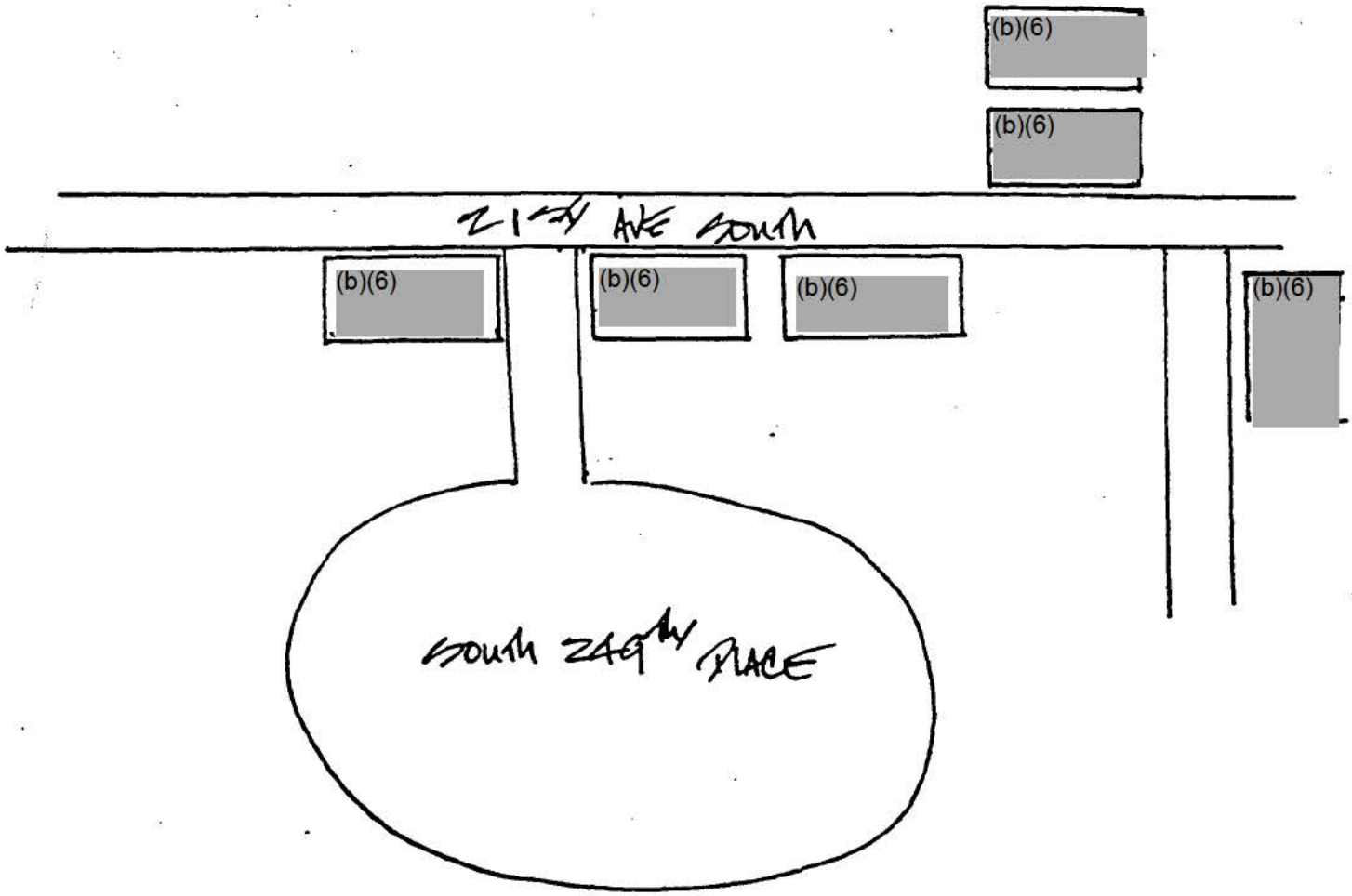
11. (b)(6) [redacted]

Apparently backyard to damp to grow a garden

12. Person behind (b)(6) [redacted] is having problems with excess moisture in yard.

13. (b)(6) [redacted]

also has no problem watering



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

February 4, 1986

TO: Midway Landfill File

FROM: Jim Oberlander J.O.
Mike Blum Mike B

SUBJECT: Surface Water Sampling
January 24, 1986
West of Highway 99

On January 24, 1986, we constructed a shallow (2') sampling probe in (b)(6) (b)(6) s back yard (b)(6) . This probe needs to be developed prior to sampling. Following this, we visited the (b)(6) home on (b)(6) and tested a catch basin in (b) back yard. (b) home is (b)(6) .

Continuing on, we contacted (b)(6) who joined us walking the swamp and the neighborhoods west of Highway 99.

The weather was clear and sunny.

	Station/Location	Temperature °C	Conductivity* Micromhoms/cm
A.	(b)(6) back yard catch basin (b)(6)	7.5	170
B.	Flowing Ditch 24th & 244 Street	7.8	110
Swamp Walk			
C.	North Edge	7.2	200
D.	Ditch E. Edge at 246th	7.3	370
E.	South of 246th, ditch/flow	7.5	310
F.	250 ft. south of 246th (seep/spring) (good location for a probe)	9.1	250

*This is a common landfill leachate field test which can indicate dissolved substances. A reading above 700 would be of concern.

	Station/Location	Temperature °C	Conductivity* Micromhoms/cm
G.	South of 246th in swamp	8.4	330
H.	South of 248th ditch into swamp	6.3	170
I.	Swamp discharge into Parkside Elementary drain	6.4	85
J.	Parkside Park Swamp	6.7	100

*This is a common landfill leachate field test which can indicate dissolved substances. A reading above 700 would be of concern.

During our swamp walk, a flow which did not exist during the dry season was discovered exiting/merging into the flow at the Parkside Elementary drain. It appeared that this new flow relates to the inflow from the ditch on the swamp's south side, goes subterrain, and then emerges.

We also were shown an old dug well (b)(6) along 24th Avenue South, just north of 244th. This farm well is not in use, the pump needs repair.

No obvious pollution was noted during this scanning. However, we did note that considerable dumping of miscellaneous debris throughout the general area, particularly around the swamp and along 25th Avenue.

JC/MB/sr

cc: Dave Bradley
Mark Edens
Pete Kmet
Mike Ruef

State of Washington Department of Ecology

INSPECTION REPORT

To Midway file - groundwater

Inspector Mike Blum

Date of Visit 1/23/86

Permit Number

Name of Entity Midway Landfill

Permit Expires

City Kent County King

New Industry

Person Contacted none

Type of Facility

Receiving Water

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe I sample groundwater from Ecology's methane probes and surface water locations. I used the peristaltic pump to obtain the groundwater samples. I pumped about 5 minutes before taking the sample in a 500 ml poly bottle. I sampled for Temperature, pH, and conductivity as indicators of groundwater contamination (landfill leachate).

Probe/location	Time	Temp °C	pH	cond	comments
28	1345	9.5	5.7	160	lots of water
27	1410	9.6	6.2	95	" " "
21	1450	dry probe			dry probe
25	1455	8.8	7.1	290	silty
Parkside Storm Sewer	1505	6.9	7.4	160	lots of water
18	1530	9.4	6.4	375	" " "
Drainage Ditch by probe 15	1535	6.9	7.3	82	little flow

CC Dave Bradley, Mike Reif, Glynnis Stumpf, Pete Kmet, Jim Oberlander

ECY 040-2-116

State of Washington
Department of Ecology

INSPECTION REPORT

To Midway file - groundwater/seep

Inspector Mike Blum

Date of Visit 1/30/86

Permit Number

Name of Entity Probe R-2 in swamp

Permit Expires

City Kent County King

New Industry

Person Contacted none

Type of Facility probe to sample water from seep

Receiving Water

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe I installed probe R-2 in a seep located within the swamp. Probe R-2 is about 220 feet north of probe #16. Installation includes slotted PVC pipe, cap, and 2-90 pound sacks of pea gravel. The seep produces lots of water with no color nor odor. Sampled water below location of R-2 where water was ~~clear~~ running clear, as the digging made sampling water in the probe very turbid. Turbidity due to surrounding soils being disturbed and pea gravel not being washed.

pH - 6.6
temp - 10.1°C
conductivity 340

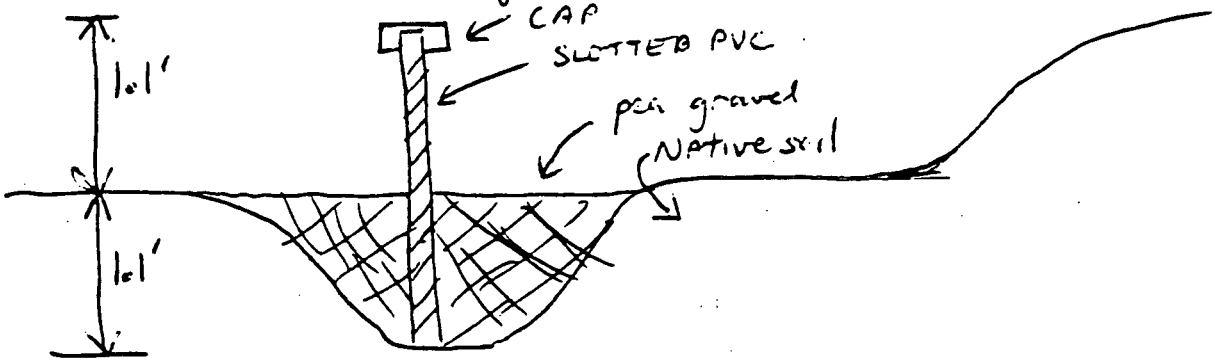
Will sample R-2 another day after silt settles

OVER

CC Dave Bradley, Mike Ruef, Glynnis Stumpf, Jim Oberlander, Pete Kmet

ECY 040-2-116

Completed installation of R-2 at 1500 (hours)



Probe R-2

Looking South

Looking North

State of Washington Department of Ecology

INSPECTION REPORT

To Midway file - groundwater

Inspector Mike Blum

Date of Visit 1/30/86

Permit Number

Name of Entity Trejt Well - 24431-24th Ave So.

Permit Expires

City Kent County King

New Industry

Person Contacted Mrs Trejt

Type of Facility private dug well

Receiving Water

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe (b)(6) family moved into house ((b)(6)) in (b)(6) Dug well was already there. Well is 12.5 feet deep. Family stopped using well 7 years ago. Primary use was for garden and livestock watering. (b)(6) (b)(6) He had told (b)(6) to not use well, as it was too much trouble.

0930 PM (b)(6) Well - brick lined dug well

12.5 feet deep

3.0 feet diameter

2.9 feet to static water level

Obtained sample with peristaltic pump. Water clear, no odor. Temp - 8.8°C

Conductivity 130

pH - 6.0

Over

CC Dave Bradley, Mike Ruef, Jim Oberlander, Pete Kmet, Glynnis Stump

ECY 040-2-116

(b)(6) [redacted] said Ecology may use her well as sampling location. Will require our own pump to purge well, as existing pump does not work.

(b)(6) [redacted] mentioned about "Eco-virus" back in 1969 or 1970. About 20 kids on the street (24th) got sick (headaches, nausea, stiff necks). Also relayed stories ~~fo~~ of faulty and failing septic tanks. Said some of them had been dye tested and their discharges located by health dept.

State of Washington
Department of Ecology

INSPECTION REPORT

To Midway file - Groundwater Sampling Inspector Mike Blum

Date of Visit 2/12/86 Permit Number

Name of Entity Midway Landfill Permit Expires

City Kent County King New Industry

Person Contacted —

Type of Facility —

Receiving Water —

Type of Treatment System —

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Sampled probes and drainage ditch for conductivity (meter #1) and temperature (°C)

Time	Probe	Depth to water	Depth of probe	cond.	temp	other
1415 hrs	9	6"	3'	300	8.4	little water ≈ .5 liters
1430	ditch in front of S. Dahl house			130	—	clear
1640	8	6"	6'	160	7.5	pumped 10 min Sulfur? odor
1655	10	7'	9'	500	9.3	pumped 7 min. ran dry - sulfur odor
1710	6	5.5'	10'	115	7.7	pumped 6 min. ran dry, no odor
1725	~~12~~ 7	3.5'	10'	315	9.3	pumped 6 min, ran dry, no odor
1740	R-2	surface		335	8.2	
1751	17	3.5	4.5	430	6.3	
1820	R-1	near surface		350	6.3	

over

CC Pete K, Dave B, Mike R
Jim O, Glynnis S.

ECY 040-2-116

Took sample of pea gravel from Fred Meyers (used in probes R-1, R2, and R3) and put it in container with tap water. Tap water conductivity was 125. After 2 hours with some agitation, the conductivity rose to 180. After 20 hours, conductivity was 235.

Also spoke with (b)(6) and (b)(6) about history of swamp, methane, odors, water samples, soil samples, and medical diagnosis of (b)(6) children. They both wanted copies of the soil and water samples data near their homes. Said I would send them both copies

State of Washington Department of Ecology

~~#3~~ 1/4

INSPECTION REPORT

To Midway file - groundwater sampling Inspector Mike Blum

Date of Visit 2/12/86 Permit Number

Name of Entity Probes R-3A and 3B - Elsie Hurley Permit Expires

City Kent County King New Industry

Person Contacted (b)(6) - owns rental home at (b)(6)

Type of Facility seep probe.

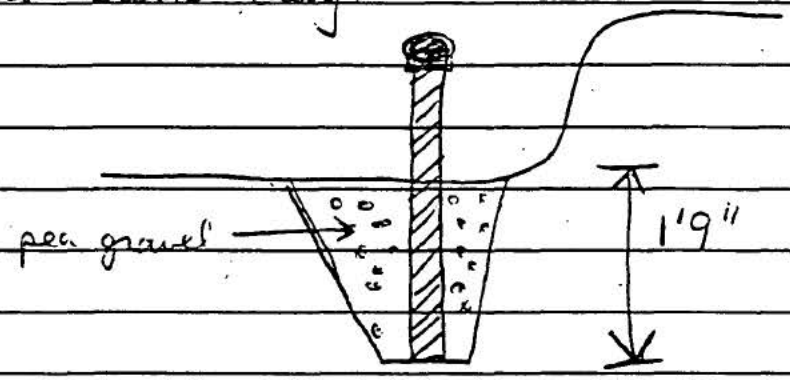
Receiving Water

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Dug hole in back yard below rockery bank. Placed slotted PVC in hole, backfilled w/ pea gravel and called it R-3A. Ground saturated along back bank. No unusual odors noted. Top 6 inches (max) is top soil w/ gravel, and remainder below is slick clay.



Initial conductivity reading of 285, temp 6.0°C on sample of very muddy water.

Hurleys installed drain tile along back bank and ran pipe out to street, near probe R-3B. See sketch.

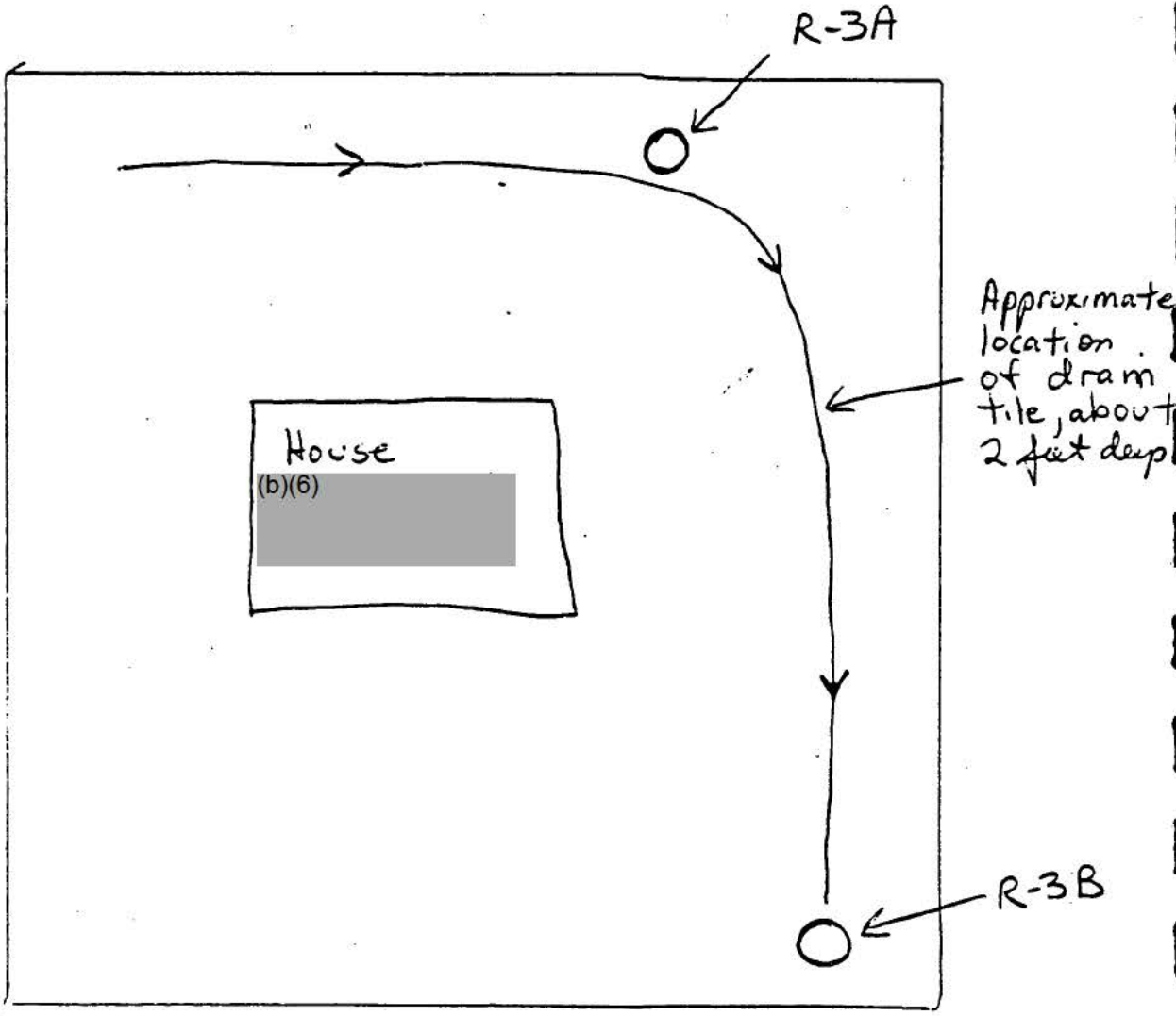
CC Dave B, Pete K, Jim O
Glynis S. Mike R.

(OVER)

ECY 040-2-116

Probe R-3B installed in front yard near street, at exit of drain tile drainage. Hole for R-3B about 12" deep, pea gravel backfill and soil cover. Pipe is slotted 2" PVC.

Back yard is <u>very</u> messy. Dog dropping everywhere and trash scattered about. Home on public sewer. Renters complained of open sores since moving into the house. Inside of house was thick with cigarette smoke.



21st Place So.

See next page for photos —

3/4

State of Washington Department of Ecology

INSPECTION REPORT

To Midway file - g.w. monitoring

Inspector M Blum

Date of Visit 2/12/86

Permit Number

Name of Entity Probes R3A + 3B (continued)

Permit Expires

Probe R-3A

note decomposing sheet rock to left of probe and trash in rear of photo

Probe R3-A

OVER

CC

ECY 040-2-116

Probe R3-B

21st Place S.

State of Washington
Department of Ecology

INSPECTION REPORT

To Midway file – surface water

Inspector Mike Blum

Date of Visit 1/30/86

Permit Number

Name of Entity Harvey's Dive Shop Area

Permit Expires

City Kent County King

New Industry

Person Contacted Receptionist – Harvey's Dive Shop

Type of Facility

Receiving Water

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

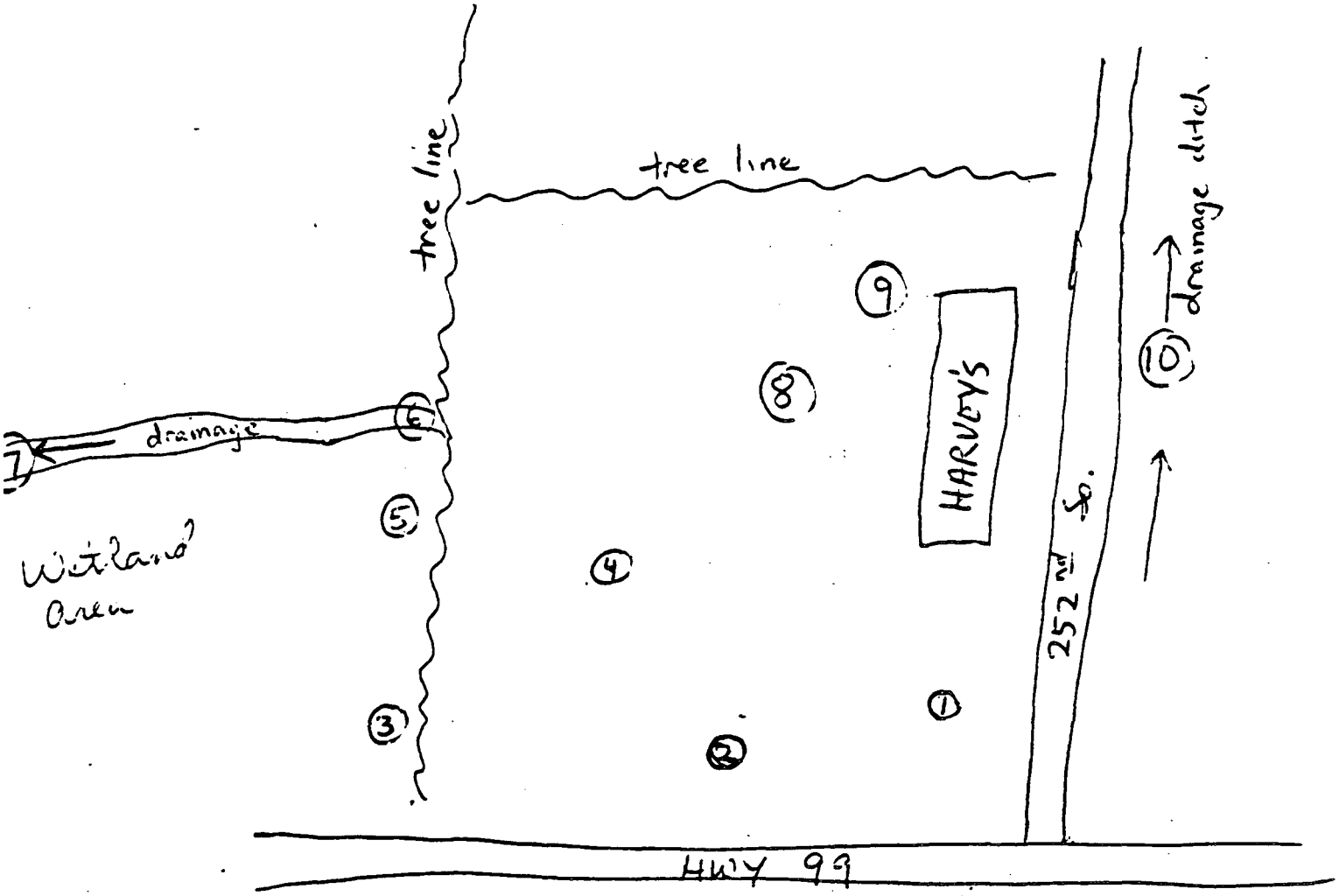
☐ Does not comply with permit conditions

Describe Walked the area surrounding Harvey's Dive Shop, sampling surface water (ponded and flowing) for conductivity. Weather was cool and sunny. Conductivity readings were adjusted for temperature, but temp was not recorded. Sampling was done between 1515 and 1630 hours. Sample locations and conductivity readings are on the back.

Also spoke with (b)(6) who lives on property behind Sleepine (Hwy 99) along (b)(6) Also owner of property, (b)(6), has lived on the area for 35 years. Maybe source of frustrated info. (b)(6) says the standing water in wetlands area north of his house, between home and Harvey's, sometimes really stinks. No odors noted during my survey.

cc Dave B, Jim O, Mike R, Glynn S, Pete R.

ECY 040-2-116



Conductivity readings

1. 15
2. 30
3. 150
4. 260
5. 60
6. 70
7. 60
8. 65
9. 40
10. 65

State of Washington
Department of Ecology

INSPECTION REPORT

To Midway file - Surface water

Inspector Mike Blum

Date of Visit 2/6/86

Permit Number

Name of Entity Saltwater State Park

Permit Expires

City Des Moines County King

New Industry

Person Contacted Park manager

Type of Facility State Park

Receiving Water Creek and Puget Sound

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Walked the creek flowing through Saltwater State Park, checking it and any seeps for Conductivity, temp., and color. Lots of hillside seeps. Nothing unusual noted.

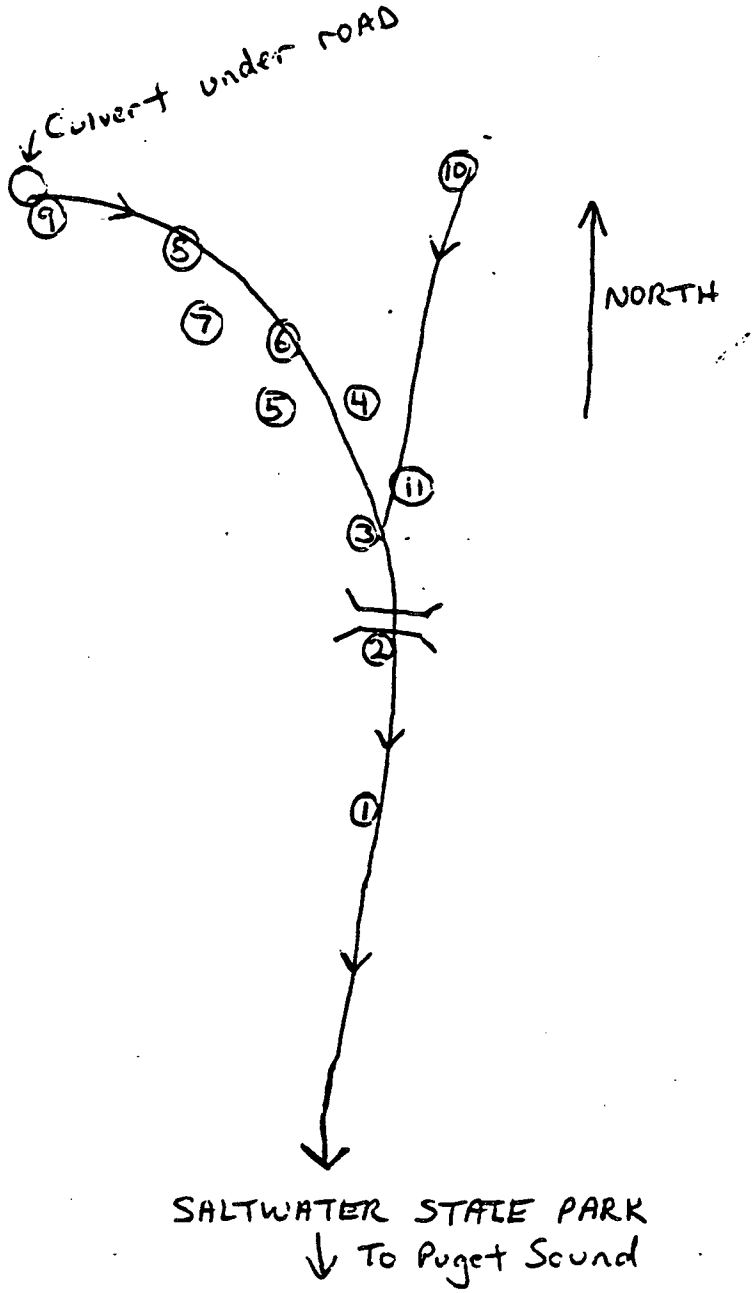
Location	Time	Temp °C	Cond.	OTHER
1	1600 hrs.	6.0	140	fairly clear - yellow/brownish
2	1603	6.7	210	clear, 1/4 gal per min.
3	1605	6.8	175	clear
4	1608	6.8	200	no flow, skunk cabbage
5	1615	—	5	clear
6	1625	7.2	170	clear
7	1630	6.3	160	clear, 1/2 gpm
8	1635	7.5	175	clear
9	1642	7.5	160	slight grey color
10	1648	6.2	130	—
11.	1655	6.2	140	yellow-brown hue

CC Dave B, Pete K, Jim C, Mike R, Glynnis S.

OVER

ECY 040-2-116

Location	Other comments
1.	near parking lot
2.	drainage ~~cult~~ culvert under bridge
3	North fork past bridge
4.	Hillside seep, east of creek
5	Hillside seep/spring, west of creek
6.	creek sample
7.	no odor, seep, west of creek
8	creek sample
9.	creek sample at culvert discharge
10.	drainage from street
11.	creek sample, upstream of fork



Weather was mild and sunny. Spoke w/ Park Manager. He had been at Saltwater Park for 2½ years. Has not noticed any seeps which look unusual, smell funny, etc. Generally, creek flow is clear, except after rains, then the flow is muddy.

State of Washington
Department of Ecology

INSPECTION REPORT

To Midway file - surface water

Inspector Mike Blum

Date of Visit 2/12/86

Permit Number

Name of Entity Midway landfill

Permit Expires

City Kent County King

New Industry

Person Contacted none

Type of Facility Midway Landfill

Receiving Water ground

Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

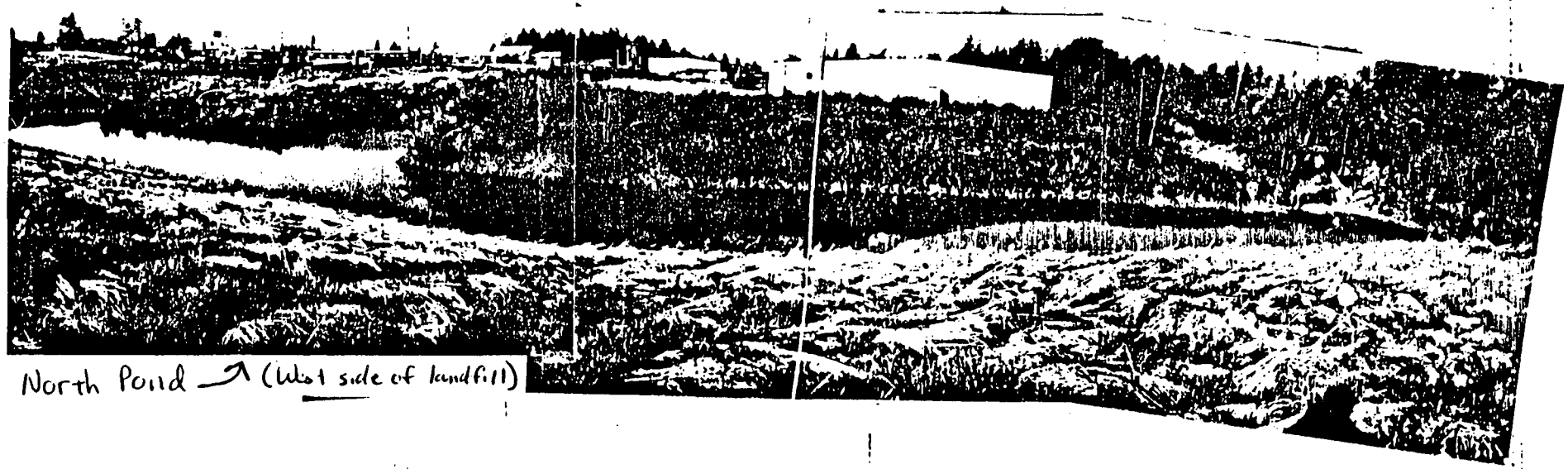
☐ Does not comply with permit conditions

Describe I walked and drove the landfill and took the following photos of the surface water ponds. No samples were taken. Weather was clear and sunny

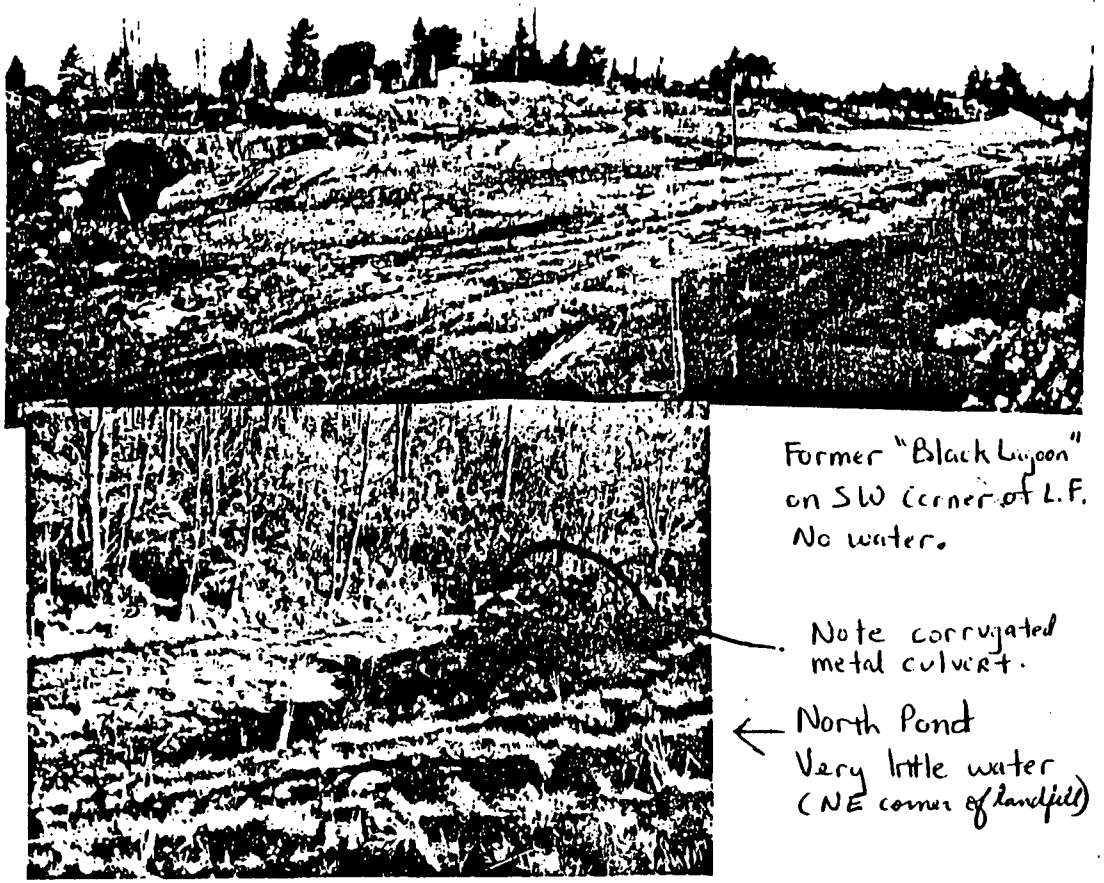
West Pond - Area from which water is pumped into tanker trucks

CC

ECY 040-2-116



North Pond → (West side of landfill)



Former "Black Lagoon" on SW Corner of L.F. No water.

Note corrugated metal culvert.

← North Pond
Very little water
(NE corner of landfill)

APPENDIX Q

OFF-SITE STORM WATER MANAGEMENT PLAN ALTERNATIVES

TECHNICAL MEMORANDUM

MIDWAY LANDFILL CLOSURE PLAN
SUPPLEMENTAL OFF-SITE
SURFACE WATER MANAGEMENT PLAN ALTERNATIVES

For

Seattle Engineering Department
Solid Waste Utility

By

Parametrix, Inc.
13020 Northup Way, Suite 8
Bellevue, Washington 98005
PMX #55-1550-08

April 30, 1986

TECHNICAL MEMORANDUM

MIDWAY LANDFILL CLOSURE PLAN
SUPPLEMENTAL OFF-SITE
SURFACE WATER MANAGEMENT PLAN ALTERNATIVES

TABLE OF CONTENTS

		Page
I.	PURPOSE AND SCOPE	1
II.	DESCRIPTION OF SUPPLEMENTAL OFF-SITE DISCHARGE ALTERNATIVES	3
	A. Tightline to 20th Avenue South So That Flows Bypass the Wetland and Parkside Elementary School	5
	B. Tightline on 250th Street	8
	C. Tightline on 252nd Street	10
	D. Wetland Discharge Route	12
	E. Southerly Drainage Routes	19
III.	COMPATIBILITY WITH DRAFT ENVIRONMENTAL IMPACT STATEMENT, PUBLIC HEARING TESTIMONY AND WRITTEN COMMENTS	25
	A. Tightline to 20th Avenue That Bypasses the Wetland and Parkside Elementary School - 246th Street Route	26
	B. 250th Street Route	26
	C. 252nd Street Route	27
	D. Wetland Discharge Alternative	28
	E. Southerly Drainage Routes	28
IV.	ESTIMATED COSTS	29
V.	COMPARISON OF SURFACE WATER MANAGEMENT PLAN ALTERNATIVES	31
	A. I-5/East Drainage System	31
	B. Detention Facilities	32
	C. Highway 99/West Discharge Route	33

		Page
VI.	RECOMMENDATION OF PREFERRED ALTERNATIVE	39
	A. I-5/East Drainage System	39
	B. Detention Facilities	39
	C. Highway 99/West Discharge Route	39

LIST OF FIGURES

Figure 1	Midway Landfill Surface Water Management Plan Supplemental Alternatives - On-Site Detention Basin	4
Figure 2	Midway Landfill Surface Water Management Plan Supplemental Alternatives - 246th Street Pipeline Route	7
Figure 3	Midway Landfill Surface Water Management Plan Supplemental Alternatives - 248th Street Pipeline Route	9
Figure 4	Midway Landfill Surface Water Management Plan Supplemental Alternatives - 250th Street Pipeline Route	11
Figure 5	Midway Landfill Surface Water Management Plan Supplemental Alternatives - 252nd Street Pipeline Route	13
Figure 6	Midway Landfill Surface Water Management Plan Supplemental Alternatives - Wetland Discharge Route	15
Figure 7	Midway Landfill Surface Water Management Plan Supplemental Alternatives - Potential Southerly Routes	20

LIST OF TABLES

Table 1	Midway Landfill Surface Water Management Plan Supplemental Alternatives - Estimated Costs	30
Table 2	Midway Landfill Closure Surface Water Management Plan Comparison of Off-Site Pipeline Route Alternatives	35

I. PURPOSE AND SCOPE

In August 1985 the City of Seattle issued the Draft Environmental Impact Statement for the Midway Landfill Closure Plan. The DEIS included four off-site surface water management plan alternatives with Puget Sound discharge. These were:

- Puget Sound Discharge Alternative with Off-Site Detention. This would include a pipeline that would discharge storm water from the Midway Landfill to the vicinity of an existing natural wetland detention basin near Parkside Elementary School where a new detention basin would be constructed. Another pipeline would discharge from this new detention basin around Parkside Elementary School to the North Fork of Smith Creek near 20th Avenue.

- Puget Sound Discharge with On-Site Detention. This would include a detention basin at the landfill site, a pipeline that would discharge storm water flows from the on-site detention basin to the natural wetland detention basin and another pipeline that would discharge from the wetland around Parkside Elementary School to the North Fork of Smith Creek near 20th Avenue.

- Puget Sound Discharge with No Detention. This would include a pipeline that would carry storm water flows from the landfill running southerly behind properties on the west side of Highway 99 to 250th Street and then westerly on 250th Street to near 16th Avenue where it would discharge into the North Fork of Smith Creek.

- Tightline to Puget Sound. This would include a pipeline that would follow the same route as the No Detention alternative to near 16th Avenue. At that point, it would continue westerly on 250th and 251st Streets, southerly on 11th Avenue into Saltwater State Park and then westerly paralleling Smith Creek to Puget Sound. This alternative had both on-site and no detention variations.

Testimony given at public hearings on the project and written comments received by the City indicate that there is concern with using the wetland area for a detention basin and routing flows to this basin. Concern was also expressed over using 250th Street for the pipeline route. As a result, the City of Seattle, Solid Waste Utility directed Parametrix, Inc. to investigate additional off-site surface water management plan alternatives that would include an on-site detention basin and a pipeline discharging as follows:

A. Tightline to the vicinity of 20th Avenue so that flows bypass the natural wetland and Parkside Elementary School.

B. Tightline on 250th Street to the vicinity of 16th Avenue.

C. Tightline on 252nd Street to the vicinity of 16th Avenue.

After presenting these alternatives to the City of Seattle, Parametrix was subsequently directed to investigate another alternative that would include on-site detention and a pipeline that would discharge west of the landfill site at the closest natural drainage course. Investigations indicated that this point would be near the eastern edge of the natural wetland area and within the City of Kent corporate limits. This discharge alternative is designated as the Wetland Discharge route.

This technical memorandum presents these alternatives. These new alternatives are variations to the previously described Puget Sound Discharge Alternative With On-Site Detention that is included in the DEIS for the Midway Landfill Closure Plan. Collection and routing of storm water flows from east of I-5, the on-site detention basin and diversion of some Highway 99 drainage into the on-site basin would be the same for these new atlernatives as described in the DEIS for the On-Site Detention Alternative.

Additionally, the City of Seattle requested Parametrix to undertake a brief review of drainage courses immediately south of the Midway Landfill to determine the potential feasibility of routing storm water flow from the landfill to the south. The results of this investigation are presented in this technical memorandum.

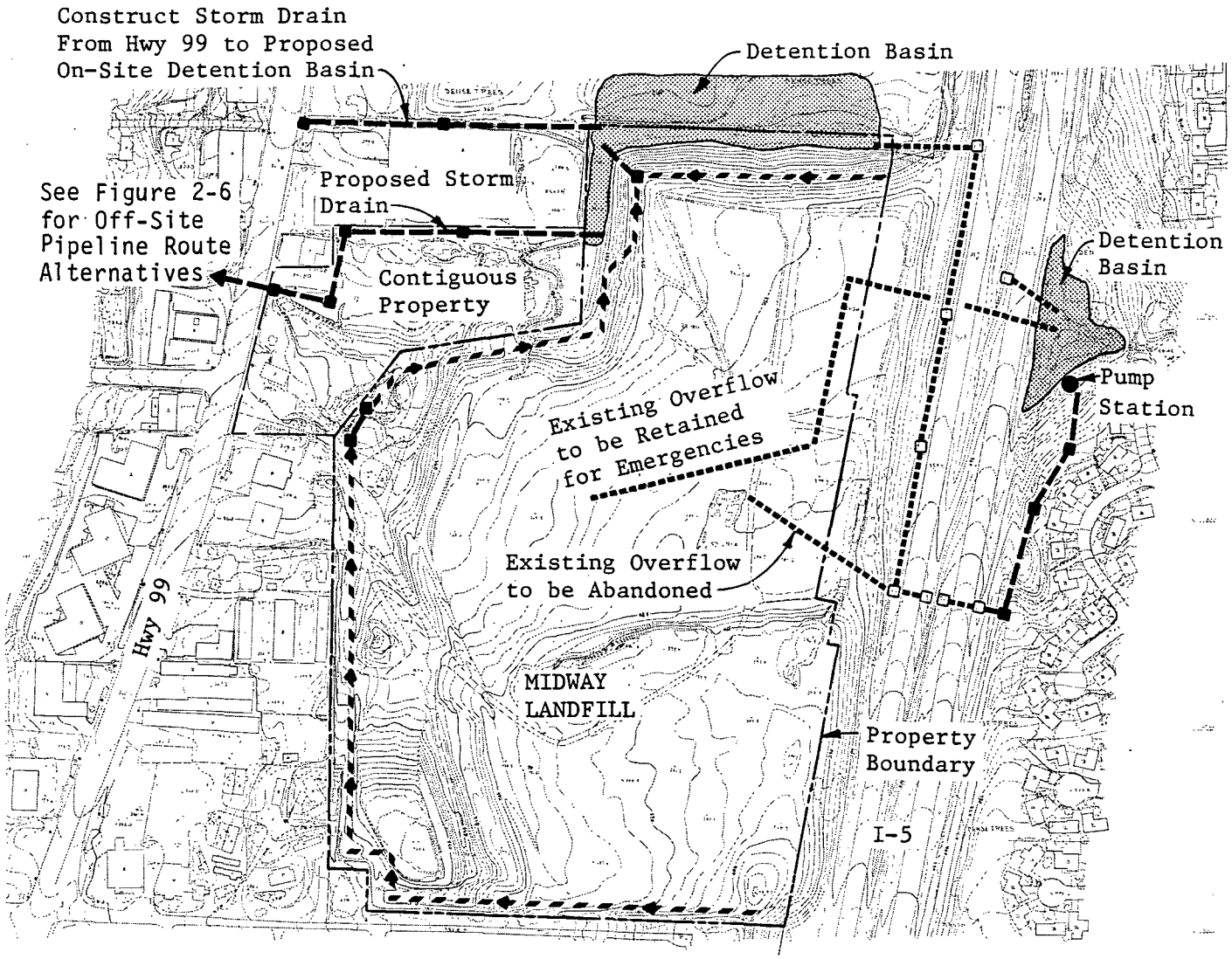
The DEIS did not include an evaluation of the storm water management alternatives or a selection of the preferred alternative. A final purpose of this technical memorandum is to compare all storm water management alternatives and make a recommendation as to the preferred alternative.

This technical memorandum focuses on the additional off-site surface water management plan alternatives for routing the pipeline from the landfill to the discharge point in Smith Creek or other natural drainage courses. The alternative routes are described, compatibility with public hearing testimony and written comments are discussed for each alternative route and estimated projects costs for each alternative route are presented, along with total estimated costs for the entire On-Site Detention Alternative using these alternative pipeline routes. The level of detail of the preliminary design and the accuracy of the cost estimates for these pipeline route alternatives are the same as for the Surface Water Management Plan Alternatives in the DEIS to allow a valid comparison. A comparison of alternatives is presented and a recommendation of the Preferred Alternative is included.

Investigations of the southern drainage courses focus on potential routes that were determined after field investigations and study of topographic maps of the area. Existing drainage patterns and drainage facilities are identified, potential routes are described and the potential problems with these routes into the southerly drainage basin are discussed. No hydraulic computations or calculations were performed for the south drainage basin routes, nor were detailed cost estimates prepared. The routes are compared to the Tightline on 252nd Street discharge alternative for the most part, and one of the southerly basin routes was identified as a potential variation to the 252nd Street discharge route.

II. DESCRIPTION OF SUPPLEMENTAL OFF-SITE DISCHARGE ALTERNATIVES

All of the pipeline alternatives would use a common route for the pipe from the on-site detention basin to the west side of Highway 99. This on-site portion of the discharge pipe would be about 1,000 feet in length and would follow the north westerly boundary of the landfill and the north boundary of the contiguous property to Highway 99. The pipe would cross under Highway 99 near the existing secondary access road into the landfill. After crossing under Highway 99 the pipeline route



N

0 200 400
Scale in Feet

Existing Storm Drain
Proposed Storm Drain
Future Open Channel
Ditch/Drainage Swale

FIGURE 1: MIDWAY LANDFILL
SURFACE WATER MANAGEMENT
PLAN SUPPLEMENTAL ALTERNATIVES
ON-SITE DETENTION BASIN

would be different for each of the alternatives as discussed below. The on-site portion that would be common to all of the alternatives is shown in Figure 1. It is estimated that this portion of the pipeline would be 30 inches in diameter to handle the storm water discharge for the 25-year design storm. Because an overflow would be provided at the detention basin for storms that exceed the 25-year design storm, the pipeline might have to be slightly larger than 30 inches in diameter to handle these storms. As with the On-Site Detention Basin Alternative in the DEIS, all of these alternatives would include diversion of some of the storm water flows from Highway 99 into the on-site detention basin so that the combined peak discharge from the basin and the undiverted portion of the surface water drainage would not exceed the present peak flow at the point of discharge to Smith Creek.

A. Tightline to 20th Avenue South So That Flows Bypass the Wetland and Parkside Elementary School

Two possible routes were investigated for flow bypass of the wetland and Parkside Elementary School. The first is north of the wetland and the school on 246th Street. The second passes south of the wetland and the school on 248th Street.

1. 246th Street Route

After crossing under Highway 99, the pipeline would continue westerly for about 100 feet and then turns northerly following the right-of-way for 27th Avenue to 246th Street. An easement would be required for the portion between Highway 99 and 27th Avenue. Additional easements might be necessary if 27th Avenue right-of-way is insufficient.

On 246th Street the pipeline would continue westerly crossing the northern end of the wetland area to 24th Avenue. The portion of the pipeline that crosses the north end of the wetland would require substantial foundation stabilization by overexcavating and backfilling with granular material or possibly using piling supports because of deep peat soils that will not provide a firm foundation. Recently, construction of a sewer line along this same portion of the route was reportedly abandoned because of the unstable bottom conditions.

From 246th Street and 24th Avenue, the pipeline would continue westerly for about 300 feet to the eastern property line of Parkside Elementary School. This 300-foot portion would require an easement. Once on the school property, the pipeline would run northerly and then westerly along the east and north property lines until it ended at the North Fork of Smith Creek. An easement would be required for the portion of pipeline on the school property.

The total length of the pipeline from Highway 99 to the discharge point in the North Fork of Smith Creek east of 20th Avenue would be about 2,900 feet. This discharge point would be the same as the discharge point with the On-Site Detention Basin Alternative in the DEIS. Pipe size would vary from 18 to 30 inches in diameter, depending on the pipeline slope. As with the On-Site Detention Alternative in the DEIS, culvert improvements at 245th Place, 246th Place and 20th Avenue would be provided to correct existing under-capacity conditions. This pipeline route alternative is shown in Figure 2.

2. 248th Street Route

After crossing under Highway 99, the pipeline would continue westerly and southwesterly to the right-of-way for 26th Place. This portion of the pipeline would require an easement. The pipeline would then continue southerly on 26th Place right-of-way to 248th Street. On 248th Street the pipeline would proceed westerly until it reached the North Fork of Smith Creek.

About 200 feet of the pipeline east of 23rd Avenue would cross the southern end of the wetland area where there presently is no roadway. To facilitate construction of the pipeline, a road would be constructed along this short section. Depending on soil conditions, extensive over excavation and backfilling with granular material may also be necessary along this portion of the pipeline. West of 20th Avenue the pipeline would require an easement. The discharge point would be at the

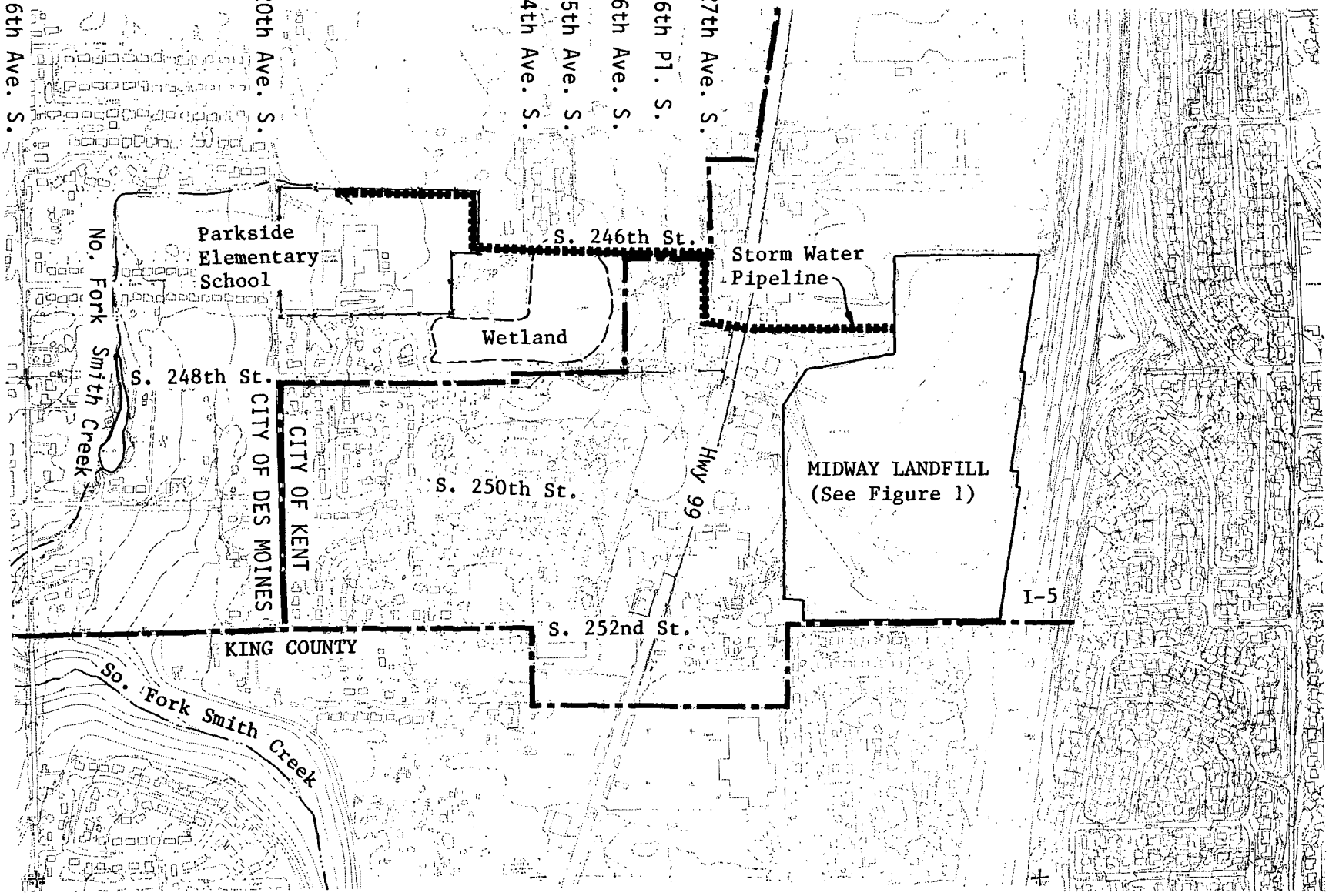


FIGURE 2: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES 246th STREET PIPELINE ROUTE

upstream end of a small pond in the North Fork of Smith Creek located on private property. Easements would be necessary for access and maintenance.

The total length of this pipeline would be about 3,600 feet. It is estimated that the pipeline size would vary from 18 to 30 inches in diameter depending on its slope. No downstream improvements to Smith Creek are proposed with this alternative route because the discharge from the on-site detention basin would be limited so that it doesn't exceed existing peak discharges. This alternative route is shown in Figure 3.

Both the 246th Street route and the 248th Street route would meet the objective of routing the flow so that it bypasses the wetland and Parkside Elementary School. The 248th Street route would offer the advantage of construction activities bypassing the school grounds all together. However, the disadvantages of this route, namely the location of the discharge point, the impact on adjacent properties during construction and the additional length which would result in more cost, would outweigh that advantage. Therefore, the 248th Street route is not as desirable an alternative as the 246th Street route for bypassing the wetland the school and will not be considered any further unless subsequent studies determine the 246th Street route to be unfeasible.

B. Tightline on 250th Street

The route of this pipeline would be the same as described for the No Detention Alternative in the DEIS. Because on-site detention would be provided, however, the size of the pipeline would be smaller than with the No Detention Alternative.

The pipeline would follow the same route from Highway 99 to 248th Street as previously described for the 248th Street route. From 248th Street the pipeline would continue southwesterly behind the properties located on the west side of Highway 99 to 250th Street. This section would require an easement.

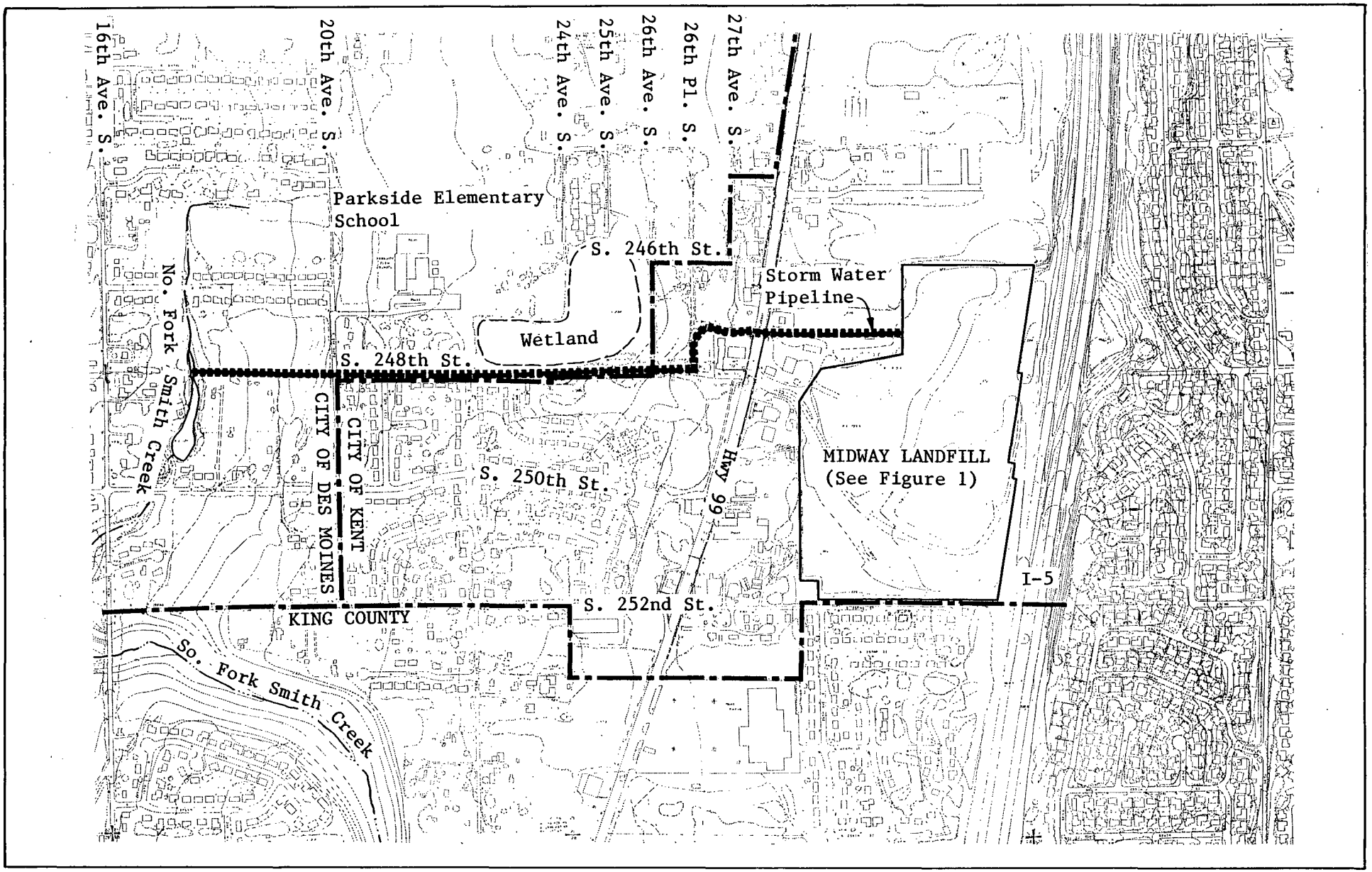


FIGURE 3: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES 248th STREET PIPELINE ROUTE

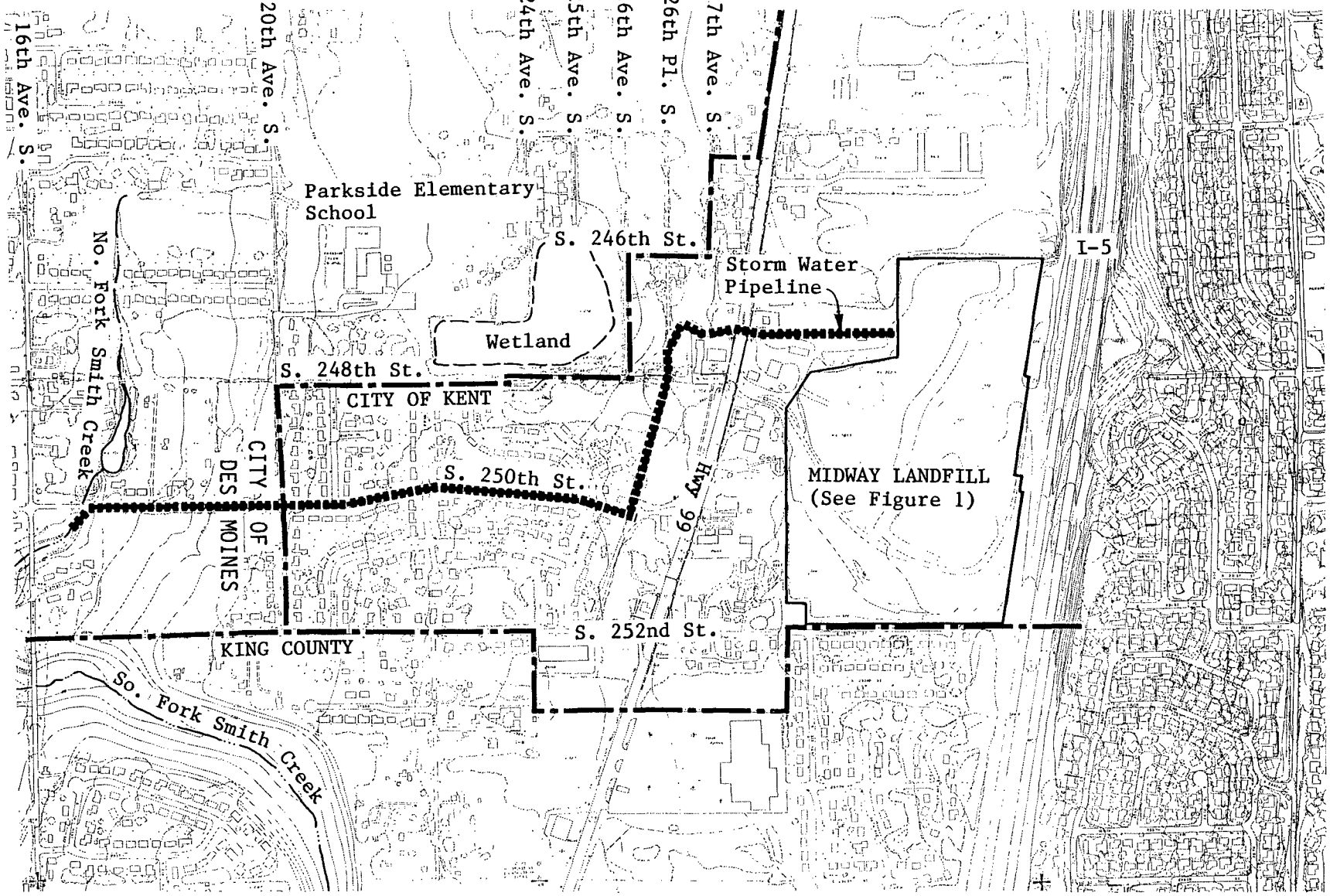
At 250th Street the pipeline would turn westerly and follow 250th Street until it reached the North Fork of Smith Creek near 16th Avenue. The pipeline would discharge into the North Fork of Smith Creek at this point.

This route is shown in Figure 4. The total pipeline length would be about 4,400 feet. Pipe size would vary from 18 to 30 inches in diameter depending on the slope. Because the on-site detention basin would limit the discharge so that it doesn't exceed the existing peak flows, no downstream improvements would be included with this alternative route.

C. Tightline on 252nd Street

With this route the pipeline would follow the same alignment as with the 250th Street alignment to 250th Street west of the properties on the west side of Highway 99. From this point, the pipeline would continue southwesterly to 252nd Street. This portion of the pipeline would require an easement. The pipeline would then proceed westerly on 252nd Street to 16th Avenue. The westerly 1,000 feet of this portion of the route would be on an undeveloped section of 252nd Avenue and would require construction of a road for construction equipment access. Depending on the width and location of the right-of-way, easements might also be necessary along this portion of the pipeline. This route to this point would be entirely within the City of Kent and King County.

At 16th Avenue, the pipeline could proceed either northerly to the North Fork of Smith Creek, westerly to the North Fork or southerly to the South Fork, depending on its ability to comply with the requirements of different entities. The route to the north would enter the City of Des Moines and be subject to that City's requirements. The route to the west would be within Salt Water State Park and would require an easement from the State Parks Commission. The route to the south enters the South Fork drainage basin and would have to be able to comply with the King County Surface Water Ordinance. The route to the South Fork is about 200 feet shorter than either of the other two and would not disrupt any traffic or access to residences on the east side of 16th Avenue, so it might be preferrable, assuming compliance with King County's ordinance. Following this route, the pipeline would proceed down the steep hillside to the creek. Slope anchors would be provided for this short section.



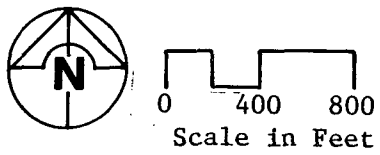


FIGURE 4: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES 250th STREET PIPELINE ROUTE

An energy dissipator at the bottom of the slope would be provided to slow the velocity of the flow prior to discharge into Smith Creek. No other downstream improvements would be included as the discharge would be limited so as not to exceed existing peak flows.

The total length of the off-site pipeline for this alternative route would be about 5,200 feet. The size of the pipe is estimated to vary from 18 to 30 inches in diameter, depending on the slope. This route alternative is shown in Figure 5.

D. Wetland Discharge Route

With this alternative, the pipeline would follow the approximate route of the natural drainage from Highway 99 on the west side of Midway Landfill to the nearest point where it can end in an existing drainage course. This location would be near the eastern edge of the natural wetland area and within the City of Kent corporate limits.

After crossing under Highway 99, the pipeline would continue westerly for about 100 feet and then turn northerly following the right-of-way for 27th Avenue until it would be approximately 150 feet south of 246th Street. Up to this point, the alignment would be the same as that of the 246th Street route. At this point the pipeline route would turn west and continue for approximately 400 feet to where it would discharge into a natural drainage course that flows directly into the wetland a short distance away. The discharge point would be a short distance east of 26th Avenue South and approximately 150 feet south of 246th Street. There would be no construction activity in the wetland itself. However, drainage problems that are presently occurring between Highway 99 and the wetland would be corrected.

The total length of the pipeline from Highway 99 to the discharge point would be about 900 feet. Pipe size would vary from 18 to 30 inches in diameter, depending on the pipeline slope. The location of the discharge point with this alternative would be the same as the discharge point to the wetland with the

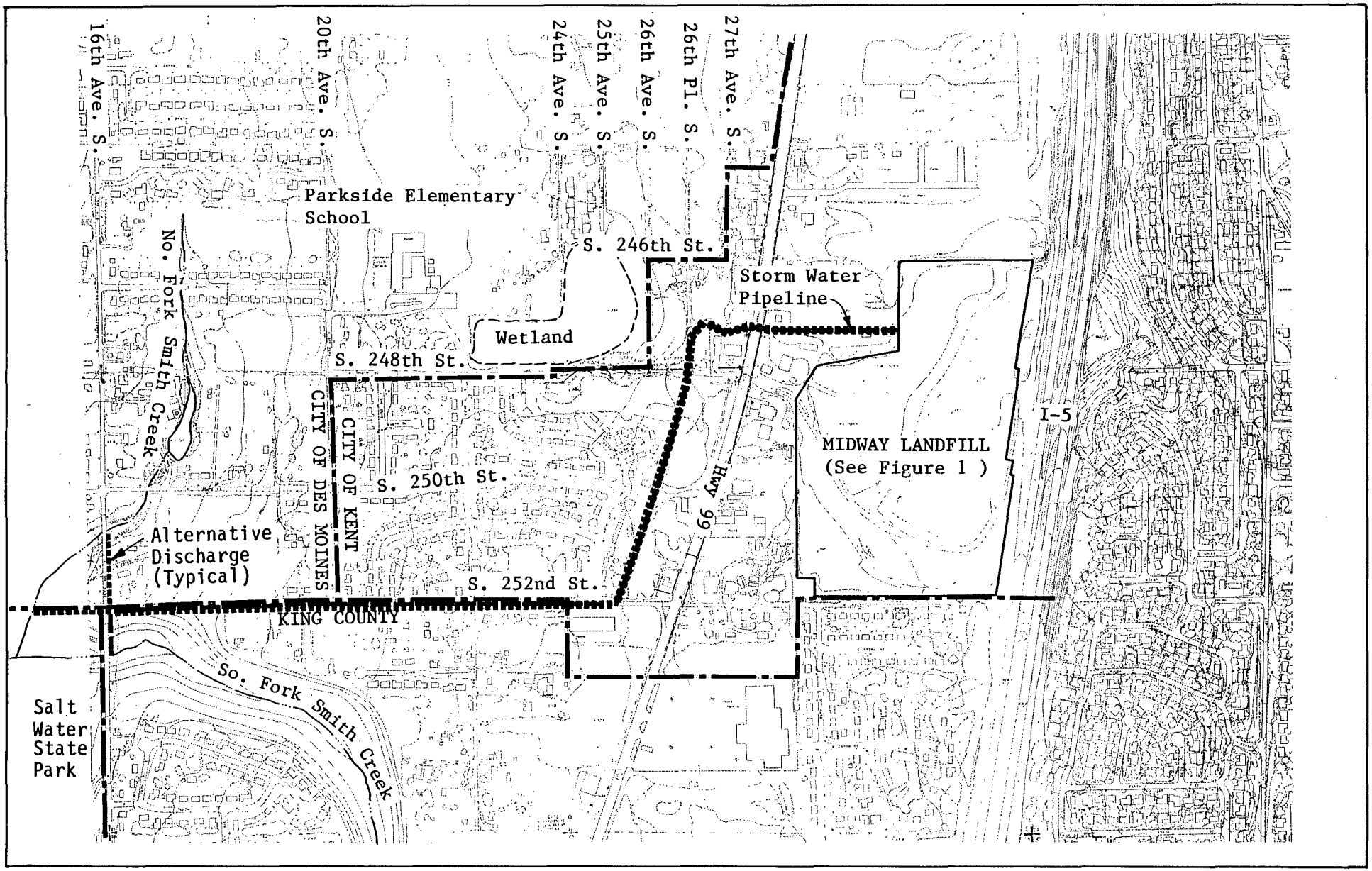


FIGURE 5: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES 252nd STREET PIPELINE ROUTE

On-Site Detention Basin Alternative in the DEIS. Because of the fairly steep pipeline slope just prior to the discharge point, an energy dissipator would be provided to slow the velocity of the flow prior to discharge into the natural drainage course that leads to the wetland. Nearly all of this route would be located on private property and easements from several property owners would be reuqired. This alternative is shown in Figure 6.

The discharge point for this alternative is located within the City of Kent. Therefore, this alternative would be subject to compliance with the City of Kent Surface Water Drainage Code (Ordinance No. 2130). A review of this ordinance and discussions with City of Kent Engineering Department personnel indicate that it is very similar to the King County Surface Water Runoff Policy and that facilities designed to comply with King County requirements would also comply with the City of Kent requirements. Because all Surface Water Management Plan Alternatives for the closure of the Midway Landfill are intended to comply with King County requirements, this alternative would not be subject to significant additional requirements to comply with the City of Kent ordinance.

This alternative is essentially the same as the On-Site Detention Basin Alternative in the DEIS, except that no additional improvements downstream of the discharge point would be included with the Wetland Discharge Alternative. Thus, except as possible mitigating measures, there would be no correction of the present drainage problems that are occurring at Parkside Elementary School and no increased culvert capacity at 20th Avenue South, 245th Place or 246th Place. By design, this discharge alternative would not increase the peak discharge from the 25-year storm. However, the school drainage system and the road culverts were identified as being under-capacity for the 25-year design storm in work done for the DEIS. A storm event that occurred subsequent to the issuance of the DEIS presented an opportunity to verify the extent of the problem at these locations and to check the assumptions made to determine capacities of existing facilities for the DEIS work.

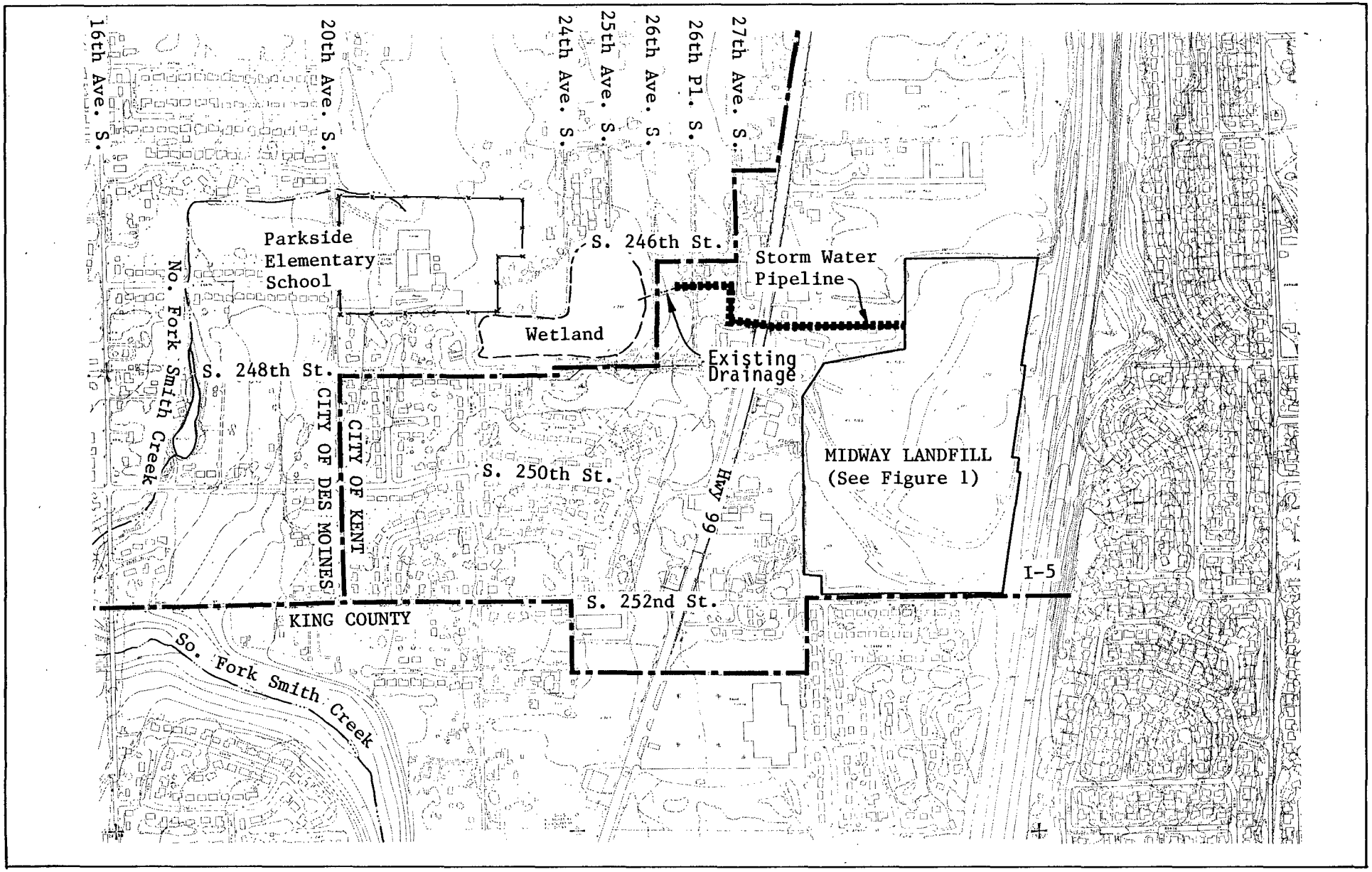


FIGURE 6: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES WETLAND DISCHARGE ROUTE

On January 17 and 18, 1986 a storm occurred that resulted in a 24-hour period precipitation amount of 3.22 inches recorded at Sea-Tac Airport. Because final records for the month of January are not available as of this date from the National Weather Service, the actual duration of this storm event is not known, nor is the hourly distribution of the total precipitation. News reports after this storm event cited sources that indicated it approached the 100-year storm event in some areas of the Puget Sound Region. Twenty-four hour precipitation maps for various recurrence intervals prepared by the Weather Bureau for the Soil Conversation Service, dated September 1970, indicate the following:

Recurrence Interval	24-Hour Precipitation
100 year	4.0 inches
50 year	3.7 inches
25 year	3.4 inches
10 year	2.9 inches
5 year	2.5 inches

Without knowing the actual duration of the storm, it is not possible to accurately estimate the recurrence interval, but from the above information it appears that the January 17-18 storm was at least close to the 25-year storm at Sea-Tac Airport and might have been greater. Because Sea-Tac is close to the Midway Landfill site, it is assumed that the precipitation in the vicinity of the landfill was similar.

In a telephone conversation with City of Des Moines Engineering Department personnel (Mr. Ron Longhi, February 24, 1986), it was confirmed that areas of the City experienced flooding on the dates of the storm. City personnel were not aware of any flooding problems in the North Fork of Smith Creek drainage area and there were no reports of street flooding at 20th Avenue, 245th Place or 246th Place. City personnel indicated that the culverts may have been restricting the flows somewhat, however, because of inadequate capacity.

From telephone conversations with Highline School District personnel (Mr. Blaine Larson and Mr. Paul Bray, February 24, 1986), it was learned that there were substantial flooding problems at Parkside Elementary School. The buildings were not threatened, but the playground was pretty bad and somewhat worse than in the past. The water was flowing over the playground from the southeast corner (near the wetland) to the northwest corner where it could get into the drainage channel of the North Fork of Smith Creek. School District personnel indicated that the storm drainage system is not adequate and the school district may have to proceed to improve it this year. The playground flooding was over by January 21 when these School District personnel went to the school.

Parametrix personnel made field investigations of the school grounds and the culvert locations on three occurrences between January 24 and March 3. No evidence of any extensive damage as a result of flooding was observed. The creek near each of the culverts showed evidence of recent high flows, but there was no new major erosion or other damage. It appeared the creek had handled the flow from the storm with little, if any, problems. The school playgrounds were quite muddy and saturated with water in places where the flows had gone overland. Apparently the under-capacity storm drainage system at Parkside Elementary School is restricting discharges to the downstream sections of the North Fork of Smith Creek and the wetland area is functioning as a natural detention basin until the water depth becomes sufficient to allow overland flow across the school playground.

From the previous investigations it is apparent that although certain existing drainage facilities in the North Fork of Smith Creek basin and the school facilities in particular may be under-capacity for the 25-year storm, because of the natural wetland area detention, the problems they are causing are not too substantial and appear to be of short-term duration. The assumptions previously made in determining the flows in the existing system appear to not have fully considered the detention being provided by the wetland area as a result of the restriction caused by the under-capacity school storm drainage

system. Therefore, as long as the Wetland Discharge Alternative includes provisions to limit the peak discharge from the 25-year storm so as not to exceed the existing peak discharge to the wetland area, no additional downstream improvements would appear to be necessary.

By limiting the discharge to the wetland area so that it does not exceed the existing peak discharge, the existing flooding condition in the wetland area and at the school would not become more extensive. However, because more water would be routed through the area, the duration of the existing flooding conditions would be extended. Although detailed computations have not been prepared, it is estimated that this extended duration would be one day for the 25-year design storm.

Because the Wetland Discharge Alternative would extend the duration of an existing flooding condition at Parkland Elementary School, mitigating measures should be considered. By increasing the capacity of the school storm drainage system, the existing flooding of the wetland area and the playground could be reduced or eliminated. The increased capacity of the school storm drainage system would result in increased flow in the downstream sections of the North Fork of Smith Creek, however. To allow for this increased flow without causing increased flooding, the capacity of the culverts at 20th Avenue, 245th Place and 246th Place would have to be increased. It appears that the North Fork of Smith Creek channel would be adequate for this increased flow and, as long as the increased culvert capacities were provided, there would not be any increased extent of flooding near the channel. It should be noted that this increased flow in the North Fork of Smith Creek would be solely the result of increasing the capacity of the school storm drainage system and the increased flow would occur even without the discharge to the wetland area of surface water from the Midway Landfill. Mitigation of existing flooding conditions by improving the school storm drainage system and downstream culverts will be pursued with the School District and the City of Des Moines if the Wetland Discharge Alternative is selected as the preferred alternative.

E. Southerly Drainage Routes

Four potential routes to the south of the Midway Landfill were identified after field investigations and review of topographic maps of the area. The potential routes are shown on Figure 7. Two of the routes, Route 1 and 2, would use a gravity pipeline to the south that follows the previously described 252nd Street route for part of their length. Because of this, these routes are compared to the 252nd Street route. The other potential routes, Route 3 and 4, would use a pump station and force main because of topographical constraints to reach their discharge point. The four potential routes and some of the advantages and disadvantages of each are discussed below.

Route No. 1

This route would be similar to the storm route on 252nd Street, but it would not proceed west to 16th Avenue. At 22nd Avenue the storm line would proceed south to 253rd Street, then west to Smith Creek as shown on Figure 7.

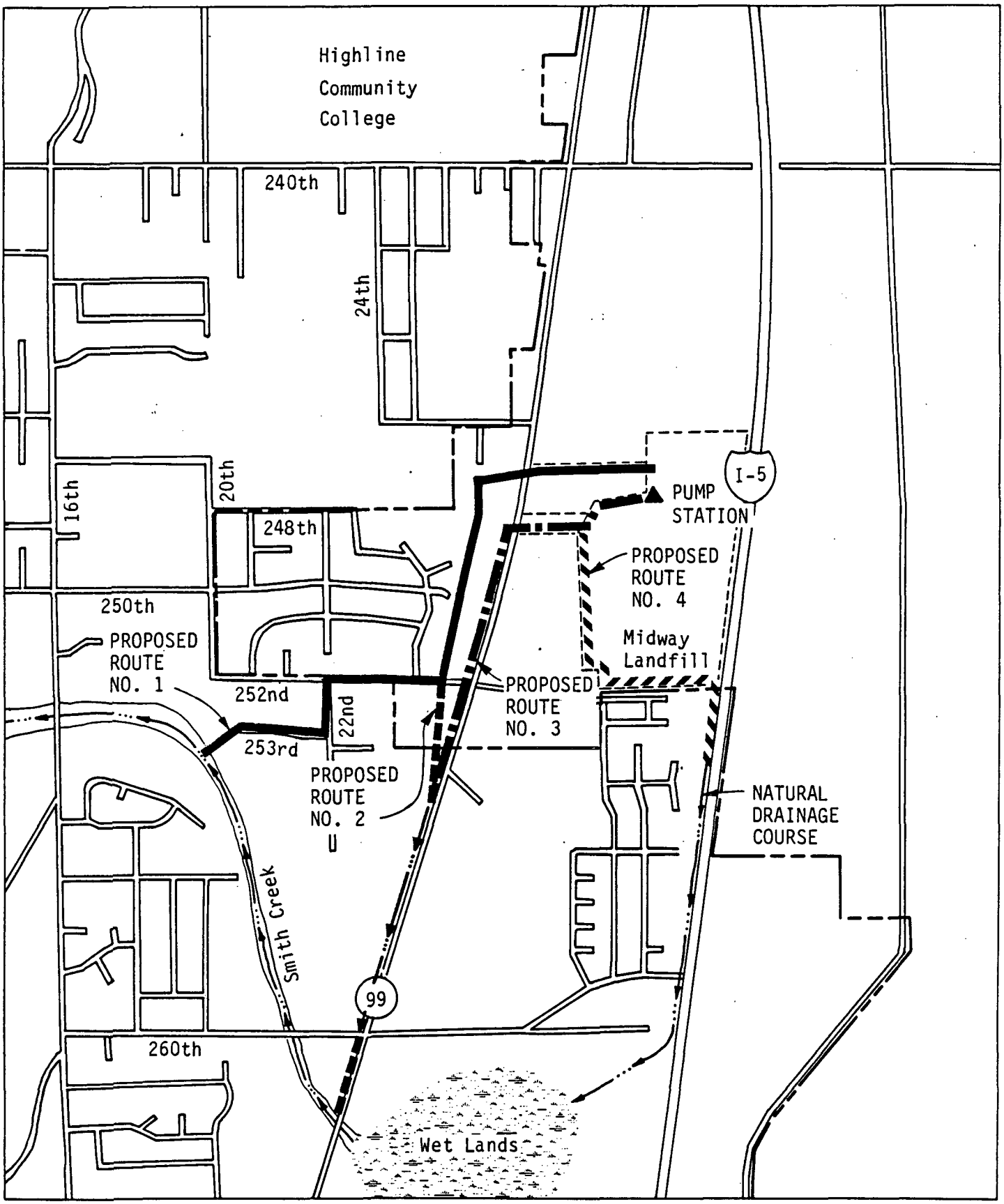
There would be some distinct advantages and disadvantages to this route, which are outlined below.

Advantages

1. The overall length of storm line of this alternative would be approximately 1,000 feet shorter than the previous alternative of running a storm line west on 252nd Street to 16th Avenue. The length would be about the same as the previously described 250th Street route.

Disadvantages

1. By placing the discharge point in the South Fork of Smith Creek upstream of the north fork, storm water would be introduced into a basin that is not part of the Midway Landfill drainage basin. King County Surface Water Ordinance compliance may not be possible.



No Scale

FIGURE 7: MIDWAY LANDFILL SURFACE WATER MANAGEMENT PLAN SUPPLEMENTAL ALTERNATIVES POTENTIAL SOUTHERLY ROUTES

This potentially could have a liability issue attached: erosion, increased runoff, etc. However, since it appears that the creek bottom is rather wide in this area, any overall impact in this reach of Smith Creek would be negligible.

2. The major disadvantage would be the actual construction of the storm line from the cul de sac at 253rd Street to the creek bottom. The slope is approximately 1:1 or greater and consists of silty, potentially unstable soil. Construction would require a specialized design by a geotechnical engineer, large soil anchors, and locking mechanical joint ductile iron pipe and extremely difficult conditions for storm line installation.

   There would be some impacts to the adjacent neighborhood; however, these would be similar to those of any other storm drainage construction. These impacts would be road reconstruction and the need for easements from the cul de sac at 253rd Street.

   It appears from the type of existing road construction on 22nd Avenue and the proposed grade at the storm line, it would probably be necessary to restore only one-half of 22nd Avenue South. Road reconstruction on 253rd Street might be restricted to one-half road reconstruction. However, it appears to be a low traveled residential street which might be greatly impacted by the introduction of heavy construction equipment and could require full restoration.

   Easement requirements between 253rd Street and Smith Creek would probably take less than five, and possibly only one or two, property owners' approval to acquire the necessary easements and right-of-entry.

   The number of residences that would be adjacent to the storm line construction south of 252nd Street is approximately 20.

Route No. 2

This route would be similar to the gravity storm system proposed for the 252nd Street route, but this route would not proceed west on 252nd. With this alternative, the storm line would proceed south across private property from 252nd Street and would intersect the right-of-way of Highway 99, see Figure 7, Route No. 2. This route would require a tight line system as shown along the right-of-way of Highway 99 until the pipe could discharge in the open ditch system adjacent to Highway 99.

Storm water would then be transmitted along Highway 99 in an open ditch. It should be noted that the existing drainage ditch is inadequate for the additional flow and would have to be upgraded. The drainage course would require conventional ditching methods to the intersection of 260th Street. The intersection of 260th and Highway 99 is a major signalized intersection which would require extra consideration for existing utilities and traffic. The storm water would have to be transmitted in a tight line system from the north side of 260th intersection to Smith Creek, an approximate length of 500 feet.

It would be necessary to acquire easements along the property from 252nd Street south. The parcel is large and essentially undeveloped, except for the one wetsuit manufacturing company. It appears that the number of easements that would have to be obtained would be less than five. However, the easement would be approximately 900 feet in length.

Advantages and disadvantages of this route would be as follows:

Advantages:

1. The overall tight line system would be reduced by approximately 600 LF as compared to the 252nd Street alternative. The length would be slightly greater than the previously described 250th Street route.

Disadvantages:

1. There would be increased construction difficulty at the intersection of 260th and Highway 99 due to utility conflicts and traffic considerations.

2. The ditch system along Highway 99 would have to be improved to accommodate the increase in storm runoff.

3. The storm runoff from the landfill would be being introduced into a drainage course that is not part of the Midway Landfill drainage basin. This could cause increased erosion to Smith Creek above the convergence of the north fork due to the increase in runoff. This alternative might not comply with the King County Surface Water Ordinance.

Route No. 3

The third potential route or method of storm discharge would be to place a pump station at the landfill and pump storm water to the south along Highway 99 right-of-way. The pump station would be required due to the deep cuts encountered along Highway 99. If a gravity system was utilized, approximately 35-foot cuts would be encountered. The force main for the system would discharge into a ditch system identical to proposed Route No. 2, see Figure 7.

There would be no apparent advantages to this route. The disadvantages of this route would be as follows:

Disadvantages:

1. This alternative would have construction and ditching problems along Highway 99 and would require the construction of a tight line system at the intersection of 260th, which are identified in Route No. 2.

2. As also stated for Route No. 2, the storm water would be discharged into a drainage basin that is not part of the Midway Landfill drainage basin and could impact downstream facilities. Compliance with the King County Surface Water Ordinance might not be possible.

3. With this alternative, a pump station would be utilized which would require increased cost and continuous operation and maintenance expense.

Route No. 4

Route No. 4 also would utilize the same pump station required for Route No. 3. However, the discharge line would be routed to the I-5 corridor within the landfill property and the storm water would be discharged to an open ditch system within State right-of-way as shown on Figure 7. The storm water would continue southerly in the ditch system and then leave the I-5 right-of-way at 260th Street directly west of I-5. The storm runoff would flow under 260th Street through a tight line system into a naturally occurring wetlands area between I-5 and Highway 99. From the wetland area the storm water would flow northwest under Highway 99 and again under 260th using existing culverts as a drainage path. After traveling past the wetlands area, the drainage course would be considered Smith Creek. The wetlands area at the head of Smith Creek appears to be developing with multi-family housing and commercial land use.

There would be no apparent advantages to this route. The main disadvantages of this route would be as follows:

Disadvantages:

1. A pump station would still be utilized to transmit storm drainage which would increase cost and maintenance on the overall system.

2. It appears that the storm drain under 260th Street directly west of I-5 would have to be upgraded to handle the increased storm runoff.

3. The major concern would be discharging increased storm runoff into State right-of-way and a wetlands area which appears to be slated for future development. This drainage basin is not part of the Midway Landfill drainage basin. Compliance with King County Surface Water Ordinance might not be possible.

Summary of Potential Southerly Routes

All the potential routes to the south or southwest appear to have more disadvantages than advantages. The major disadvantage of all the alternatives would be the introduction of storm water into a drainage basin that is not in the Midway Landfill drainage basin and is not the natural outlet for surface water from the landfill if a discharge were provided. This would imply liability associated with increased erosion, requirements to upgrade culvert crossings, etc. The only alternative that does not greatly impact another drainage course would be Route No. 1 which would be essentially a modification to the original route along 252nd Street. This route should be considered further only if the 252nd Street route is selected as the preferred alternative. In that case, this route would offer potential cost savings if the requirements of the King County Surface Water Ordinance can be met.

III. COMPATIBILITY WITH DRAFT ENVIRONMENTAL IMPACT STATEMENT, PUBLIC HEARING TESTIMONY AND WRITTEN COMMENTS

Each of the pipeline route alternatives is a variation of the On-Site Detention Alternative in the DEIS. All project descriptions, existing conditions, impacts and mitigating measures discussed in the DEIS for the On-Site Detention Alternative are valid for these pipeline route alternatives, except as previously noted or discussed hereafter. The degree to which the pipeline route alternatives address the concerns expressed in public hearing testimony and written comments received by the City is discussed below.

A. Tightline to 20th Avenue That Bypasses the Wetland and Parkside Elementary School - 246th Street Route

This pipeline route alternative would be very similar to the On-Site Detention Alternative in the DEIS. The difference would be that instead of a discharge pipe into the wetland and another pipe from the wetland to the North Fork of Smith Creek, there would be a tightline all the way to the same location in the North Fork of Smith Creek. Impacts and mitigation measures to Smith Creek would be the same also.

This alternative would address the concern expressed during the public hearings and in written comments of using the wetland for a detention basin and routing flows directly to it. In fact, because some of the Highway 99 drainage would be diverted to the on-site detention basin and the pipeline would discharge downstream of the wetland, flows in the natural drainage courses between Highway 99 and the pipeline discharge point, including the wetland and Parkside School grounds, would be decreased. This alternative would require construction of a short section of the pipeline across the north end of the wetland that would be in the same location as previous sewer construction. The route of the pipeline would require an easement where it is located on Parkside Elementary School. Highline Public School District has stated its opposition to any route that would discharge to the Parkside School grounds and, along with others, has expressed a preference for a closed conduit to Puget Sound.

B. 250th Street Route

The route of the pipeline with this alternative would be the same as with the No Detention Alternative in the DEIS. The difference would be that because this alternative includes an on-site detention basin, the size of the pipeline would be smaller. Impacts and mitigation measures to Smith Creek downstream of the discharge point would be the same as for the On-Site Detention Alternative. The on-site detention basin and diversion of some of the Highway 99 drainage would result in a reduction of the existing flows in the natural drainage courses between Highway 99 and the discharge point. The existing culverts in this area may be adequate with the reduced flows.

Because this route would be the same as that of the No Detention Alternative in the DEIS, the same opposition to the use of 250th Street that was voiced in public hearings and in written comments would apply to this alternative, even though the pipeline size would be smaller because of the on-site detention basin.

C. 252nd Street Route

From Highway 99 to 250th Street the pipeline route with this alternative would be the same as that of the No Detention Alternative in the DEIS and the 250th Street route discussed previously. Impacts and mitigation measures to this portion of the pipeline for those alternatives would apply to the 252nd Street route. From 250th Street to the discharge point in Smith Creek the pipeline route would be different from any alternative in the DEIS, however, and could result in new impacts requiring additional mitigation measures. The impacts and mitigation measures to Smith Creek downstream of the discharge point would be the same as for the On-Site Detention Alternative in the DEIS.

The diversion of some Highway 99 drainage into the on-site detention basin and the pipeline discharge into the South Fork of Smith Creek would result in reduced flows in the entire North Fork of Smith Creek. Downstream of the discharge point, the peak flows in Smith Creek would not exceed the existing conditions. By following 252nd Street, this alternative would address the concerns expressed in public hearings and written comments of using 250th Street for the pipeline route. However, the impacts to residents along 252nd Street would be similar to what the impacts would be to residents on 250th Street with that pipeline route alternative. There appears to be fewer residences on 252nd Street than on 250th Street (approximately 35 versus approximately 50) and the length of paved street to be restored would also be about 1,000 feet less with the 252nd Street route. By following the 252nd Street route, the pipeline would not pass within the city limits of Des Moines, thereby addressing some of the concerns expressed in a written comment from the City's Mayor.

D. Wetland Discharge Alternative

Because this route is very similar to the On-Site Detention Alternative in the DEIS, except for the culvert improvements at Parkside Elementary School and the three street crossings, impacts to the wetland and Smith Creek would be the same. The concerns expressed during the public hearings and in written comments that are applicable to the On-Site Detention Alternative in the DEIS would be applicable to this alternative also. Generally, these comments pertained to the condition of the wetland and its use as a natural detention basin. However, because this alternative would be designed so as not to increase the peak discharge from the 25-year storm, there should be little, if any, change in the wetland from its present condition. It would be necessary to provide energy dissipation and erosion protection at the point where the pipeline would discharge to the natural drainage course at the eastern edge of the wetland, however. There would be no noticeable difference in the peak flow conditions at the school grounds or downstream in the North Fork of Smith Creek. The additional water that would be routed to the drainage course would increase the duration of existing flooding conditions, however. As noted previously, it is estimated that the extended duration would be one day for the 25-year design storm.

E. Southerly Drainage Routes

Routes 2, 3 and 4 are not considered to be feasible alternatives. Route 1 is considered to be a potential variation of the 252nd Street route. Therefore, the above section that discusses the 252nd Street route is applicable to Route 1 of the southerly drainage routes also. With Route 1 there would be approximately the same number of residents impacted along the pipeline route as with the 252nd Street route. Pavement restoration requirements would also be similar. Easements would be required with Route 1 to get from the end of 253rd Street to the South Fork of Smith Creek, however.

IV. ESTIMATED COSTS

Cost estimates were developed for the pipeline discharge route alternatives to allow an economic comparison between them, as well as with the project costs for the Stormwater Management Alternatives in the DEIS. The pipeline route alternatives are variations of the On-Site Detention Alternative in the DEIS and many costs for that alternative are directly applicable to these pipeline route alternatives. Such common costs include the detention basin, pump station and storm sewer line on the east side of I-5; the on-site detention basin and land necessary for its construction; the storm sewer to divert some of the Highway 99 drainage into the on-site detention basin; and the portion of the discharge pipeline from the on-site detention basin to the west side of Highway 99. The variable costs of the pipeline route alternatives are associated with the portion of the pipeline from the west side of Highway 99 to the discharge point.

As with the cost estimates in the DEIS, the cost estimates for the pipeline route alternatives represent an "order of magnitude" estimate and are typically expected to be accurate to within 50 percent above or 30 percent below actual costs. The cost estimates are stated in May 1985 dollars, the same as in the DEIS, and include mobilization, construction incidentals, contingencies, sales tax, administrative, legal and engineering expenses in the same percentages as stated in the DEIS. The estimated costs for the pipeline route atlernatives are shown in Table 1.

TABLE 1

MIDWAY LANDFILL
SURFACE WATER MANAGEMENT PLAN
SUPPLEMENTAL ALTERNATIVES
ESTIMATED COSTS[1]

	246th St. Route	250th St. Route	252nd St. Route	Wetland Discharge Route
Common Costs[2]				
Storm Sewer Pipe	$ 324,000	$ 324,000	$ 324,000	$ 324,000
Manholes	25,000	25,000	25,000	25,000
Highway Bore	62,000	62,000	62,000	62,000
Pump Station	1,124,000	1,124,000	1,124,000	1,124,000
Detention Basins	702,000	702,000	702,000	702,000
Land Purchase	463,000	463,000	463,000	463,000
Subtotal	2,700,000	2,700,000	2,700,000	2,700,000
Variable Costs[3]				
Storm Sewer Pipe	829,000	1,108,000	1,294,000	217,000
Manholes & Structures	67,000	100,000	112,000	34,000
Pavement Restoration	9,000	92,000	64,000	9,000
Culvert Improvements	35,000	0	0	0
Subtotal	940,000	1,300,000	1,470,000 [4]	260,000
ESTIMATED TOTAL PROJECT COST	$3,640,000	$4,000,000	$4,170,000 [4]	$2,960,000

NOTE:
(1) Includes 25 percent allowance for mobilization, construction incidentals and contigencies; 8.1 percent sales tax; and 16.5 percent allowance for administrative, legal and engineering expenses.
(2) Common costs are the same as those for the identical items in the On-Site Detention Alternative in the Midway Landfill Closure Plan DEIS.
(3) Variable costs are those for the pipeline route alternatives from the west side of Highway 99 to the discharge point in Smith Creek.
(4) Alternative 1 of the Southerly Drainage routes offers a $250,000 potential reduction of this cost.

V. COMPARISON OF SURFACE WATER MANAGEMENT PLAN ALTERNATIVES

For purposes of comparison, the Surface Water Management Plan Alternatives for the closure of the Midway Landfill are divided into three components:

A. I-5/East Drainage System
B. Detention Facilities
C. Highway 99/West Discharge Route

All Surface Water Management Plan Alternatives described in the DEIS plus the supplemental alternatives described in this technical memorandum are compared for the purpose of recommending a preferred alternative. As indicated in the DEIS, the City of Seattle considers the No Action Alternative unacceptable, so it is not included in this comparison.

A. I-5/East Drainage System

Only one alternative was identified to handle drainage from I-5 and the area east of I-5 and re-route it around the landfill. Implementation of this alternative is imperative if leachate generation at the Midway Landfill is to be minimized. As described in the DEIS, this alternative would include the construction of a detention basin and pump station on the east side of I-5 to intercept runoff that presently drains into the Midway Landfill through subsurface drainage pipes. Discharge from the pump station would be routed southwards through a new force main and gravity storm sewer that would connect to an existing storm drain that crosses under I-5. This existing storm drain continues north along the west side of I-5 to the northeast corner of the Midway Landfill. Continuation from this point would be dependent on the detention facilities to be included in the project. During design of the I-5/east drainage system, refinements could be made to intercept as much runoff by gravity storm sewers as possible so that the size of detention and pumping facilities on the east side of I-5 can be minimized.

B. Detention Facilities

Three alternatives for detention facilities were included in the DEIS. These were off-site detention, on-site detention and no detention. The off-site detention basin location would be the natural wetland area near Parkside Elementary School. With off-site detention, a formal detention basin would be constructed in this wetland. The location of the on-site detention basin would be on property adjacent to the north side of the Midway Landfill site. With the No Detention Alternative, discharge pipes would be sized to handle the peak flows and the discharge point was selected to minimize potential downstream impacts in Smith Creek. Some downstream improvements would be necessary to achieve this, however.

Off-site detention would require the purchase of 12 acres of the wetland area near Parkside Elementary School. Most of this wetland area would be eliminated by the construction of the detention basin, although a natural vegetative buffer would be maintained. Surface water flows from the Midway Landfill could not be controlled on-site. Should leachate contamination of the surface water occur, this water would have to be discharged from the site and controlled at the off-site detention basin. The basin, being located in the City of Des Moines and with a discharge also in the City of Des Moines, would be subject to the drainage requirements of that City.

The on-site detention basin would allow total control of runoff from the Midway Landfill at the landfill site itself. The on-site basin would be subject to the drainage requirements of the municipality in which the surface water would be discharged. Only six acres of property would need to be developed for the on-site detention basin.

Although suitable discharge locations were selected to use with the No Detention Alternative, it is unlikely that the increased flows would be acceptable and could comply with the drainage ordinance requirements of either Des Moines or King County. No detention would only be acceptable with the Tightline to Puget Sound Alternative, but with this alternative, the long pipeline would cause extensive disruption to streets, traffic patterns, access, and Salt Water State Park.

C. Highway 99/West Discharge Route

The DEIS included three alternate routes for discharging surface water from Midway Landfill to Puget Sound. Discharges to the Green River were not considered to be feasible. The three alternatives for Puget Sound discharge consisted of: (1) discharge via the wetland and North Fork of Smith Creek with either off-site or on-site detention, (2) discharge via 250th Street to the North Fork of Smith Creek near 16th Avenue South, and (3) a tightline to Puget Sound with and without on-site detention.

The first of these three discharge alternatives is very similar to the Wetland Discharge Alternative described in this technical memorandum. There is enough difference, however, that for purposes of comparison they will be kept separate and the DEIS alternative will be designated as the Wetland/North Fork Discharge Alternative. (It should be noted that the Wetland Discharge Alternative presented in this technical memorandum would end in a natural drainage course a short distance east of the wetland within the City of Kent and would not include the school and street crossing culvert improvements that were part of the Off-Site Detention and On-Site Detention Alternatives in the DEIS. With this alternative, the City of Seattle would pursue making improvements at Parkside Elementary School and to culverts at 20th Avenue, 245th Place and 246th Place if school district and City of Des Moines requirements can be met.)

The second discharge alternative included in the DEIS is nearly the same as the 250th Street route described in this technical memorandum, except for the pipe size and the downstream improvements in Salt Water State Park that were required for the No Detention Alternative in the DEIS. For purposes of comparison with other routes, however, these two alternatives will be considered to be the same.

The 252nd Street route described in this technical memorandum assumed on-site detention; however, the route potentially could be suitable for use with no detention. Therefore, this comparison assumes that the 252nd Street route

could be used either with or without detention. Without detention, the pipe size would be larger and downstream improvements in Salt Water State Park as described for the No Detention Alternative in the DEIS would be necessary.

Given the above discussed conditions and similarities of some alternative routes for discharge of storm water from the Midway Landfill, the alternatives to be compared and the possible detention facilities that could accompany them are as follows:

1. Wetland/North Fork Discharge Alternative (with off-site or on-site detention)
2. Tightline Route to Puget Sound (with or without detention)
3. 250th Street Route (with or without detention)
4. 246th Street Route (with on-site detention)
5. 252nd Street Route (with or without detention, including the potential variation of Route 1 of the Southerly Drainage Route)
6. Wetland Discharge Alternative (with on-site detention)

Table 2 presents a comparison of these six discharge route alternatives.

TABLE 2

MIDWAY LANDFILL CLOSURE
SURFACE WATER MANAGEMENT PLAN
COMPARISON OF OFF-SITE PIPELINE ROUTE ALTERNATIVES

Comparison Item	Wetland/ N. Fork Discharge Alternative	Tightline Route to Puget Sound	250th St. Route	246th St. Route	252nd St. Route	Wetland Discharge Alternative
Discharge Point Location	N. Fork Smith Creek, shallow ravine at NW corner Parkside Elem. School. With on-site detention, flow also passes through existing wetland.	Puget Sound at Salt Water State Park	N. Fork Smith Creek, deep ravine adjacent to 250th St. R/W.	Same as Wetland/ No. Fork Discharge Alt., except wetland area is bypassed.	S. Fork Smith Creek, deep ravine under 16th Ave. bridge; or N. Fork Smith Creek, deep ravine under 16th Ave. bridge; or N. Fork Smith Creek in Salt Water State Park 400 ft. west of 16th Ave., deep ravine; or S. Fork Smith Creek, deep ravine SW of cul-de-sac on 253rd St.	Natural drainage course east of wetland a short distance.
Erosion/Flooding Potential	Slight increase because of longer duration peak flow. Localized at the wetland with the on-site detention basin.	None in Smith Creek.	Very slight increase with on-site detention because of longer duration peak flow. Somewhat greater without detention because of increased peak flow.	Same as Wetland/ No. Fork Discharge Alt., except wetland area is bypassed.	Same as 250th St. for each potential discharge location.	Slight increase because of longer duration peak flow. Localized at the natural drainage course leading to the wetland.
Improvements to local drainage problems	Highway 99 to wetland, Parkside School, and three street culvert crossings in Des Moines.	None.	Resulting from flow reduction in No. Fork Smith Creek.	Same as Wetland/N. Fork Discharge Alternative.	Resulting from flow reduction in all of N. Fork Smith Creek.	Highway 99 to wetland.

TABLE 2
(cont'd)

MIDWAY LANDFILL CLOSURE
SURFACE WATER MANAGEMENT PLAN
COMPARISON OF OFF-SITE PIPELINE ROUTE ALTERNATIVES

Comparison Item	Wetland/ N. Fork Discharge Alternative	Tightline Route to Puget Sound	250th St. Route	246th St. Route	252nd St. Route	Wetland Discharge Alternative
Changes to flow/ drainage patterns in Smith Creek	None with on-site detention. Wetland eliminated with off-site detention.	None.	Approx. 75% of run-off from Highway 99 re-routed. Flows to wetland and N. Fork of Smith Creek greatly reduced upstream of discharge point.	Approx.75% of run off from Highway 99 re-routed. Flows to wetland greatly reduced. No change downstream of discharge point.	Approx. 75% of run-off from Highway 99 re-routed. Flows to wetland and all of N. Fork Smith Creek greatly reduced.	None.
Wetland Area Disturbance	Minor along east side with on-site detention. Wetland eliminated with off-site detention.	None.	None.	400-foot strip at north end. Previously disturbed by sewer construction.	None.	Very minor near east side.
Vegetation Destroyed/ Restoration Requirements	Trees and brush on 900 ft. undeveloped land, 1,200 ft. school playground, three street crossings.	Trees, brush and grass on 2,200 ft. in Salt Water State Park, 1,400 ft. of brush on undeveloped land, 5,000 ft. of pavement.	1,400 ft. of brush on undeveloped land, 3,000 ft. of pavement.	Trees and brush on 800 ft. undeveloped land, 900 ft. school playground, 600 ft. unimproved street R/W, 300 ft. pavement.	Trees and brush on 3,200 ft. undeveloped land, 2,000 ft. pavement.	Trees and brush on 700 ft. of undeveloped land and one street crossing.

TABLE 2
(cont'd)

MIDWAY LANDFILL CLOSURE
SURFACE WATER MANAGEMENT PLAN
COMPARISON OF OFF-SITE PIPELINE ROUTE ALTERNATIVES

Comparison Item	Wetland/ N. Fork Discharge Alternative	Tightline Route to Puget Sound	250th St. Route	246th St. Route	252nd St. Route	Wetland Discharge Alternative
Potential Construction Difficulties	Some wet area construction, minor street restoration, probably complete in one construction season. Pipeline across school grounds should be installed during summer.	Park use conflicts, steep terraine in park, deep cuts, long length, extensive street restoration, probably require two construction seasons.	Steep terrain near discharge, long length, some deep cuts, street restoration, potentially require more than one construction season.	400 ft. across wetland, other wet area construction, minor street restoration, probably complete in one construction season. Pipeline across school grounds should be installed during summer.	Steep terrain near discharge, long length, some deep cuts, street restoration, potentially require more than one construction season.	Some wet area construction, minor street restoration, can be completed in one construction season.
Number of Residences Abutting Route	Approx. 15 plus school.	Approx. 75 plus businesses along Highway 99 and State Park.	Approx. 50 plus businesses along Highway 99.	Approx. 15 plus school.	Approx. 35 plus businesses along Highway 99.	Approx. 5.
Easement Requirements	1,900 ft. on approx. 5 properties and school.	1,400 ft. on approx. 10 properties and approx. 2,200 feet in State Park.	1,400 ft. on approx. 10 properties.	1,700 ft. on approx. 5 properties and school.	2,000 ft. on approx. 15 properties.	700 ft. on approx. 5 properties.

TABLE 2
(cont'd)

MIDWAY LANDFILL CLOSURE
SURFACE WATER MANAGEMENT PLAN
COMPARISON OF OFF-SITE PIPELINE ROUTE ALTERNATIVES

Comparison Item	Wetland/ N. Fork Discharge Alternative	Tightline Route to Puget Sound	250th St. Route	246th St. Route	252nd St. Route	Wetland Discharge Alternative
Effects on Transportation Systems and Public Services	Minor disruption at four street crossings.	Extensive disruption all along 250th St. between 11th Ave. and 25th Ave. Disruption to school bus routes.	Extensive disruption all along 250th St. between 16th Ave. and 25th Ave. Disruption to school bus routes.	Minor disruption on 246th St. and at three street crossings.	Extensive disruption on 252nd St. between 20th Ave. and Pacific Highway South. Main connector street to Pacific Highway So. for this area. Disruption to school bus routes.	Minor disruption at one street crossing.
Political Jurisdictions/ Compliance With Local Drainage Ordinances	Kent and Des Moines. Des Moines drainage requirements.	Kent, Des Moines and State Park. Des Moines and State Park drainage requirements.	Kent and Des Moines. Des Moines drainage requirements.	Kent and Des Moines. Des Moines drainage requirements.	Kent and King County. King County drainage requirements.	Kent. Kent drainage requirements.

VI. RECOMMENDATION OF PREFERRED ALTERNATIVE

Based on the comparison of alternatives presented in the previous section of this technical memorandum, it is recommended that the preferred Surface Water Management Plan Alternative for the closure of the Midway Landfill be as follows:

A. I-5/East Drainage System

The drainage facilities to intercept and re-route runoff from I-5 and the area east of I-5 should consist of the detention basin, pump station, force main and gravity sewers as described in the DEIS. During the design of these facilities, methods should be explored to intercept as much runoff as possible by gravity storm sewers so that the size of any required detention and pumping facilities can be minimized.

B. Detention Facilities

Detention facilities should be provided so that the peak discharge from the 25-year storm does not exceed the existing peak flow at the point of discharge. The detention facilities should be located on-site as described for the On-Site Detention Alternative in the DEIS, so that the City can retain maximum control of all surface waters leaving the Midway Landfill. The on-site detention basin should be located on property to be acquired by the City adjacent to the north side of the Midway Landfill site.

C. Highway 99/West Discharge Route

The pipeline for discharging storm water from the Midway Landfill should follow the route of the Wetland Discharge Alternative described in this technical memorandum. In addition to providing a discharge for surface water from the Midway Landfill, this route corrects existing drainage problems between Highway 99 and the wetland area, but causes very little change in the existing conditions in the wetland and North Fork of Smith Creek. This alternative causes disruption to the fewest number of adjacent properties, causes the least disruption to traffic and transportation systems, and has the least impact on public services such as school bus routes. It involves the

jurisdiction of only one municipality (City of Kent), is the shortest in length and, therefore, can be constructed in the shortest time. This alternative offers flexibility and is capable of being extended along any one of the other alternative discharge routes if future conditions should warrant. Because this alternative discharges into drainage courses that eventually lead to Parkside School and City of Des Moines storm drainage facilities that currently have inadequate capacity for the 25-year storm, the City of Seattle will pursue with the School District and City of Des Moines plans for improving these under-capacity facilities.