Second Five-Year Review Report

for

MIDWAY LANDFILL
Superfund Site

Kent, Washington

SEPTEMBER 2015

PREPARED BY:

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TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS iv
EXECUTIVE SUMMARY v
FIVE-YEAR REVIEW SUMMARY FORM vi
I. INTRODUCTION 1
II. SITE CHRONOLOGY 2
III. BACKGROUND 2
Site Location and Description 2
Physical and Geographical Characteristics 3
Synopsis of Hydrogeology Setting 3
A. Perched Aquifer (also referred to as Shallow Groundwater) 3
B. Landfill Aquifer (also referred to as Saturated Refuse) 4
C. Upper Gravel Aquifer (UGA) 4
D. Sand Aquifer (SA) 4
E. Southern Gravel Aquifer (SGA) 4
F. Northern Gravel Aquifer (NGA) 5
G. Flow Rates 5
Land and Resource Use 5
A. Land Use 5
B. Groundwater Use 6
History of Contamination 7
Initial Response 8
A. Gas Control 8
B. Landfill Surface Filling and Grading 8
C. Storm Water Detention Pond 8
D. Landfill Cap Installation 9
E. Linda Heights Park Storm Water Diversion 9
F. Operations and Maintenance (O&M) Plan 9
Summary of Basis for Taking Action 9
IV. REMEDIAL ACTIONS 9
ROD Cleanup Goals 10
Remedy Implementation 11
A. Monitoring 11
Fluid Level Monitoring 11
Groundwater Chemistry Monitoring 12
Landfill Gas Monitoring 12
B. Continue to operate and maintain all remedial project elements required in the Ecology/City of Seattle 1990 consent decree, including the gas collection system, the multilayered cap, and the storm water collection system. 12
C. Implementing institutional controls. 12
Operations and Maintenance 13
A. Landfill Cap 13
B. Gas Collection System 13
C. Surface Water Drainage System 13
V. PROGRESS SINCE LAST REVIEW -- CURRENT STATUS 14
Protectiveness Statement from Last Review 14
Status of recommendations and follow-up actions from last review. 164
VI. FIVE-YEAR REVIEW PROCESS 16

Administrative Components 16
Documents Reviewed 16
Data Review and Evaluation 17
A. Landfill Cap 17
B. Gas Collection System 17
C. Surface Water Drainage System 17
D. Groundwater Flow 17
E. Water Quality Monitoring 18
F. Institutional Controls 19
Community Notification 19
Site Inspection 19
VII. TECHNICAL ASSESSMENT 20
Question A: Is the remedy functioning as intended by the decision documents? 20
A.1 Removal Action Performance and Monitoring Results 20
A.2 System Operations and Maintenance 21
A.3 Costs of System Operations, Maintenance, and Monitoring 21
A.4 Opportunities for Optimization 21
A.5 Early Indicators of Potential Remedy Problems 21
A.6 Implementation of Institutional Controls and Other Measures 21
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid? 22
B.1 Changes in Standards and To Be Considered: 22
B.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics 24
B.3 Changes in Land Use 25
B.4 Remedial Action Objectives 25
Question C: Has any other information come to light that could call into question the protectiveness of the remedy? 25
D. Technical Assessment Summary 25
VIII. ISSUES, RECOMMENDATIONS AND FOLLOW-UP ACTIONS 26
X. PROTECTIVENESS STATEMENT 29
XI. NEXT REVIEW 29

APPENDICES

A. Letter from the City of Seattle to prospective purchasers of adjacent or nearby properties.
B. Groundwater monitoring results from 2010-2014.
C. Copy of the 2015 notice regarding downgradient groundwater conditions to Ecology.
D. Site inspection report.

List of Acronyms and Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
City	City of Seattle
COCs	Contaminants of Concern
DCE	Dichloroethene
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
Ft	Feet
FS	Feasibility Study
HDPE	High-density Polyethylene Membrane
I-5	Interstate 5
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
LEL	Lower explosive level
MCLs	Maximum Contaminant Levels
MTCA	Model Toxics Control Act
MW	Monitoring Well
NCP	National Contingency Plan
NGA	Northern Gravel Aquifer
NPL	National Priorities List
NTU	Nephelometric Tubidity Unit
O&M	Operations and Maintenance
PCE	Tetrachlorethene
PCOR	Preliminary Close Out Report
PSCAA	Puget Sound Clean Air Agency
RAG	Remedial Action Goal
RAO	Remedial Action Objective
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RPM	Remedial Project Manager
ROD	Record of Decision
RSL	Regional Screening Level
SA	Sand Aquifer
SF	Slope Factor
SG	Shallow Groundwater
SGA	Southern Gravel Aquifer
SR	Saturated Refuse
TCE	Trichloroethene
UECA	Uniform Environmental Covenants Act
UGA	Upper Gravel Aquifer
USACE	U.S. Army Corps of Engineers
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

The remedy for the Midway Landfill included an active gas control system, landfill surface filling and grading, storm water detention pond landfill cap installation, Linda Heights Park storm water diversion, groundwater monitoring, and institutional controls. The Site achieved construction completion in 1992 under a Consent Decree between Washington State Department of Ecology and the City of Seattle. However a Record of Decision (ROD) was not signed until 2000, which initiated the requirement for five-year reviews, the first of which was completed in 2005. This is the third five-year review.

This five-year review found that the landfill gas collection, cap, and surface water drainage systems are functioning as intended. Methane concentrations outside the landfill boundary are below the lower explosive level (LEL). The flare/blower station, landfill cap, and surface water drainage system appeared to be well maintained. Groundwater monitoring continued annually for the past five years. Institutional controls consistent with the ROD requirements and current site conditions are in place where necessary and are functioning as intended. Contaminants of concern (COCs) are still being detected in groundwater beyond the landfill boundary, but COC concentrations are trending downwards in downgradient wells and are below or approaching the Remedial Action Goals. However, during the last five-year review, 1,4 dioxane was added to the monitoring network and was detected above MTCA method B levels in several wells, including the downgradient well that has been used as an early detection well for downgradient drinking water and irrigation wells.

A protectiveness determination of the remedy at the Midway Landfill cannot be made at this time until the extent of the 1,4-dioxane plume is delineated and there is more information about potential downgradient wells. It is expected that letters can be sent to property owners in a one mile radius of Midway Landfill in the next six months to determine if there are any active wells. However, until the 1,4-dioxane plume is delineated, it cannot be determined if a one mile radius is sufficient. It is expected that a protectiveness determination can be made by September 2018.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Midway Landfill		
EPA ID: WAD980638910		
Region: 10	**State:** WA	**City/County:** Kent, Washington

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: State
Author name (Federal or State Project Manager): Laura Buelow
Author affiliation: U.S. EPA, Region 10, Hanford Project Office
Review period: 01/2015 – 09/2015
Date of site inspection: 06/10/2015
Type of review: Statutory.
Review number: 3
Triggering action date: 09/15/2010
Due date *(five years after triggering action date)*: 09/15/2015

Issues and Recommendations Identified in the Five-Year Review:				
	Issue Category: Remedy Performance			
	Issue: Upgradient sources of VOCs in groundwater will continue to limit the potential for the chemicals of concern in the SGA to decrease below the ROD cleanup levels, especially because the concentrations of volatile organic compounds in upgradient well MW-21B are not decreasing.			
	Recommendation: Ecology will notify property owners with potential upgradient sources of contamination, including current COCs and 1,4-dioxane, by September 2016. Ecology will advise the property owners on cleanup requirements. By September 2018, property owners need to take substantive action on the upgradient source.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	09/2018

Issues and Recommendations Identified in the Five-Year Review:				
	Issue Category: Changed Site Conditions			
	Issue: 1,4-dioxane has been found in several wells at concentration that exceed regulatory levels. The ROD contains no cleanup level for 1,4-dioxane. Additionally, the first five year review identified a change to vinyl chloide cleanup level.			
	Recommendation: EPA will write an Explanation of Significant Difference to add 1,4-dioxane as a COC to the ROD. EPA will consider whether the vinyl chloride cleanup level established in the ROD should be changed, and if so, it will be documented in an ESD.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	09/2018

Issues and Recommendations Identified in the Five-Year Review:
Issue Category: Monitoring
Issue: The extent of the 1, 4-dioxane plume has not been delineated.
Recommendation: Ecology will do a search to determine the

	location of any wells constructed within a one mile radius of Midway Landfill and 1) identify the status of those wells (active, inactive) 2) determine the use (water supply/irrigation/monitoring/etc.) 3) compile well construction logs as available. Based on the well construction logs, Ecology will determine if any of these wells are constructed in a manner that would allow for water quality sampling that would allow further characterization and delineation of the contaminant plume downgradient of the site. If no existing wells can be confidently used for this purpose, Ecology will identify locations for new monitoring wells to delineate the extent of the 1,4 dioxane plume.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	09/2018

Issues and Recommendations Identified in the Five-Year Review:				
	Issue Category: Changed Site Conditions			
	Issue: The extent of the 1,4-dioxane plume is unknown. It is therefore uncertain whether or not the ICs prohibiting water supply well drilling in “the affected area” are protective.			
	Recommendation: Ecology will send out letters to all properties in a one mile radius from Midway Landfill to determine if they contain a well, if that that well is being used, and for what purpose (e.g. drinking water, irrigation, etc). In the event that a property owner is actively using a well, Ecology will notify the owner of the potential risks immediately.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	State	EPA	03/2016

Protectiveness Statement	
Protectiveness Determination: Protectiveness Deferred	*Addendum Due Date:* *09/2018*

Protectiveness Statement:
A protectiveness determination of the remedy at the Midway Landfill cannot be made at this time until further information on the extent of 1,4 dioxane is obtained. Further information will be obtained by additional water quality sampling downgradient of the site, either at existing and appropriately constructed wells identified by Ecology or by new wells installed for this purpose and by conducting a survey of the use of downgradient private wells. It is expected that the protectiveness determination can be made by September, 2018.

I. INTRODUCTION

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and identify recommendations to address them. The U.S. Environmental Protection Agency (EPA) is preparing this Five-Year Review Report pursuant to CERCLA §121(c) and the National Contingency Plan (NCP). CERCLA §121(c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Region 10 of the EPA conducted the Five-Year Review of the remedy implemented at the Midway Landfill, located in Kent, Washington. This Third Five-Year Review for the Midway Landfill was conducted by the EPA Remedial Project Manager (RPM) from January 2015 through September 2015. This report documents the results of the review. The triggering action for this statutory review was the completion of the Second Five-Year Review Report, dated September 15, 2010. The five year review is required because hazardous substances, pollutants, or contaminants remain in the soil and groundwater above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

September 2015	Third Five-Year Review
January 2013	Second Five-Year Review Addendum
September 2010	Second Five-Year Review
September 28, 2005	First Five-Year Review
September 21, 2000	PCOR is signed – site is construction complete
September 6, 2000	EPA completes a Record of Decision.
1991	Landfill cap and cover system construction completed.
1990	Consent decree between Ecology and City of Seattle.
1989	Landfill cap and cover system designed and construction started.
September 1988.	City of Seattle and Washington Department of Ecology sign Response Order on Consent
May 1986	Landfill Placed on National Priorities List.
October 1984	Landfill nominated to the National Priorities List.
1985	Removal action begun to extract migrating landfill gases.
1984	Methane gas discovered in surrounding residential area.
Fall 1983	City of Seattle closed the landfill.
1966-1983	Site leased by City of Seattle for use as a landfill.
1945-1968	Site operated as a gravel pit.

III. BACKGROUND

Site Location and Description

The Midway Landfill was placed on the National Priorities List (NPL) in May, 1986. The Washington State Department of Ecology (Ecology) is responsible for the oversight management of the site as stipulated by an agreement with Region 10 of the Environmental Protection Agency (EPA). The cleanup is managed by Ecology under the authority of the Model Toxics Control Act [Chapter 70.105D RCW], the Water Pollution Control Act [Ch. 90.48 RCW], and all other applicable state and federal laws.

The Midway Landfill is in King County, Washington, between Interstate-5 (I-5) and Highway 99, and between South 252nd Street and South 246th Street in Kent, Washington 98032. Figure 1 shows the regional site location. The location is in a geographic area known as the Puget Sound Lowland. The area has been glaciated several times and is underlain by a sequence of glaciofluvial sediments. The area has a maritime climate characterized by cool, wet winters and drier, mild summers. Annual rainfall is approximately 40 inches per year, which falls mainly between November and June.

Land use in the landfill vicinity consists primarily of commercial activities and residential areas. Commercial establishments and light industry and manufacturing border both sides of Highway 99 in the area. Two elementary schools, Sunnycrest Elementary School and Parkside Elementary School, and a city park, Linda Heights Park, are within a half-mile radius of the site. Most of the nearby residences are detached single-family dwellings, with some multi-unit

residential developments to the south and west. Several mobile home parks are also in the vicinity.

Physical and Geographical Characteristics

The Midway Landfill is located near the crest of a narrow north-south trending glacier feature known as the Des Moines Drift Plain. This area, referred to as "upland" because of its location above adjacent valleys and sea level, is bordered by Puget Sound on the west and the Green River valley on the east. Maximum elevations along the crest of the upland generally range from 400 to 450 ft above mean sea level. Puget Sound is at sea level, and the Green River valley floor typically averages about 30 ft above mean sea level.

The Midway Landfill occupies a shallow, bowl-shaped depression (a former gravel pit) near the crest of the upland. The surface of the landfill generally ranges from 360 to 400 ft above mean sea level and slopes upward to the south and east. West of the landfill, the land surface is nearly flat across Highway 99 and then drops steeply downward approximately 100 ft to the Parkside Wetland. The upland area is cut with a number of steep-sided stream valleys. Midway Creek is located northeast of the landfill, and two other streams, the north and south forks of McSorley Creek, are located to the west and southwest, respectively. The Green River Valley is east of the Midway Landfill.

There is no major surface water body in the immediate vicinity of the Midway Landfill. The closest are Lake Fenwick, located approximately one mile to the southeast, and Star Lake, located approximately 1.5 miles to the south.

Synopsis of Hydrogeology Setting

The groundwater conditions beneath the landfill are very complex. A brief synopsis is provided to describe the important hydrogeologic features of the landfill. Groundwater movement within and below the landfill has been characterized to an approximate depth of 300 to 350 ft below ground surface (50 to 100 ft above mean sea level). Several aquifers have been identified within this interval, including (from shallowest to deepest):

- Perched Aquifer (also referred to as Shallow Groundwater)
- Landfill Aquifer (also referred to as Saturated Refuse)
- Upper Gravel Aquifer (UGA)
- Sand Aquifer (SA)
- Southern Gravel Aquifer (SGA)
- Northern Gravel Aquifer (NGA)

A. Perched Aquifer (also referred to as Shallow Groundwater)

The Perched Aquifer was named during the remedial investigation (RI) when it was believed to represent shallow, discontinuous lenses of groundwater perched on low permeability deposits above the UGA. Field work and data analysis since completion of the RI indicate that while this groundwater is shallow and discontinuous, it is not always perched. The majority of these

shallow zones are found north of the landfill. The Perched Aquifer is referred to as Shallow Groundwater in the remainder of this report.

B. Landfill Aquifer (also referred to as Saturated Refuse)

The Saturated Refuse consists of leachate within the landfill. Its occurrence and movement are largely functions of the former gravel pit topography. Flow in the Saturated Refuse is generally from the north and west toward the south central section of the landfill, where the pit excavations were deepest. Leachate likely discharges vertically throughout much of the landfill base, but the greatest volume of vertical flow is in the south central area.

Figure 2 shows the Shallow Groundwater and Saturated Refuse fluid level monitoring network.

C. Upper Gravel Aquifer (UGA)

All past and present monitoring wells for the UGA, SA, SGA, and NGA are presented in Figure 3. Some of the wells are no longer being sampled for a variety of reasons (e.g. the well is currently dry, the well was damaged, it was determined not to be needed, etc.).

A generalized potentiometric surface map of the UGA for May 2014 is presented in Figure 4. The UGA occurs immediately below the base of the landfill, is limited in lateral extent and is composed of silty and sandy gravel. Leachate discharging from the landfill enters the underlying UGA. The aquifer is typically semi-confined, although some parts are unconfined. Groundwater flow in the UGA is generally from both the north and south inward toward an area beneath the southern end of the landfill where the groundwater appears to discharge downward into the underlying SA. The UGA and SA are separated by the Upper Silt Aquitard, a discontinuous layer of fine-grained silt, clayey silt, and silty fine sand. Vertical flow from the UGA into the SA is most pronounced in places where the aquitard is absent.

D. Sand Aquifer (SA)

A generalized potentiometric surface map of the SA for May 2014 is presented as Figure 5. The SA occurs as a widespread deposit of interbedded sands and silts. Flow in this aquifer in the vicinity of the landfill is generally from the north and west to the southeast toward an apparent hydraulic sink. The sink occurs across a broad area beneath the southern part of the landfill and extends several hundred feet to the east. Groundwater south of this sink also flows towards the sink. Groundwater entering this sink appears to flow downward into the SGA. Some vertical flow outside the sink area also occurs from the SA downward into the SGA and NGA.

E. Southern Gravel Aquifer (SGA)

The SA and SGA are separated by the Lower Silt Aquitard. Like the Upper Silt Aquitard, the Lower Silt Aquitard is discontinuous and likely controls downward flow from the SA into the SGA. The deepest stratigraphic units studied are the NGA and SGA; they occur at about the same elevation, but hydraulic heads in the NGA are typically 100 ft higher than heads in the SGA. A generalized potentiometric surface map of the SGA for May 2014 is presented in Figure 6. The SGA is found beneath the southern half of the landfill and extends to the east, south, and west. It consists of permeable sands and gravel interbedded with silts and silty gravel. The SGA appears to be recharged by the SA and by lateral flow from the south. A groundwater mound in the SGA, below the hydraulic sink in the SA, is believed to be an expression of flow through the

sink. Groundwater flow has changed slightly since the RI, with a more northeast/northwest direction instead of east/west. Flow to the north is blocked by higher potentiometric heads within the NGA. Groundwater in the SGA eventually discharges west to Puget Sound and east to the Green River Valley.

F. Northern Gravel Aquifer (NGA)

The NGA is found beneath the northern half of the landfill and extends to the north and northeast. Like the SGA, the NGA consists of permeable sands and gravel interbedded with silts and silty gravel. Flow from the NGA is generally from north to south toward the SGA. Like the SGA, the NGA eventually discharges to Puget Sound and the Green River Valley.

G. Flow Rates

Flow rates within the aquifers and along critical flow paths are very difficult to estimate at Midway Landfill because of the complex stratigraphy and the strong vertical gradients. Based on evidence from calculated hydraulic conductivities, estimated porosities, and measured hydraulic heads, flow rates in the aquifers beneath Midway Landfill range from less than 0.01 to 10 ft per day. Given that flow rates of 0.1 to 1 ft per day are most likely, actions affecting leachate discharge or quality would be detectable in the groundwater monitoring network between 3 months and 30 years after they occurred. Note that the groundwater monitoring wells were selected in representative upgradient and downgradient sampling locations based on flow directions within each aquifer. Monitoring has been conducted at the site for over 20 years. Over this period, flow rates have been sufficient to allow observation of substantial changes in fluid level and chemical monitoring data in response to remedial actions.

Land and Resource Use

A. Land Use

Currently the landfill is capped and fenced. No public access is allowed.

Sound Transit is proposing to expand the regional light rail system south from the city of SeaTac to Federal Way, Washington. The I-5 corridor is currently the Preferred Alternative in the Environmental Impact Statement, which will likely impact the Midway Landfill. Sound Transit is working with Ecology and EPA and if the chosen alternative affects Midway Landfill, the appropriate regulatory documentation will be completed.

The most recent evaluation of potential future land use was a reuse planning report for Midway Landfill completed in February 2007. Below is a brief summary of the report:

- Four acres of the site have no refuse and minimal remedy components. They front the Pacific Highway South and could be potentially used for unrestricted uses in the near term.
- Seven acres have shallow (approximately 50 to 60 feet deep) refuse and have minimal surface remedy components. They could potentially be used for surface uses such as a parking lot or active recreation in the future.
- Fourteen acres house the site's flare station and retention pond, and these will be operational into the foreseeable future.

- There are nine acres that are a Washington Department of Transportation Right of Way that will be used in the future for an I-5 roadway widening project.
- Thirty-three acres where waste is moderately or deeply located have extensive surface remedy components. Alternate land uses in the future may be possible in the long term.

Occasionally there are inquiries from buyers of properties adjacent to or near the Midway Landfill. The inquiries request information on any environmental impacts to the property that the buyer may be interested in purchasing. Whenever such inquiries are received, the City of Seattle reviews the current environmental data with respect to the location of the property of interest. There have not been any inquiries from potential buyers in the last ten years. An example information letter from the City of Seattle to prospective purchasers of adjacent or nearby properties is provided in Appendix A.

B. Groundwater Use

To the best of Ecology's and the City's knowledge, no one is drinking the groundwater from any aquifer within almost a mile of the landfill, and there are no current plans to use the groundwater near the landfill for drinking water. The closest wells for drinking water are the Lake Fenwick wells almost 1 mile southeast of the Midway Landfill. As part of the Midway Landfill Environmental Impact Survey (EIS) in 1985, the City's contractor located private wells within a one-mile radius of the landfill, and public wells within five miles of the landfill by reviewing numerous agency files. Based on this inventory, the contractor sent questionnaires to approximately 90 households near the landfill in order to verify the existence and use of private wells. The list of households was updated during the RI, and several key downgradient wells were re-verified in 1999. Citizens were also questioned at several public meetings and at meetings of the Midway Action Group regarding their knowledge of any wells in neighborhoods surrounding the landfill. From this information, 31 private wells were identified within a one-mile radius of the landfill.

Of the 31 wells, nine were in use, 12 were unused, and 10 were inoperable as of the time of the ROD. Of the nine wells in use, five were used for drinking water, including the Lake Fenwick supply, which services nine homes, and the other four wells were used for irrigation. The five drinking-water wells are all located over 4,600 feet from the landfill, in the Lake Fenwick area. Three of the four irrigation wells are located over 2,000 feet southwest of the landfill (out of the plume path). The fourth irrigation well is located between the groundwater plume and the Lake Fenwick wells. Two other wells were identified within 1,000 feet of the landfill (Well Nos. 37 and 57). Well No. 57 is dry and owned by the City of Kent. Well No. 37, on privately owned property, is unused and covered.

Monitoring Well 30 (MW-30) in the Southern Gravel Aquifer was added in 1988 to act as an early warning location should any measurable contamination from the landfill move toward the irrigation well or toward the Lake Fenwick wells. MW-30 is still monitored, and has generally remained clean and unimpacted throughout the groundwater monitoring program. However, after the last five year review, 1,4-dioxane began being sampled annually in MW-30C and has consistently been detected at concentrations exceeding MTCA method B cleanup levels. The

Lake Fenwick well has been inactive since 2002. It is unknown if the status of the other 30 wells in the one-mile radius of Midway has changed.

There are three public wells in the Midway Landfill area. Two are operated by the Highline Water District near the two intersections of South 209th Street and 31st Avenue South and South 208th Street and 12th Avenue South, respectively. These two wells are screened in the second confined aquifer at over 120 ft below sea level. Both are over two miles north and northwest from the landfill in an area upgradient of the landfill, and are completed in aquifers that are not connected to the affected aquifers. The third well is operated by the Kent Water District at South 212th Street and Valley Freeway and is used to satisfy peak summer demands. None of these municipal wells draw water from aquifers known to be affected, and all are more distant from the landfill than are the Lake Fenwick wells. Neither water district has future plans to develop groundwater supplies from any aquifers within a one-mile radius of the Midway Landfill. The wellhead protection areas delineated by these utilities do not include the Midway Landfill site.

State regulations (WAC 173-160 -171) do not allow any new private drinking water wells within 1000 ft of a solid waste landfill or 100 ft of all other sources or potential sources of contamination, and notice is required to be given to Ecology prior to the construction of any well. However, the NCP is more stringent and requires EPA to consider all groundwater as drinking water except directly under a waste management area. The landfill area with refuse is a waste management area and thus is not considered a future drinking water source by EPA. All other areas downgradient of the landfill are considered to be potential future drinking water sources. However, it is likely that all future developments lie within water district service areas and, therefore, are not likely to rely on private wells for their potable water supply.

History of Contamination

From 1945 to 1966, the site of the current Midway Landfill was operated as a gravel pit. Originally, the pit was adjacent to a natural drainage basin often used as a settling pond. This basin, known as Lake Meade, was located northeast from the center of the present landfill. As the pit was mined, water was drawn from Lake Meade to wash silt and clay from the gravel and sand and then returned to the lake. This silt and clay settled on the lake bottom. Near the end of the gravel pit operation, the lake was drained into the southern end of the gravel pit, depositing a layer of clay and silt into the bottom of the pit. This layer of fine materials currently underlies much, but not all, of the present landfill.

In 1966, the City of Seattle leased the site and began using it as a landfill. From 1966 to 1983, approximately three million cubic yards of solid waste were deposited there. The exact dimensions of the bottom of the landfill are not known. However, existing boreholes indicate that the solid waste extends as deep as 130 ft in some places. The Midway Landfill was created primarily to accept demolition materials, wood waste, and other slowly decomposing materials. However, some hazardous wastes and industrial wastes, including approximately two million gallons of bulk industrial liquids from a single source, were also placed in the landfill.

Initial Response

In 1980, a state-mandated screening process administered by the Seattle-King County Department of Public Health was initiated to eliminate the disposal of any hazardous waste into Midway Landfill. When the City closed the landfill in the fall of 1983, it began extensive testing of water and gas in the landfill and its vicinity. Samples of groundwater from monitoring wells in and around the landfill and gas samples from gas probes indicated the presence of organic and inorganic contaminants outside the landfill boundary.

In 1985, Ecology also began investigating the site and found methane gas in nearby residences. Beginning in September 1985, the City of Seattle constructed gas migration control wells within the landfill property and gas extraction wells beyond the landfill property to control the subsurface migration of gas. Gas was found to have migrated up to 2600 ft beyond the landfill prior to installation of the gas extraction system.

In 1986, the site was placed on the NPL by the EPA for groundwater conditions at the site. As required by the EPA, the City completed a remedial investigation, endangerment assessment, and a feasibility study.

In May 1990, prior to completion of the remedial investigation and feasibility studies, the City and Ecology entered into a consent decree pursuant to MTCA. This legal agreement set forth Ecology's determination that undertaking certain remedial actions at Midway Landfill, prior to a Cleanup Action Plan (a MTCA decision document, similar to a Superfund ROD) would provide immediate protection to public health and the environment. In this consent decree, the City of Seattle agreed to finance and perform specific cleanup work. This cleanup work consisted of the elements described in the following sections.

A. Gas Control

An active gas control system was installed at the Midway Landfill. It originally included 87 gas extraction wells, 31 of which were located off the landfill in native soil. The off-landfill wells have since been abandoned or capped because gas has been removed from the offsite locations and is currently effectively controlled and removed onsite. In addition, approximately 70 off-landfill gas monitoring probes were installed to provide information on gas concentrations; about half of these probes have since been abandoned. The gas is extracted through the control wells at the landfill and routed to a permanent blower/flare system. Construction of the gas migration control system began in September 1985 and was completed in March 1991.

B. Landfill Surface Filling and Grading

The landfill surface was regraded, which increased the soil cover over the landfill by 2 to 14 ft. The engineered grades improved surface water runoff and decreased infiltration. The fill was also compacted to reduce permeability and prepare the surface for the cover system. The work began in August 1988 and was competed in June 1989.

C. Storm Water Detention Pond

The storm water detention pond includes the landfill dewatering and discharge system. A lined detention pond was constructed to the north of the landfill. Regrading of the landfill surface

redirected surface water to the new detention pond. Previously, the surface water infiltrated into the landfill. The detention pond is a 3-acre structure, lined with a 60-millimeter high-density polyethylene membrane (HDPE) to eliminate infiltration. The bottom of the pond was constructed below localized groundwater; therefore, a permanent dewatering system was also installed. Construction of the storm water detention pond began in August 1988 and was completed in June 1989.

D. Landfill Cap Installation

Construction of the final landfill cover began in October 1989 and was completed in May 1991. It consists of the following layers from bottom to top: a 12-inch-thick layer of low permeability (1 x 10-7 cm/sec) soil/clay material; a 50 millimeter HDPE flexible membrane; drainage net; filter fabric; 12-inch-thick drainage layer; and a 12-inch-thick topsoil layer.

E. Linda Heights Park Storm Water Diversion

The Linda Heights Park drain, a 30-inch culvert that drained directly into the landfill, was blocked. Storm water is now routed through a pump station and a pipeline to the detention pond. The old discharge line to the landfill is still in place and functions as an overflow in the event of a pump station failure. The construction of this rerouting began in August 1989 and was completed in 1991. The pump station and associated diversion of storm water was activated in January 1992.

F. Operations and Maintenance (O&M) Plan

A comprehensive operation and maintenance manual for both short-term and long-term operation and maintenance for the systems constructed under the consent decree was prepared by the City of Seattle and was approved by Ecology in April 1992. The 1990 consent decree also required the City to place a notice in the records of real property kept by the county auditor stating that the landfill was on the NPL and serve a copy of the consent decree upon any prospective purchaser, lessee, transferee, assignee, or other successor in interest to the property prior to the transfer of any legal or equitable interest in all or any portion of the landfill.

Summary of Basis for Taking Action

The basis for action was groundwater contamination above federal drinking water standards (MCLs) in two monitoring wells east of the landfill and I-5. In addition, state groundwater cleanup levels under MTCA were exceeded. Because drinking this groundwater could result in an imminent and substantial endangerment to human health, remedial action was warranted at the Midway Landfill.

Contaminants of concern for groundwater include 1,2-dichloroethane, vinyl chloride, and manganese.

IV. REMEDIAL ACTIONS

A final remedy for Midway Landfill was selected in a ROD by EPA with Ecology's concurrence on September 6, 2000.

The remedial action objectives for the site were:

- To ensure containment is effective and working. Although not explicitly said in the ROD, containment refers to containment of the waste by a landfill cap, containment of surface water infiltration by the landfill cap and the leachate collection basin, and containment of the gas by the gas extraction system.
- To ensure containment will be maintained.
- To return groundwater to drinking water standards and state cleanup standards downgradient of the landfill boundary.
- To ensure no residential exposure to groundwater until groundwater cleanup standards have been met.

The selected remedy consisted of:

1. Monitoring to:
(a) Determine if the remedial systems are working as designed,
(b) Determine the progress towards meeting the groundwater cleanup standards,
(c) Determine if adequate containment is maintained when and if major changes are approved by Ecology in the operation of the site, such as turning off or scaling down the gas collection system, and
(d) Demonstrate that the cleanup levels have been achieved.

2. Continue to operate and maintain all remedial project elements required in the Ecology/City of Seattle 1990 consent decree, including the gas collection system, the multilayered cap, and the storm water collection system.

3. Institutional controls. Three types of institutional controls are included in the selected remedy: permanent notices in King County's real estate records, assurances in the 1990 consent decree that operation and maintenance of the containment and monitoring systems will continue if the ownership or control of the property should change; and annual notices to appropriate agencies, water districts and locally active well drillers so that no water supply wells are constructed or used in areas with groundwater contamination from the landfill.

This ROD also establishes cleanup levels for the groundwater down gradient from the landfill.

ROD Cleanup Goals

The cleanup levels set in the ROD are shown in Table 1.

Table 1. List of Contaminants of Concern and Cleanup Standards

Contaminant	Cleanup Level	Basis of the Cleanup Level
Manganese	2.2 mg/L	MTCA Method B
1,2-dichloroethane	5 µg/L	Federal Drinking Water Standard (MCL)
Vinyl chloride	0.02 µg/L*	MTCA Method B.

NOTES:
(*) Pursuant to WAC 173-340-707(2), Ecology will utilize the practical quantification limit (PQL) of 0.2 µg/L to determine compliance with this cleanup standard because the cleanup standard is lower than the PQL.

1) 1,2-Dichloroethane and vinyl chloride are solvents. Vinyl chloride can also be formed in groundwater during the natural breakdown of other solvents. Manganese is a natural mineral in soil that dissolves into the groundwater because of the chemistry of the water leaving the landfill.
2) If other contaminants resulting from releases from the landfill are found in any downgradient monitoring well, cleanup levels, if necessary, will be established for these additional contaminants using the federal drinking water standards and MTCA.
3) The point of compliance for the groundwater will be at the edge of the landfill waste as specified in a Compliance Monitoring Plan to be approved by Ecology. Under MTCA, this location is considered a "conditional point of compliance." All groundwater downgradient of this point of compliance will need to meet these cleanup levels for contaminants resulting from releases from the landfill before the Midway Landfill is removed from the Superfund National Priorities List.

Remedy Implementation

A. Monitoring

The monitoring has been performed by the City of Seattle, while Ecology will continue to be the lead cleanup regulatory agency at the site. To evaluate the effectiveness of the remediation measures described above, the City has conducted performance and compliance monitoring programs at the Midway Landfill since 1989. These include fluid level monitoring, groundwater chemistry monitoring, and landfill gas monitoring that are performed on an ongoing basis. The current monitoring program is described in the Midway Landfill Monitoring Plan.

Fluid Level Monitoring

An extensive formal fluid level monitoring program began in October 1989 and was initially conducted monthly, quarterly, or semi-annually. In 1993 the monitoring frequency was reduced to a semi-annual schedule. Fluid level monitoring was previously referred to as "Performance Monitoring" and is intended to track response of landfill leachate levels and shallow groundwater levels to remedial actions required by the consent decree. It includes collection of groundwater level and oil thickness measurements within the saturated portion of Midway Landfill (termed Saturated Refuse) and groundwater levels in the shallow groundwater surrounding the landfill (Shallow Groundwater). The fluid level monitoring network for the Shallow Groundwater and Saturated Refuse is shown in Figure 2. Fluid level monitoring is currently being conducted on an annual basis and the current program consists of:

- Monitoring seven wells from the key hydraulic areas (south end, hydraulic sink, west side, central mound, Linda Heights, north end, north end shallow) of the landfill twice a year beginning in 2002 during Round 41. These wells monitor the Shallow Groundwater/Saturated Refuse (SG/SR). The measurements from these wells are being compared to historical data to evaluate continued effectiveness of the closure measures.
- Monitoring 61 additional wells from the SG/SR once every other year beginning in 2003. Measurements from these wells are being compared to historical data as described above and used to evaluate groundwater flow within the SG/SR and oil thickness trends.

Groundwater Chemistry Monitoring

Groundwater chemistry monitoring was initiated in February 1990 and has been conducted on a quarterly or semi-annual basis. As of 2010, the groundwater monitoring will be switched to annual sampling, to be conducted in the spring (April or May). Groundwater chemistry monitoring has also been referred to as "Compliance Monitoring" in previous documents and is intended to track the presence, concentrations, and migration of groundwater contaminants, both upgradient and downgradient of the landfill, to assess the effectiveness of the remedial actions.

The current groundwater chemistry monitoring program includes collection and qualitative analysis of groundwater samples collected from monitoring wells located upgradient and downgradient of the landfill and groundwater flow determination. The well locations currently used for groundwater chemistry monitoring are shown in Figure 7.

Landfill Gas Monitoring

Gas monitoring is conducted on a biweekly, weekly, monthly, or quarterly basis; it consists of checks for concentration, composition, temperature, flow, and velocity of gases.

B. Continue to operate and maintain all remedial project elements required in the Ecology/City of Seattle 1990 consent decree, including the gas collection system, the multilayered cap, and the storm water collection system.

The O&M requirements for Midway Landfill are described in Midway Landfill Operation and Maintenance Manual completed in 1992. This document is a comprehensive operation and maintenance manual for both short-term and long-term operation and maintenance for the systems constructed under the consent decree, was prepared by the City of Seattle, and was approved by Ecology in April 1992. The manual addresses operation and maintenance of all components of the remedy including: gas system, surface water systems, pump stations, landfill cover system, and roadway and site control.

Ecology continues to oversee the City's operation and maintenance activities. Operational changes can be approved by Ecology when such changes ensure that the site and remedy will remain protective. The Seattle King County Public Health Department is given the opportunity to review requested operational changes.

C. Implementing institutional controls.

The City of Seattle was required to place a notice in the records of real property kept by the King County auditor alerting any future purchaser of the landfill property, in perpetuity, that this property had been used as a landfill and was on EPA's National Priorities List, and that future

use of the property is restricted. The use restriction shall comply with the post-closure use restrictions under the State of Washington's Criteria for Municipal Solid Waste Landfills, WAC 173-351-500(1)(I) and (2)(c)(iii). The City is responsible for ensuring future owners and operators are made aware of these restrictions and that restrictions remain in effect and are complied with even in the event the property is sold or transferred.

The City is required to ensure continued operation and maintenance of the containment and monitoring systems if any portion of the property is sold, leased, transferred or otherwise conveyed.

The City of Seattle is required to send an annual written notice about the groundwater quality downgradient from the landfill to the Seattle-King County Department of Public Health, nearby water districts, locally active licensed well drillers, and Ecology. A copy of the 2015 letter is in Appendix C.

Operations and Maintenance

Routine maintenance is completed for the gas collection system, landfill cap, and surface water drainage system as described in the Operations and Maintenance Manual (Parametrix, 1992). Figure 8 shows the locations of the on-site gas extraction wells, the flare/blower, and the detention pond. All routine maintenance records are kept on-site. There is no reporting requirement associated with the landfill cap, gas collection system or surface water drainage system.

The cost for annual Operations and Maintenance was between $263,000 and $290,000 annually for the last five years.

A. Landfill Cap

Maintenance at the landfill cap and gas collection system was evaluated during the site visit. At the time of the site visit, the vegetative cap was being mowed. Cap settlement or damaged areas were not observed. According to the City of Seattle, the cap is mowed 2-3 times per year and cap inspections are completed during landfill gas sampling events.

B. Gas Collection System

The motor blower/flare facility has been modified since the original construction. The current operation consists of one 250 cubic feet per minute (cfm) flare with one 5-horsepower blower. One of the older flares remain in place as a backup to the smaller flare. All of the PC and PD extraction wells on the north and east side of the landfill have also been shut down. There have been no significant changes to the gas collection system in the last five years. The flare has had no downtime in the last five years.

C. Surface Water Drainage System

The detention pond was inspected during the site visit and appeared to be well maintained. The outlet discharge line from the detention pond is TV inspected every three years. The last inspection on July 17, 2013 revealed no problems.

V. PROGRESS SINCE LAST REVIEW

Protectiveness Statement from Last Review

"Protectiveness deferred. A protectiveness determination of the remedy at the Midway Landfill cannot be made at this time until further information on 1,4 dioxane is obtained. Further information will be obtained by adding one well (MW-7B) to the monitoring network and adding 1,4 dioxane to be sampled in all monitoring wells. The City of Seattle has agreed to incorporate this additional well and contaminant to the monitoring network. It is expected that the protectiveness determination can be made after two rounds of sampling are completed, which is estimated to be available by September 2012."

In January 2013, a second five year review addendum was issue and stated "The remedy at the Midway Landfill is considered protective of human health and the environment and exposure pathways that would results in unacceptable risks are being controlled by institutional control and restrictive covenants." This statement was based off of comparing groundwater concentrations of 1,4-dioxane to a MTCA cleanup level of 7.95 µg/L. It has been determined that this cleanup levels was incorrectly reported in a groundwater table and that the correct MTCA cleanup level for 1,4-dioxane is 0.44 µg/L (and was the same value in 2013). The addendum should not have found the remedy protective.

Status of recommendations and follow-up actions from last review.

The status of the recommendations and follow-up actions from the last Five Year Review are shown in Table 2.

The recommendations and follow-up actions to add well MW-7B and sample for 1,4-dioxane were followed, however Ecology and the City of Seattle did not meet to discuss the results from the elevated 1,4-dioxane. No investigations into upgradient sources or notification of property owners were done by Ecology in the last ten years.

Table 2. List of Recommendations and Follow-up Actions from second Five Year Review and Current Status.

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness?		Status
				Current	Future	
1) a. Investigate and cleanup upgradient sources of VOC contamination. Encourage upgradient property owners to voluntarily cleanup contamination.	Ecology	EPA	2015	N	Y	Not performed
1) b. Ecology will notify property owners that have upgradient sources of contamination by September 2011. Ecology will advise the property owners on cleanup requirements. By September 2013, property owners need to take substantive action on the upgradient source.	Ecology	EPA	September 2011 and 2013	N	Y	Not performed
2) Add well MW-7B to the monitoring network to further evaluate groundwater contamination in the SA.	City of Seattle	Ecology	May 2011	N	Y	Done
3) a. Add 1,4-dioxane to be sampled in all wells in the monitoring network.	City of Seattle	Ecology	May 2011	Y	Y	Done
3) b. If 1,4-dioxane is found in downgradient wells at levels greater than upgradient wells, and above cleanup levels, then City of Seattle and Ecology need to meet and reevaluate the remedy.	City of Seattle	Ecology	May 2011	Y	Y	Not performed

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

- **Members of the FYR team**
  Laura Buelow, EPA, Remedial Project Manager
  Ching-Pi Wang, Ecology, Project Manager
  Technical support from EPA and USACE (United States Army Corps of Engineers).

- **Schedule of review**

EPA Region 10 initiated the five-year review in January 2015 and scheduled its completion for September 2015. The EPA site review team was led by EPA Remedial Project Manager (RPM) Laura Buelow and also included EPA site attorney Ted Yackulic and EPA Community Involvement Coordinator (CIC) Jo Gallaher. In January 2015, EPA had phone calls with the City of Seattle, Ecology, and USACE to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. A review schedule was established that consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Five-Year Review Report development and review.

Documents Reviewed

Data Received from City of Seattle:

- Midway Detention Pond Surface Water Quality Data. October 2010 – April 2015.
- Landfill Gas Probe Data. October 2010 – January 2015.
- Flare Data. October 2010 – April 2015.

Parametrix, Inc. 1992. Midway Landfill, Operation and Maintenance Manual, Prepared for Seattle Engineering Department, Solid Waste Utility. December 1992.

Parametrix, Inc. 2000. Midway Landfill Monitoring Plan, Prepared for City of Seattle, Seattle Public Utilities. April 2000.

Washington State Department of Ecology (Ecology) 1990. Consent Decree. May 29, 1990.

Ecology 2005. First Five-Year Review Report for Midway Landfill Site, Kent, Washington. September 19, 2005.

U.S. Environmental Protection Agency (EPA) 2000. Record of Decision, Midway Landfill, Kent, Washington. September 6, 2000.

EPA (2010). Second Five-Year Review Report for Midway Landfill Site, Kent, Washington. September 15, 2010.

Parametrix, Inc. 2015. Midway Landfill Groundwater Monitoring Status Report 2010-2014. May 2015.

Parametrix, Inc. 2009. Midway Landfill 2008 Annual Groundwater Monitoring Report Round 54. December 2009.

Data Review and Evaluation

A. Landfill Cap

According to the City of Seattle, 36 probe locations (most with multiple completions) for a total of 82 sampling points, are required to be monitored for combustible gas (primarily methane), oxygen, hydrogen sulfide, and static pressure on a monthly basis. Another 21 probe locations (mostly multiple completions) with 36 sampling points are monitored on a quarterly basis. The monitoring plan should be updated with the current monitoring schedule and probe locations.

B. Gas Collection System

Gas monitoring data from October 2010 through January 2015 were reviewed for this Five-Year Review. Methane concentrations above the lower explosive limit (LEL) of 5% by volume have been detected outside the landfill boundary at one probe location (AM) at the northeast corner of the landfill (Figure 9). Methane concentrations are highest in the shallow completion of the AM probe, screened from 25 to 40 below ground surface. Concentrations range from 0 to 7.4% by volume and appear to be relatively stable (Figure 10). The AM gas probe is outside the influence of the current gas extraction system. If concentrations of methane persist near the LEL or indicate an increasing trend, passive venting methods may be necessary to reduce the potential for gas migration in this location.

C. Surface Water Drainage System

Surface water monitoring at the detention pond is required when the water level is above 1.0 foot. Water temperature, pH, dissolved oxygen, turbidity, and conductivity are measured at each inlet (landfill inflow, I-5 inflow, and Highway 99 inflow) and at the pond discharge outlet. Discharge is shut off if the turbidity exceeds 100 NTUs. Exceedance of any other discharge parameters requires evaluation by the site supervisor.

Surface water quality data were reviewed for the last five years. With the exception of pH below 6.5, none of the water quality parameters at the discharge outlet have been outside the required parameters. The lower pH levels have been attributed to low rainfall pH and bird droppings. According to the City of Seattle, discharge from the pond has not required shut off in the last five years.

D. Groundwater Flow

Potentiometric contour maps have been generated regularly with each monitoring round for the Upper Gravel Aquifer, the Sand Aquifer, and the Southern Gravel Aquifer. The most current results are shown in Figures 4-6.

In general, the fluid levels in the shallow groundwater and saturated refuse have declined over time and the overall shape of the potentiometric surface has undergone little change over the last 20 years. The overall flow patterns within and directly under the landfill have generally remained constant over time.

E. Water Quality Monitoring

The most recent groundwater quality results are published in the 2015 Midway Landfill Groundwater Monitoring Report 2010-2014. Summary tables of groundwater quality data are attached in Appendix B.

The cleanup level for 1,2-dichloroethane had one exceedance in the last 5 years. It was in a downgradient well in the Southern Gravel Aquifer (MW-29B) during the 2013 sampling round. The cleanup level is 5 μg/L and the sample result was 5.1 μg/L.

The vinyl chloride cleanup level was exceeded in one upgradient well in the Sand Aquifer (MW-7B) and in thee downgradient wells in the Southern Gravel Aquifer (MW-14B, MW-20B, and MW-29B) during the 2010-2014 sampling rounds. In 2014, wells MW-7B and MW-14B had dropped below the cleanup level. In general, the levels of vinyl chloride in all downgradient wells are continuing to decline.

Manganese has exceeded the cleanup level in two downgradient wells (MW-7B in the Sand Aquifer and MW-20B in the Southern Gravel Aquifer) during the 2010-2014 sampling rounds. Manganese continues to decrease in these two wells.

Three additional volatile organic compounds have been detected in MW-17B and MW-21B, both upgradient wells in the Sand Aquifer. 1,1-dichloroethene [DCE]; tetrachloroethene [PCE]; and Trichloroethene [TCE]) have been detected consistently over MTCA Method B groundwater cleanup levels. The heavy influx of PCE (concentrations ranging from 110-130 ug/L in MW-21B) points towards an upgradient source of this contaminant. The downgradient wells do not have concentrations of these volatile organic compounds (VOCs) above regulatory levels, however vinyl chloride is a breakdown product of TCE and TCE is above regulatory levels in downgradient wells.

The chemical 1,4-dioxane was added to all wells currently being sampled in the monitoring network after the last five year review. In the Sand Aquifer, 1,4-dioxane is over the MTCA Method B level (0.44 μg/L) in two upgradient wells (MW-17B and MW-21B) and one downgradient well (MW-7B). In the Southern Gravel Aquifer, all downgradient wells (MW-14B, MW-20B, MW-23B, MW-29B, and MW-30C) have exceedances of 1, 4-dioxane in all rounds of sampling from 2010-2014. The levels are generally decreasing, however the levels in the Southern Gravel Aquifer are up to 80 times the MTCA Method B level. The boundary of the 1,4-dioxane plume is unknown at this time, and additional characterization to determine extent is needed.

Since the groundwater plume expands beyond the boundary of the landfill and there are residences in the area, vapor intrusion was considered in this five-year review based off of the *OSWER Technical Guide For Assessing And Mitigating The Vapor Intrusion Pathway From*

Subsurface Vapor Sources To Indoor Air (June 2015). 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,4-dioxane, tetrachloroethylene, 1,1,1,-trichloroethane, trichloroethylene, trichloroflurormethane, and vinyl chloride are sufficiently toxic and volatile to be considered a vapor intrusion threat.

The highest groundwater results in the UGA and SA are below the target groundwater concentration for residential exposure with a target risk for carcinogens at $1x10^{-6}$ risk or target hazard quotient for non-carcinogens of 1 for all contaminants listed above except for vinyl chloride. Vinyl chloride is two-fold greater than the target in a downgradient well in the SA (MW-7B). Generally only the top aquifer is considered for vapor intrusion, so an exceedance in the SA is not cause for concern. Additionally, MW-7B is monitoring under the landfill cap and gas extraction system. Therefore, vapor intrusion was not considered further and no issues or recommendations were identified.

F. Institutional Controls

EPA did an Institutional Controls review and had a Title Search done in August 2007 to determine whether the required deed restrictions had been recorded on all 8 parcels where they were required pursuant to the City's Consent Decree with Ecology, were still in place, and contained all the necessary restrictions. This review confirmed that the necessary restrictions had been recorded, but an online search of property records only turned up a restriction on one parcel. The City was notified of this issue and immediately rectified the problem such that online searches now reveal all the necessary restrictions. Verification of the institutional controls combined with the remedial actions that had already been completed formed the basis for EPA to make a Sitewide "Ready for Anticipated Use" determination in September 2007.

Annual notices have been sent to Ecology and nearby well drillers regarding the levels of contamination. A copy of the 2010 notice regarding downgradient groundwater conditions to Ecology is provided in Appendix C.

All physical controls (e.g. fencing, gates and signage) have been properly maintained and are in good condition.

Community Notification

On May 29, 2015, a Public Notice was place in the *Kent Reporter* stating that EPA was performing this Five-Year Review and soliciting comment. No inquiries from this announcement were made. A public notice of the completion of this Five-Year Review will be placed the *Kent Reporter* upon completion of this report.

Site Inspection

A site inspection was performed on June 10, 2015. Overall, the Site appeared to be in very good condition. All fences were intact, and gates were locked. There was no evidence of trespassers. The vegetation on top of the cap was approximately 12 to 18 inches deep, but was in the process of being mowed to prevent deep rooting plants from affecting the integrity of the cap. There was

minor settlement of the surface cap. The storm water retention basin had abundant wetland vegetation, which helps to reduce the turbidity of the effluent. The mechanical equipment for the gas extraction system appeared to be in good operating condition.

Participants:

Laura Buelow, EPA, Remedial Project Manager
Rebecca Gerhart, EPA, Environmental Scientist
Catherine Martin, USACE, Chemist
Jake William, USACE
Jeff Neuner, City of Seattle, Landfill Closure Business Area Manager
Min-Soon Yim, City of Seattle, Senior Environmental Analyst

The site inspection checklist and photographs from the site inspection are in Appendix D.

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the landfill gas collection, cap, and surface water drainage systems are functioning as intended. Methane concentrations outside the landfill boundary are below the LEL except for well AM. The flare/blower station, landfill cap, and surface water drainage system appeared to be well maintained. Groundwater monitoring changed to annually in 2010.

The groundwater COCs identified in the ROD are trending downwards in downgradient wells and are below or approaching the Remedial Action Goals (RAG)s.

A.1 Removal Action Performance and Monitoring Results

Consistent detections of methane outside the landfill boundary are limited to one probe location (AM) located to the northeast of the landfill. Methane concentrations in the AM probe location range from 0 to 7.4% by volume and appear to be relatively stable.

While the remedy is functioning as intended, upgradient well MW-21B has continuous levels of three volatile organic compounds (1,1-DCE, PCE, and TCE) above applicable standards (federal MCLs for drinking water, and MTCA Method B groundwater cleanup levels). The levels are not decreasing. The downgradient wells do not have concentrations of these VOCs above regulatory levels, however vinyl chloride is a breakdown product of TCE and TCE is above regulatory levels in downgradient wells.

Upgradient sources of VOCs in groundwater will continue to limit the potential for the chemicals of concern in downgradient SGA wells to decrease below the ROD cleanup level and thus the Site from achieving completion, closeout, and deletion. As the lead regulatory agency, Ecology has been tasked with investigating the potential upgradient source(s) impacting MW-21B, notifying property owner(s) and pursuing action. To date, Ecology has not taken any action.

Also, several wells in the original monitoring network in the UGA and SA have gone dry. This indicates that the cap is functioning as intended and reducing recharge of the upper aquifers; however it also limits the information on downgradient contaminants in the UGA and SA.

A.2 System Operations and Maintenance

The gas collection system, landfill cap, and surface water drainage systems appear to be well maintained. The gas collection system has been modified from the original construction to increase efficiency and decrease operating costs. Cap settlement or damage were not observed during the site visit.

A.3 Costs of System Operations, Maintenance, and Monitoring

Budget documents indicate normal expenditures for system operations, maintenance and monitoring.

A.4 Opportunities for Optimization

Overall landfill gas concentrations have decreased significantly to the point that flare operation requires gas augmentation. By determining the specific areas where significant gas concentration remains and concentrating gas extraction in those areas, the gas collection system has been optimized and natural gas consumption to augment the flare has been minimized. There are no additional opportunities for optimization at the landfill cap or surface water drainage system.

A.5 Early Indicators of Potential Remedy Problems

Methane concentrations above the LEL have been observed at gas monitoring probe, AM, located to the northeast of the landfill. This area is outside the influence of the current gas extraction system. Since concentrations persist near the LEL in the shallow probe, passive venting methods are being considered to reduce the potential for gas migration in this location.

A.6 Implementation and Review of Institutional Controls and Other Measures

Institutional controls have been properly implemented and maintained. EPA did an Institutional Controls review and had a Title Search done in August 2007 to determine whether the required deed restrictions had been recorded on all 8 parcels where they were required pursuant to the City's Consent Decree with Ecology were still in place and contained all the necessary restrictions. This review confirmed that the necessary restrictions had been recorded but an online search of property records only turned up a restriction on one parcel. The City was notified of this issue and immediately rectified the problem such that online searches now reveal all the necessary restrictions. EPA has in the past concluded that the deed restrictions combined with the State prohibition on drinking water wells within 1,000 ft of a landfill were adequate and appropriate institutional controls for this Site, with a notation that Washington has adopted the Uniform Environmental Covenants Act (UECA), so under State law future proprietary institutional controls should take the form of a UECA covenant. Once the 1,4 dioxane plume is better delineated, EPA will reevaluate if a 1,000 ft radius is adequate. Verification of the institutional controls combined with the remedial actions that had already been completed formed the basis for EPA to make a Sitewide "Ready for Anticipated Use" determination in September 2007.

Annual notices have been sent to Ecology, the Seattle-King County Deparment of Public Health, the local water districts, and locally active will drillers regarding the levels of contamination. Ecology is not aware of any new drinking water wells have been installed within the 1,000 ft restricted area or the groundwater plume in the past five years. All physical controls (e.g. fencing, gates and signage) are in good condition.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy are still valid for the contaminants of concern selected in the ROD, however, 1, 4, dioxane contamination exceeds risk-based levels and the extent of the plume has not been defined, so it is not possible to say at this time whether all exposure assumptions in the ROD are still valid.

B.1 Changes in Standards and To Be Considered:

Table 3 provides a table presenting an analysis of ARARs from the ROD to include any changes in standards and/or applicability or relevance and appropriateness.

Two regulatory requirements followed by the City of Seattle in their operation of Midway Landfill were not included in the ROD.

- Puget Sound Clean Air Agency (PSCAA); Regulations I through III; and
- Washington State Water Quality Standards

Since the last Five-Year Review, 1,4-dioxane concentration data has been collected from all active wells currently sampled in the monitoring network. Results indicate exceedances in two upgradient and six downgradient wells, including all five downgradient MWs in the SGA. Peak detections (53 ug/L) significantly exceed the MTCA B cleanup level (0.44 ug/L). The extent of the 1,4-dioxane plume is unknown.

In the first Five Year Review, the cleanup level for vinyl chloride was suggested to be changed from 0. 02 µg/L to 0.29 µg/L. Since cleanup levels cannot be changed in a five year review, it is recommended that the cleanup level for vinyl chloride be investigated and if it is determined that there should be a change to the cleanup level established in the ROD, it will be documented in an ESD.

Table 3. Midway Landfill ARAR Analysis – Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/Authority	ARAR	Status	Standard Applied in ROD	Current Use
Groundwater/Landfill/ Washington Model Toxics Control Act (MTCA)	State – MTCA (WAC 173-340-360(4);-360(6);-720(3); -720(6); -707;-440	Applicable	State requirements in determining the order of preference of cleanup technologies, providing a reasonable time frame for restoration; establishing groundwater cleanup levels; selection of the point of compliance; determining when the groundwater cleanup level is attained when the practical quantitation limit is greater than the cleanup level; and the format for institutional controls.	The remedy as presented in the ROD satisfies these requirements. Monitoring, operation and maintenance elements of the remedy are on-going. These requirements are still applicable. In 2007, MTCA was revised to further clarify how to determine cleanup standards for dioxins/furans, PCBs, and PAHs. These compounds, however, are not contaminants of concern at this site.
Landfill/Washington Criteria for Municipal Solid Waste Landfills	State – Municipal Solid Waste Landfills (WAC 173-351-500)	Relevant and Appropriate	Provides closure and post-closure requirements including notation on the deed that the land was used as a landfill.	The landfill was closed in 1983. Post-closure maintenance and monitoring is currently occurring. Monitoring of the landfill system is a component of the remedy. New rulemaking in progress since the last five year review are recorded in WSR 12-23-009.
Landfill/Washington Minimum Functional Standards for Solid Waste	State – Minimum Functional Standards for Solid Waste (WAC 173-304-460)	Relevant and Appropriate	Provides minimum standards for facilities that dispose of solid waste including minimum functional standard for explosive landfill gas.	The site is closed and is no longer accepting solid waste. This requirement is still relevant and appropriate. A new rule was created in 2005 (WAC 173-304-350) to address many changes to this regulation. The new rule remains relevant and appropriate.
Groundwater/Safe Drinking Water Act (SWDA)	Federal – SDWA (40CFR 141)	Relevant and Appropriate	Establishes MCLs which were used to establish groundwater cleanup standards downgradient of the landfill.	Groundwater cleanup standard for 1,2-dichloroethane is based on federal MCL of 5µg/L. Groundwater cleanup levels for vinyl chloride and manganese are based on MTCA Method B. No changes to federal MCLs or MTCA B. These requirements are still relevant and appropriate.

B.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics.

Exposure assumptions

No baseline risk assessment was conducted for the site. However, an Endangerment Assessment was prepared as part of the 1990 RI/FS. This assessment determined that the only potential exposure pathway is discharge of leachate into the groundwater. Based on this assessment, the ROD determined that there are likely no current unacceptable risks to human health through gas migration or groundwater because gas migration has stopped and no one was believed to be using groundwater as a source of drinking water. These exposure assumptions are currently unknown due to the unknown extent of the 1,4-dioxane plume.

No ecological risks to plants or animals were expected in the ROD. This exposure assumption is still valid.

Toxicity Data

Even though no baseline risk assessment was conducted, potential future risk to groundwater exposure was estimated in the ROD. Toxicity values used to calculate the potential future risk were from either EPA's Integrated Risk Information System (IRIS) or Region 9 PRG tables. The following table presents the toxicity values from IRIS and Region 9 PRG tables from the time of the ROD compared to current values.

Table 4. Toxicity values from IRIS and Region 9 PRG/RSL tables from the time of the ROD compared to current values 1,4-dioxane was not a COC in the ROD but is included.

Contaminant	Toxicity values in ROD[1]	Changes in Toxicity Values[2]
Vinyl Chloride	RfDo: $3x10^{-3}$ mg/kg-day RFCi: $1.0x10^{-1}$ mg/m^3 SFo: 7.5 $x10^{-1}$/ mg/kg-day IUR: $4.6x10^{-6}$ (µg/m^3)$^{-1}$	RfDo: no change RfCi: no change SFo: 7.2 $x10^{-1}$/ mg/kg-day IUR: $4.4x10^{-6}$ (µg/m^3)$^{-1}$
1,2-dichloroethane	RfDo: 2.0x10-2 RfCi: $4.9x10^{-2}$ SFO: $9.1x10^{-2}$/mg/kg-day IUR: $2.6x10^{-5}$ (µg/m^3)$^{-1}$	RfDo: $6x10^{-3}$mg/kg-day RfCi: $7.0x10^{-3}$ mg/m^3 SFO: $9.1x10^{-2}$/mg/kg-day IUR: $2.6x10^{-5}$ (µg/m^3)$^{-1}$
Manganese	RfDo: $2.4x10^{-2}$ mg/kg-day RfCi: $1.8x10^{-4}$mg/m^3 SFO: N/A IUR: N/A	RfDo: $1x10^{-2}$ mg/kg-day RfCi: 4.9x10-5 mg/m^3 SFO: N/A IUR: N/A
1,4-dioxane	RfDo: N/A RfCi: N/A SFO: $1.1x10^{-2}$(mg/kg-day) IUR: $3.4x10^{-6}$ mg/m^3	RfDo: $3.0x10^{-2}$ (mg/kg-day) RfCi: $3.0x10^{-2}$ mg/m^3 SFO: none IUR: $5.0x10^{-6}$ (µg/m^3)$^{-1}$

1 – Toxicity values were not provided in the RODs. Therefore, this evaluation uses the 2004 Preliminary Remedial Goals (PRGs) from EPA Region 9. The PRGs are the same values as from IRIS.

2 – New toxicity values are from the June 2015 EPA RSLs which reflect the most recent EPA IRIS toxicity values; different units for inhalation toxicity values have been published, as EPA no longer uses inhalation reference doses or inhalation cancer slope factors, but rather inhalation reference concentrations and inhalation unit risks. MTCA

equations continue to use the older units. These toxicity values are used to determine all screening and cleanup levels.
PRG – preliminary remediation goal
RSL – regional screening level
SF – slope factor
RfD – reference dose
RfC – reference concentration
IUR – inhalation unit risk

B.3 Changes in Land Use.

Land use has remained the same. A future project that expands the I-5 corridor and Sound Transit in this area may affect the landfill. However, these projects have not yet been approved..

B.4 Remedial Action Objectives.

The remedial objectives presented in the ROD are still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

A well survey was completed in 1985 and reverified in 1999 (described in Land and Resource Section of this Five Year Review, Section B). At least one well has changed from active to inactive since 1999 and it is unknown if other wells have changed status. Although work was done to follow up with landowners that had wells that showed up on the well survey, a broader questionnaire has not been sent to all property owners within a one mile radius of Midway Landfill. It is not known if older, unpermitted wells exist.

No other information has come to light for the gas collection, cap, and surface water drainage systems.

D. Technical Assessment Summary

While the remedy is functioning as intended, upgradient sources of VOCs in groundwater will continue to limit the potential for the COCs in downgradient SGA wells to decrease below the ROD cleanup level and thus the Site from achieving completion, closeout, and deletion.

Although 1,4-dioxane levels appear to be declining in downgradient wells (for the five sampling events on record), the plume boundary is unknown. It is therefore uncertain whether or not the ICs prohibiting water supply well drilling in “the affected area” are protective.

The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy are still valid.

VIII. ISSUES, RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 5. Issues, Recommendations and Follow-up Actions for This Five Year Review.

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Upgradient sources of VOCs in groundwater will continue to limit the potential for the chemicals of concern in the SGA to decrease below the ROD cleanup levels, especially because the concentrations of volatile organic compounds in upgradient well MW-21B are not decreasing.	Ecology will notify property owners with potential upgradient sources of contamination, including current COCs and 1,4-dioxane, by September 2016. Ecology will advise the property owners on cleanup requirements. By September 2018, property owners need to take substantive action on the upgradient source.	State	EPA	09/2018	No	Yes
1,4-dioxane has been found in several wells at concentration that exceed regulatory levels. The ROD contains no cleanup level for 1,4-dioxane. Additionally, the first five year review identified a change to vinyl chloide cleanup level.	EPA will write an Explanation of Significant Difference to add 1,4-dioxane as a COC to the ROD. EPA will consider whether the vinyl chloride cleanup level established in the ROD should be changed, and if so, it will be documented in an ESD.	EPA	EPA	09/2018	No	Yes

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
The extent of the 1, 4-dioxane plume has not been delineated.	Ecology will do a search to determine the location of any wells constructed within a one mile radius of Midway Landfill and 1) identify the status of those wells (active, inactive) 2) determine the use (water supply/irrigation/monitoring/etc.) 3) compile well construction logs as available. Based on the well construction logs, Ecology will determine if any of these wells are constructed in a manner that would allow for water quality sampling that would allow further characterization and delineation of the contaminant plume downgradient of the site. If no existing wells can be confidently used for this purpose, Ecology will identify locations for new monitoring wells to delineate the extent of the 1,4 dioxane plume.	State	EPA	09/2018	No	Yes

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
The extent of the 1,4-dioxane plume is unknown. It is therefore uncertain whether or not the ICs prohibiting water supply well drilling in "the affected area" are protective.	Ecology will send out letters to all properties in a one mile radius from Midway Landfill to determine if they contain a well, if that that well is being used, and for what purpose (e.g. drinking water, irrigation, etc). In the event that a property owner is actively using a well, Ecology will notify the owner of the potential risks immediately.	Ecology	EPA	03/2016	Yes	Yes

The following issues do not affect current or future protectiveness were also identified during the Five-Year Review:

- The Midway Landfill Operations and Maintenance Manual has not been updated since 1992. It should be updated to include the current landfill gas sampling locations and schedule and location of operational gas extraction wells.
- Update Annual Notice to drillers, water districts, and local health districts to include a map of the area with the area of known contamination shaded-in, or otherwise clearly visually identified by a boundary. Notice should clearly state uncertainties associated with the boundary and the potential for additional areas of risk (to be determined with additional plume characterization)
- The AM gas probe is outside the influence of the current gas extraction system. If concentrations of methane persist near the LEL or indicate an increasing trend, passive venting methods may be necessary to reduce the potential for gas migration in this location.

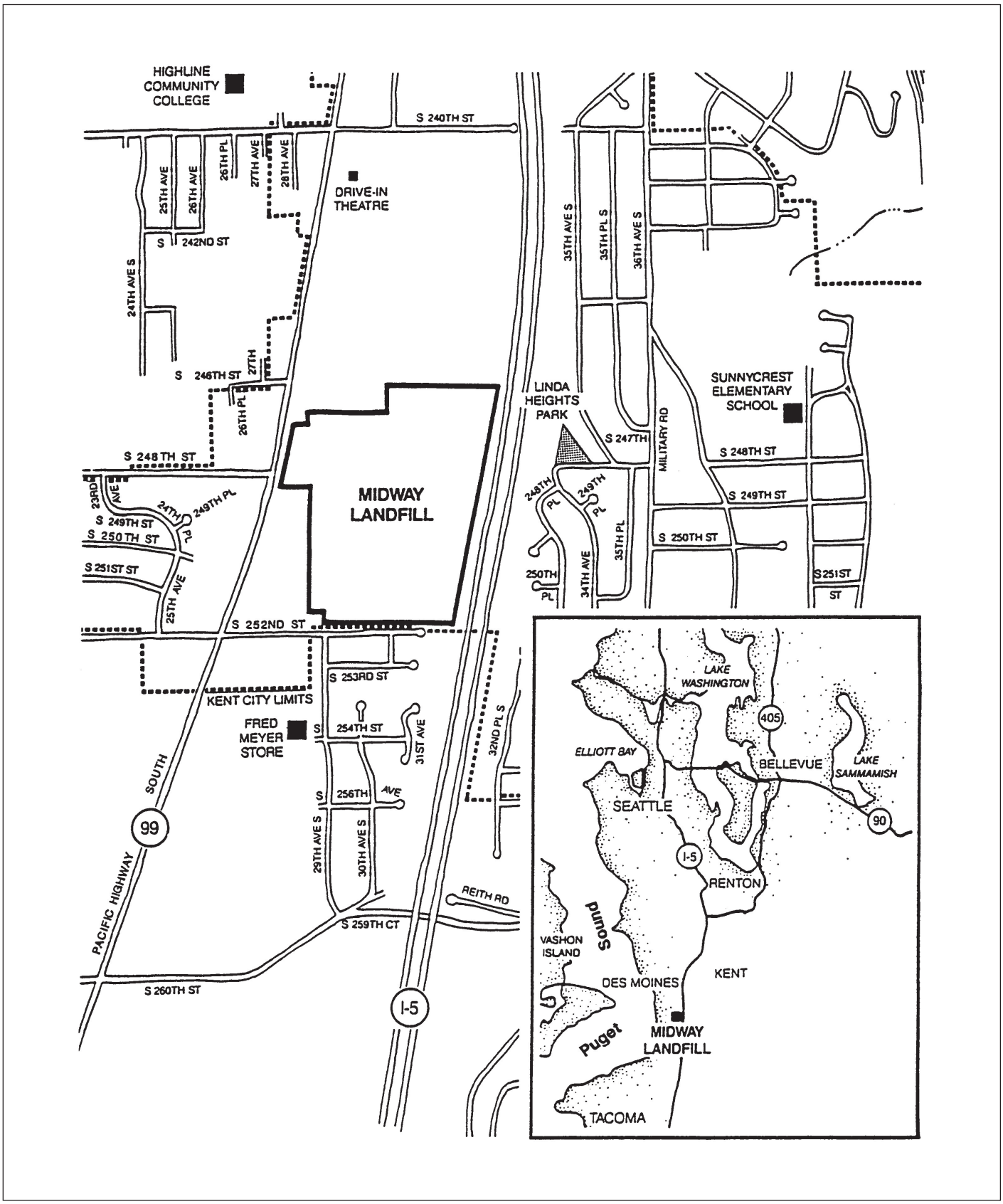
X. PROTECTIVENESS STATEMENT

Protectiveness deferred. A protectiveness determination of the remedy at the Midway Landfill cannot be made at this time until further information on the extent of 1,4 dioxane is obtained. Further information will be obtained by additional water quality sampling downgradient of the site, either at existing and appropriately constructed wells identified by Ecology or by new wells installed for this purpose and by conducting a survey of the use of downgradient private wells. It is expected that the protectiveness determination can be made by September, 2018.

XI. NEXT REVIEW

The next Five-Year Review should occur within five years, by September, 2020.

FIGURES



Parametrix Midway Landfill/555-1550-054/01(01A2) 5/11

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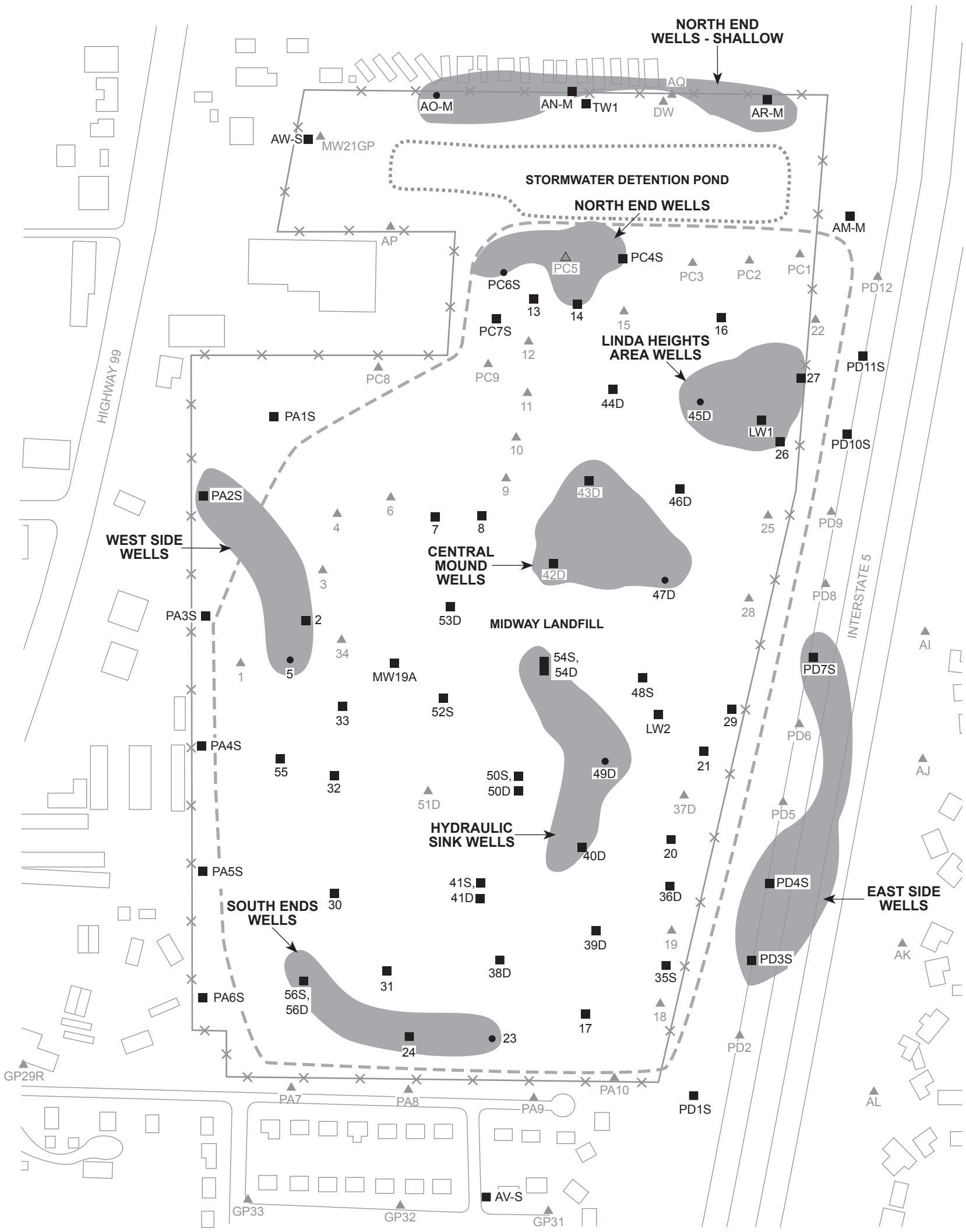
SCALE IN FEET

Figure 1
Site Location Map
Midway Landfill
Kent, Washington



Base Map Source: City of Seattle Department of Engineering
Midway Landfill Vicinity Map, 5-15-86

Parametrix Midway Landfill/555-1550-054/01(01A2) 5/11

23 — Gas probe, gas extraction well, or groundwater monitoring well number and location. Included in monitoring network. Monitoring frequency twice per year.

GP33 — Gas probe, gas extraction well, or groundwater monitoring well number and location. Not included in monitoring network.

17 — Gas probe, gas extration well, or groundwater monitoring well number and location. Included in monitoring network. Monitoring frequency once every other year.

Approximate limit of refuse

Fenced site boundary

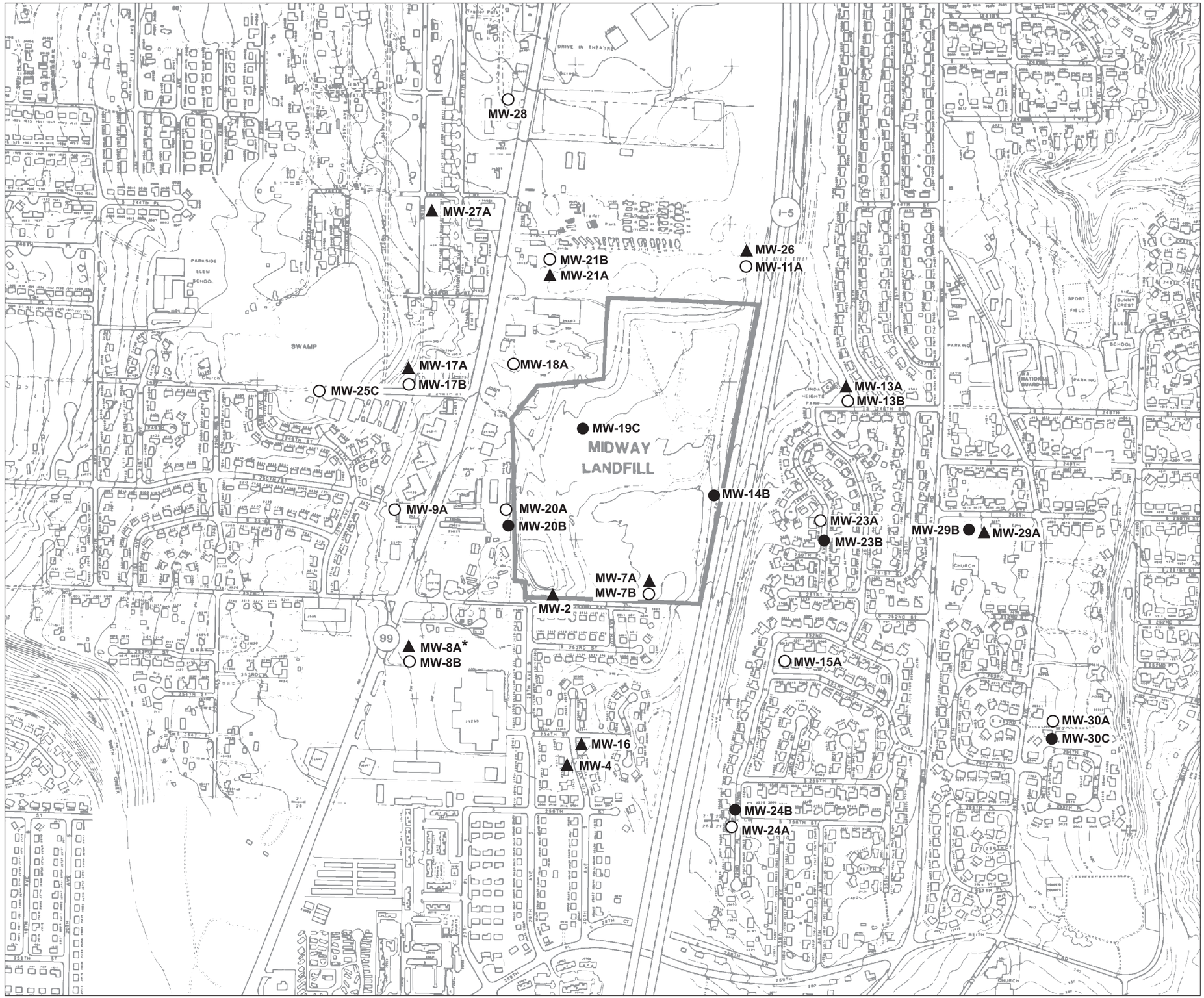
N

0 250

SCALE IN FEET

Figure 2
Shallow Groundwater/ Saturated Refuse Fluid Level Monitoring Network
Midway Landfill
Kent, Washington

Figure 3
Upper Gravel Aquifer, Sand Aquifer and Southern Gravel Aquifer Groundwater Level Monitoring Network
Midway Landfill
Kent, Washington



▲ Upper Gravel Aquifer Monitoring Well

○ Sand Aquifer Monitoring Well

● Southern Gravel Aquifer Monitoring Well

* MW-8A is screened at the contact between the UGA and SA. Fluid levels in this well are considered representative of the UGA and the SA.

Base Map Source: Supplemental Hydrogeologic and Hydrochemical Investigation, AGI 1990

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Parametrix Midway Landfill 555-1550-052/01(01A2) 5/11

Figure 4
Generalized Upper Gravel Aquifer Potentiometric Surface Map, May 2014
Midway Landfill
Kent, Washington

MW-7A ●	Upper Gravel Aquifer Monitoring Well Number and Approximate Location
—250—	Approximate Potentiometric Surface Contour (in feet)
(279.14)	Measured Groundwater Elevation in Feet May 12-14, 2014
←	General Direction of Groundwater Flow
(<215.11)	Well was Dry, Elevation is Elevation of Bottom of Well
	Inferred Extent of Upper Gravel Aquifer

Base Map Source: Supplemental Hydrogeologic and Hydrochemical Investigation, AGI 1990

N

0 300 600
Scale in Feet

Parametrix Midway Landfill/555-1550-054/01(01A2)

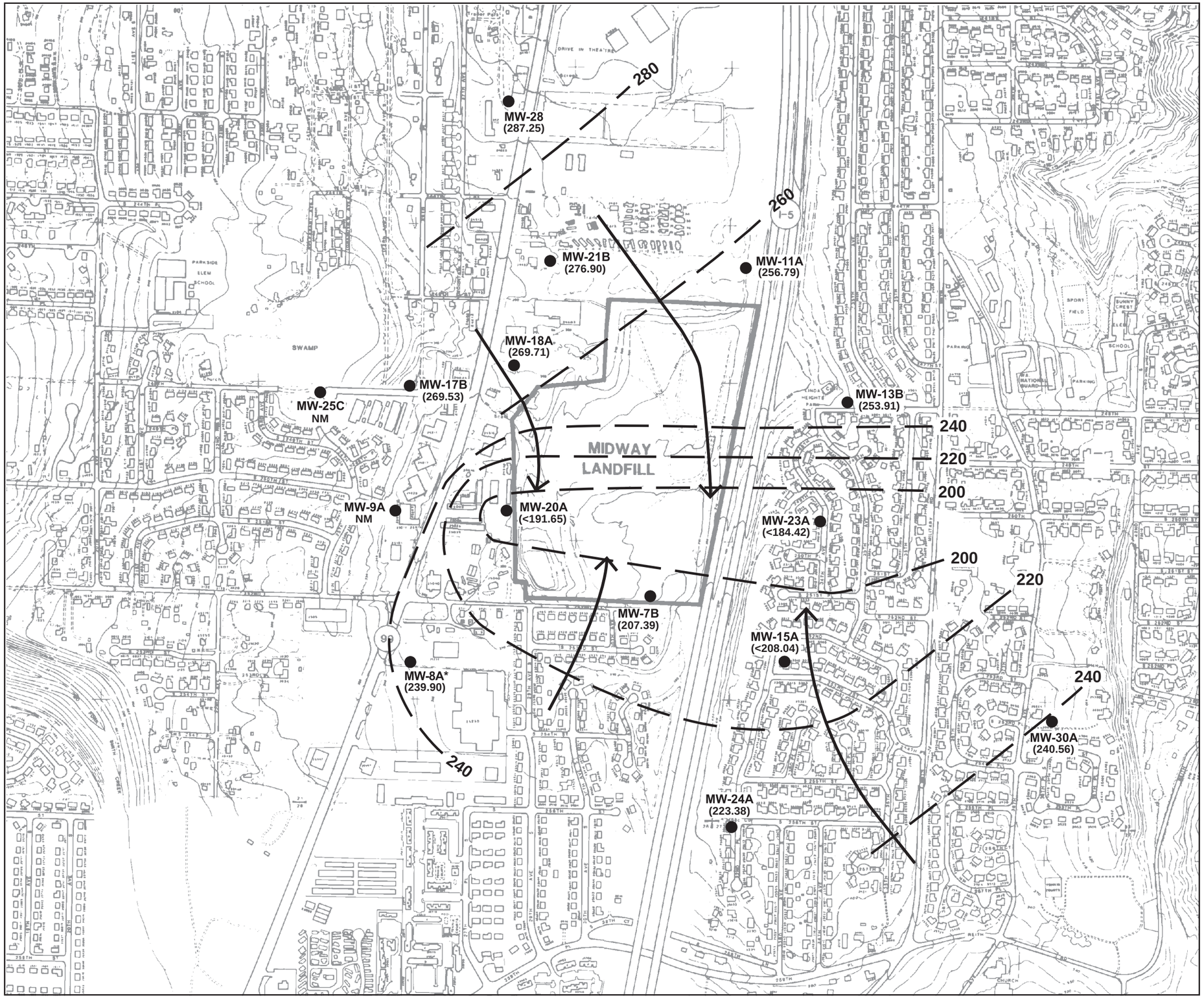

Figure 5
Generalized Sand Aquifer Potentiometric Surface Map, May 2014
Midway Landfill
Kent, Washington

MW-11A ●	Sand Aquifer Monitoring Well Number and Approximate Location
—220—	Approximate Potentiometric Surface Contour (in feet)
(203.87)	Measured Groundwater Elevation in Feet May 12-14, 2014
←	General Direction of Groundwater Flow
(<208.17)	Well was Dry, Elevation is Elevation of Bottom of WelL
NM	Not Measured

* Although MW-8A is Used for Groundwater Chemistry Monitoring in the UGA, Water Elevations in this Well are Considered Representative of the SA

Base Map Source: Supplemental Hydrogeologic and Hydrochemical Investigation, AGI 1990

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0 300 600
Scale in Feet

Parametrix Midway Landfill/555-1550-054/01(01A2)

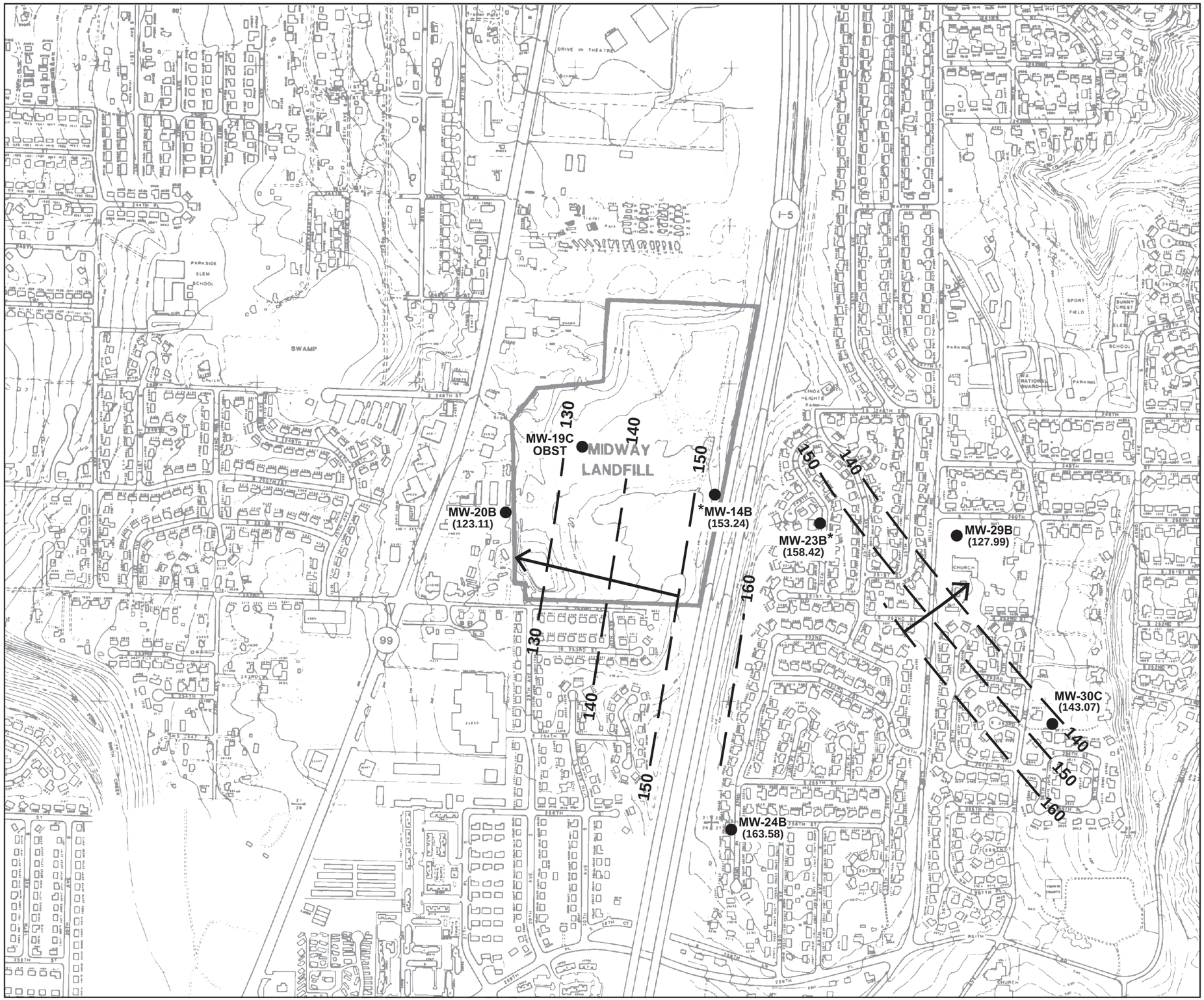


Figure 6
Generalized Southern Gravel Aquifer Potentiometric Surface Map, May 2014
Midway Landfill
Kent, Washington

MW-14B ●	Southern Gravel Aquifer Monitoring Well Number and Approximate Location
—120—	Approximate Potentiometric Surface Contour (in feet)
(149.04)	Measured Groundwater Elevation in Feet May 12-14, 2014
←	General Direction of Groundwater Flow
*	Groundwater Level in These Wells Calculated Using Air Pressure Measurements at the Wellheads
OBST	Well Obstructed at 56.87

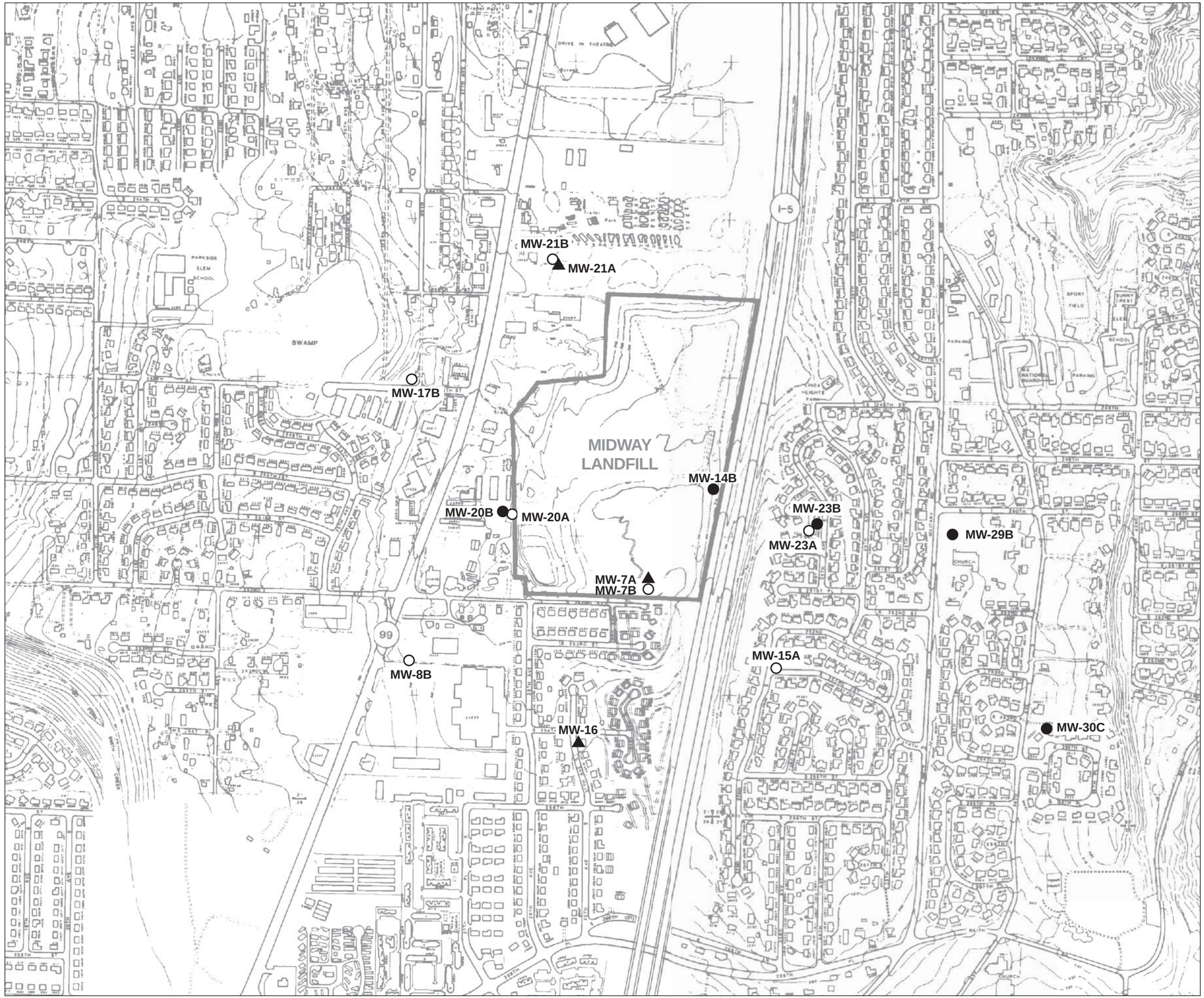
Base Map Source: Supplemental Hydrogeologic and Hydrochemical Investigation, AGI 1990

N

0 300 600
Scale in Feet

Parametrix Midway Landfill/555-1550-054/01(01A2)

Figure 7
Well Locations for Groundwater Chemistry Monitoring
Midway Landfill
Kent, Washington



MW-16 ▲ Upper Gravel Aquifer Monitoring Well Number and Approximate Location

MW-17B ○ Sand Aquifer Monitoring Well Number and Approximate Location

MW-14B ● Southern Gravel Aquifer Monitoring Well Number and Approximate Location

Base Map Source: Supplemental Hydrogeologic and Hydrochemical Investigation, AGI 1990

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SCALE IN FEET

Parametrix Midway Landfill 555-1550-052/01(01A2) 5/11

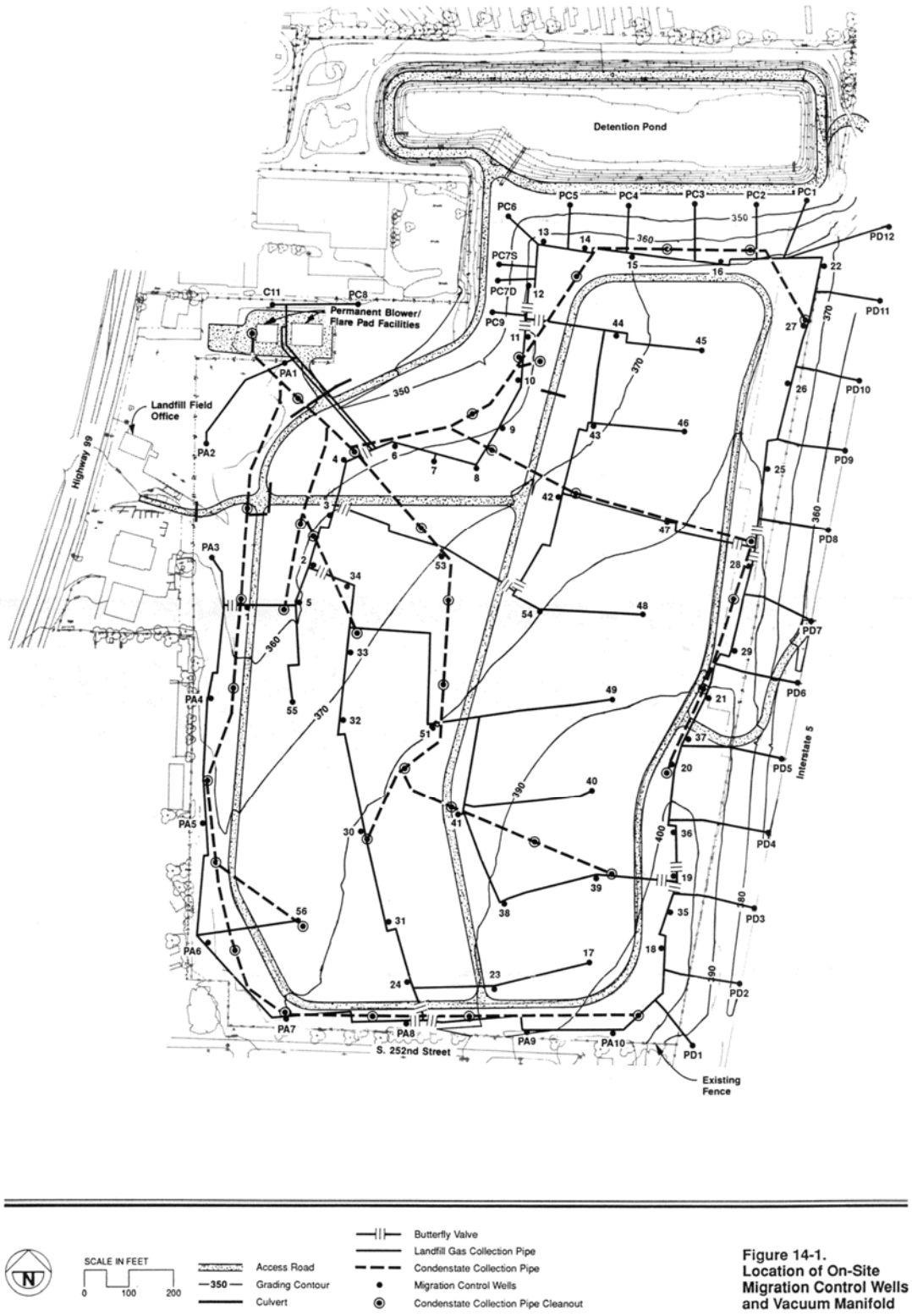


Figure 8. On-site gas extraction wells, flare/blower, and detention pod.

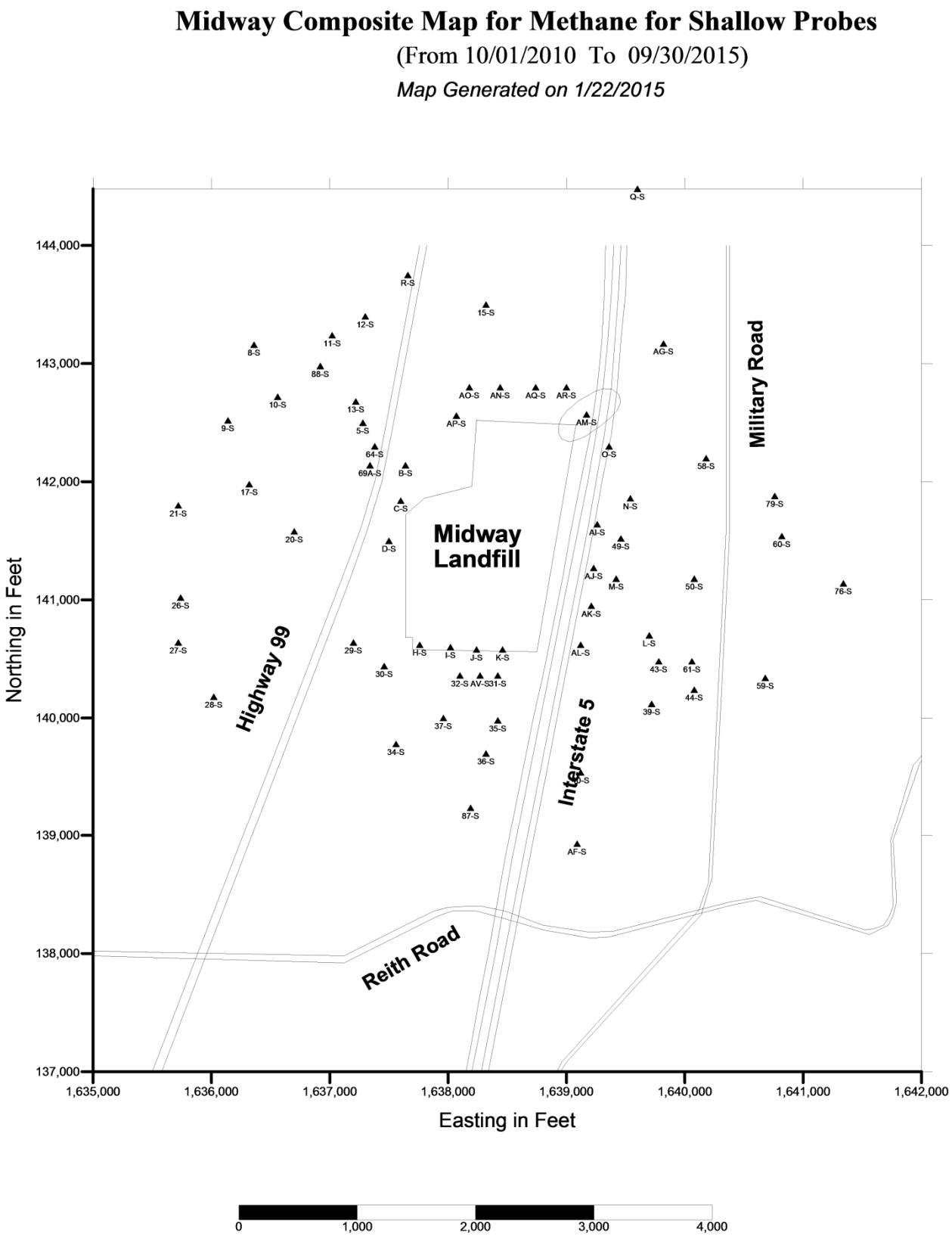


Figure 9. Shallow Gas Probes

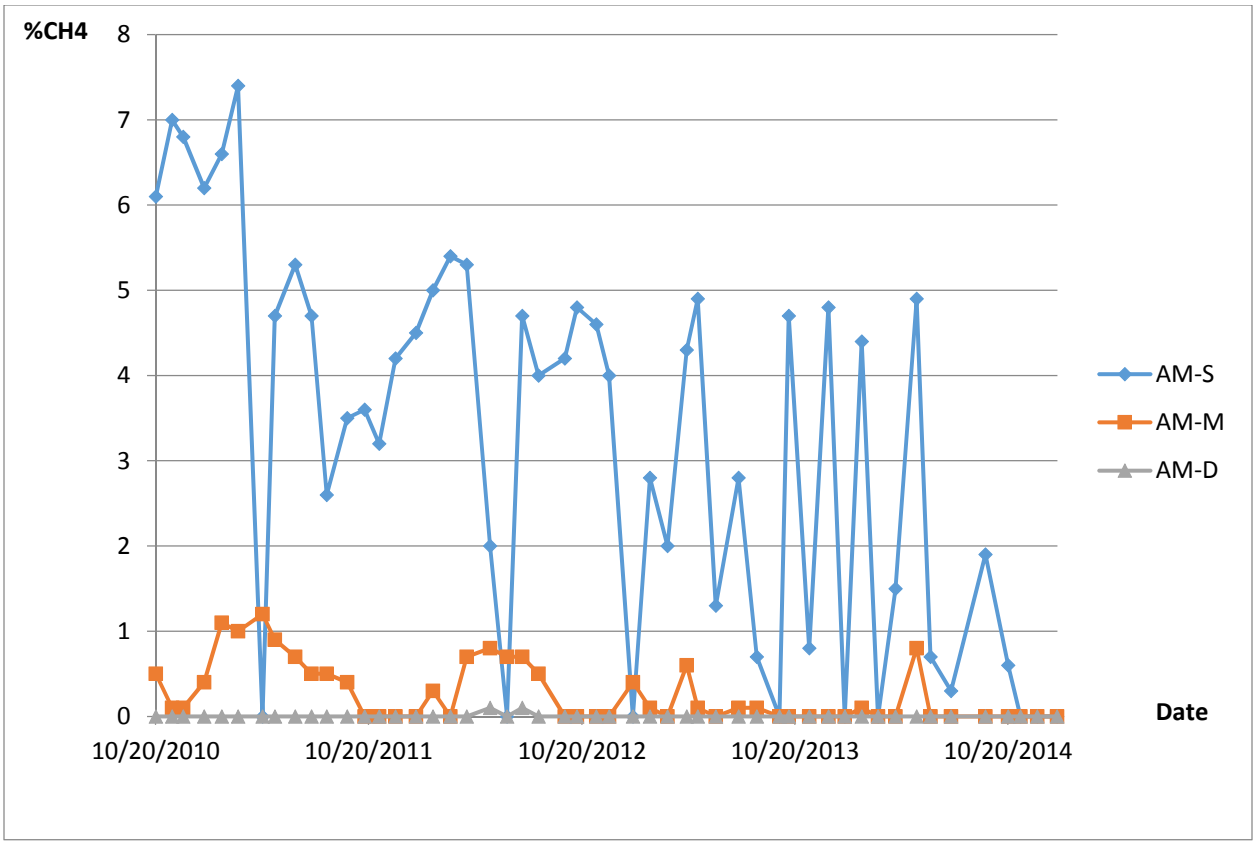


Figure 10. Percent Methane at Probe Location AM (shallow, medium and deep locations are denoted as AM–S, AM-M, AM-D)

APPENDIX A

Exhibit A.

City of Seattle

Gregory J. Nickels, Mayor

Seattle Public Utilities
Chuck Clarke, Director

Solid Waste Field Operations

April 14, 2005

[redacted]

Dear [redacted]:

RE: Status of Cleanup at the Midway Landfill Superfund Site in Kent, Washington.

I am pleased to provide this information regarding the status of cleanup activities at the Midway Landfill. I have also provided specific information with regard to your residence in the Midway vicinity. This information can be found on page 3 of this letter.

Background. The Midway Landfill, located about 15 miles south of Seattle within the City of Kent, was operated by the City of Seattle from 1966 through October 1, 1983. The site was used primarily for disposal of demolition debris, wood waste and yard waste, although there was also the disposal of some industrial wastes at the site.

Landfill Gas. In the summer of 1985 it was discovered that landfill gas had migrated away from the landfill through underground soils. As a result, about 140 gas probes were installed in the Midway vicinity. These probes, which allow us to monitor soil gas, showed that, although landfill gas was detectable on all sides of the site, the most significant migration had occurred to the east and south. Seattle also began a program of monitoring for homes and businesses in the Midway vicinity; at one time more than 300 homes were being monitored. Eleven families were evacuated from their homes between November 1985 and February 1986.

In response to the landfill gas problem, Seattle began the construction of a gas extraction system to prevent gas from leaving the site and to remove gas that had already migrated from the site. Construction of the first thirty wells at the site perimeter began in late 1985. Additional wells were constructed in the interior of the site and around the outside perimeter starting in late 1986.

Nineteen individual wells were also constructed in residential areas east of the site to remove off-site pockets of gas beginning in the spring of 1986. Gas from the on-site wells was burned off through two large temporary flares. Gas from off-site wells was vented to the air after passing through large carbon filters.

Key Tower Building, 700 5th Avenue, Suite 4900, Seattle, WA 98104-5004
Tel: (206) 684-5851, TTY/TDD: (206) 233-7241, Fax: (206) 684-4631, Internet Address: http://www.seattle.gov/util/
An equal employment opportunity, affirmative action employer. Accommodations for people with disabilities provided upon request.

The data indicate the gas extraction system was very effective in removing gas from soils in the Midway vicinity. The majority of shallow soils in the vicinity showed gas at or below background levels (200 to 400 ppm (parts per million)) by 1987. By August 1987, gas was no longer detectable in homes above the background level for ambient air (100 ppm). In fact, most homes showed 0 ppm of gas. Home monitoring was discontinued. Since that time we have continued to see significant improvements in the removal of gas from soils surrounding the site. At present, gas is above background levels in deeper levels (40 to 100 feet below ground surface) in only two off-site areas: about 1100 feet east of the southeastern side of the site and about 1000 feet east of the northeastern corner. Both areas are under the control of the gas extraction system. This means that the gas is under a vacuum and moving back towards the site rather than upwards. All of the nineteen off-site gas extraction wells have been shut down, and two are being used as gas probes. The gas pockets that these wells were constructed to evacuate have been eliminated.

Good Neighbor Program. In April 1986, Seattle established the "Good Neighbor Program" in response to citizen concerns about the value of their property. Through this program, the City guaranteed the fair market value of single family homes in a defined area around the landfill. The City agreed to maintain this program until at least 10 homes in the area had sold at fair market value or until two years after gas measured 100 ppm (0.01 percent) or less in nearby residences. The program ended in May 1988 when well over 10 homes had sold at or above fair market value. As stated above, gas in homes has been below 100 ppm since August 1987.

Participants in the program were required to actively list their homes for six months. If the City had not approved an offer on the home during that time period, the City then purchased the home at the agreed upon fair market value. During the course of the program, 349 homeowners participated, though 61 decided to drop out of the program. Of these residences, 122 sold within the six-month listing period with a City subsidy (to bring the total value up to the agreed upon fair market value), and the City purchased 166 homes. The homes purchased by the City were also listed and sold. By the end of 1988, only 22 homes remained to be sold. By December 1989, only one home remained, which was sold in 1990.

Superfund Status. In May 1986, the Midway Landfill was declared a federal "Superfund" site and listed on the National Priority List (NPL) for cleanup. As a result, Seattle conducted a detailed remedial investigation and feasibility study (RI/FS) under federal Superfund laws. Areas of investigation included geology and groundwater; surface water, seeps and soils; ambient air quality; and landfill gas. The RI was completed in September 1988.

Landfill gas was remediated by the measures described above. In regards to groundwater, the contamination extends up to about 2500 feet east/southeast of the site and about 1000 feet west at very deep levels (generally 300 to 400 feet below the ground surface). However, the contamination is at low levels (just above federal drinking water standards). No drinking water aquifers are affected by this contamination and no one comes into contact with this water. Residents in the vicinity get their water from a public supply system whose wells are several miles from the site.

The second part of the Superfund study, the Feasibility Study (FS), was completed in December 1990. The FS evaluated alternatives for cleanup of any existing or future contamination at the site. At this point in time, we are in the process of negotiating a "Cleanup Action Plan" (CAP) with the State Department of Ecology, which formalizes our cleanup/closure actions at Midway. The CAP is expected to be completed by the end of the year.

Remedial Actions. Thus far the following remedial actions have been completed at the site:

- Midway Landfill Temporary Landfill Gas Extraction System Construction

- Midway Landfill Onsite Grading and Drainage Construction (including the detention pond)
- Midway Landfill Permanent Flare Facility Construction
- Midway Landfill Downstream Drainage Improvement Project (surface water discharge pipeline to McSorley Creek and associated drainage improvements along Pacific Highway So.)
- Midway Landfill Upstream Drainage Improvement Project (I-5 pump station and associated stormwater conveyance pipeline to the Midway detention pond)
- Midway Landfill Final Cover and Permanent Gas Extraction System Project (including landfill capping and permanent gas system construction)

Specific Information. In an e-mail request to Jeff Neuner, specific information regarding the property delineated by shading on the enclosed map was requested. Enclosed are copies of the 2003/2004 monitoring data for the gas probes nearest this property. The data shows that the landfill gas in the soil zones near the property (Probe AO, probe AN, probe AQ, probe AR, and probe AW) is at zero parts per million.

The gas levels in the intermediate and deep levels of the probes also show no presence of landfill gas.

Levels of landfill gas in the vicinity of this property were never found to be above background levels. For that reason, off-site gas extraction wells were not located there. Also, no groundwater contamination has been found in this area as shown by the enclosed 2004 data for groundwater monitoring well MW-21. An extensive compilation of gas and groundwater data may be obtained at the Kent Public Library, in their public repository. These data are contained in the Remedial Investigation and Feasability Study Reports on the Midway Landfill. For more current information, you may call me at 684-7693.

The landfill gas extraction system at the Midway Landfill has been doing an excellent job of drawing off the combustible gas and harmlessly flaring it. Thus gas is no longer leaving the site. In addition, the amount of gas generated within the landfill has decreased dramatically over the last ten years. For these reasons, little gas has been detected in the surrounding neighborhoods for years. As a result, some of the gas probes that were used early in the program to establish the extent of the gas are no longer monitored because no gas has been detected in them. Because of this fact, the State Department of Ecology approved the removal of several of these old probes years ago. State law requires that abandoned wells/probes must be drilled out and sealed in a specific way, and that is the task that the City is undertaking at this time. Many probes remain in place to monitor the situation such as the two noted above. These will be monitored and studied for the foreseeable future.

The information provided in this letter, other than the gas monitoring and groundwater monitoring data, summarizes an extensive history relating to the closure of the Midway Landfill. Since this information is only general in nature, the City of Seattle does not intend that anyone reading this letter will rely solely on this information in forming a decision to purchase or finance real property. If you are concerned about the effect of the landfill closure on property values in the area of the Midway Landfill, you should contact a qualified appraiser or environmental consultant or independently review the scientific studies and other reports relating to the landfill. Further, this letter should not be construed or relied on by anyone as an endorsement or recommendation to invest, purchase or finance real property.

I hope that this information has been helpful. Please contact me at 206-684-7690 if you have any questions.

Sincerely,

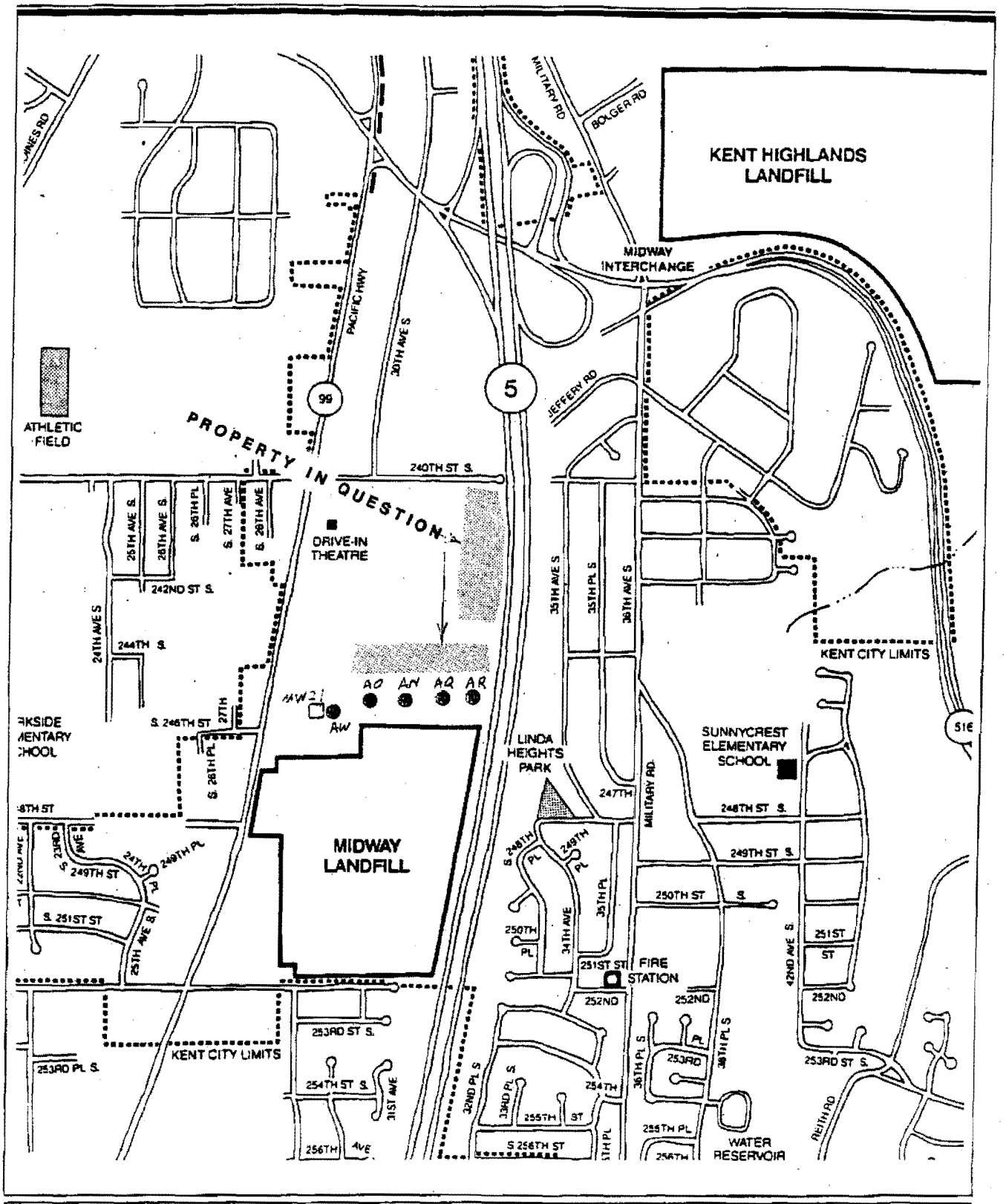
Philip R. Woodhouse //FOR//

Jeff Neuner
Landfill Manager

JHN/prw

Enclosures

cc: Sean McDonald
Jeff Neuner
Marya Silvernale
Midway Files



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April 14, 2005

Figure I-2.
Midway Landfill vicinity map.

10205975

APPENDIX B

Table B-1. Comparison of Contaminants of Concern in Groundwater to ROD Cleanup Levels, 2010-2014 Data Summary, Midway Landfill, Kent, Washington

				Upper Gravel Aquifer			Sand Aquifer							Southern Gravel Aquifer						
				MW-16	MW-16 Dup	MW-21A	MW-7B	MW-7B Dup	MW-8B	MW-8B Dup	MW-17B	MW-21B	MW-21B Dup	MW-14B	MW-20B	MW-23B	MW-29B	MW-29B Dup	MW-30C	MW-30C Dup
Compound	Units	Cleanup Level[a]	Round	UP		UP	DOWN		UP		UP	UP		DOWN	DOWN	DOWN	DOWN		DOWN	
Manganese	mg/L	2.2	R-57	0.094	0.094	0.016	- -	- -	0.004	- -	0.053	0.405	0.408	0.961	**3.24**	0.153	0.98	- -	0.706	- -
			R-58	0.094	- -	0.013	**3.07**	- -	0.047	0.046	0.050	0.396	- -	0.897	**2.99**	0.143	0.966	- -	0.639	0.645
			R-59	0.094	0.097	0.005	**3.20**	- -	0.024	- -	0.042	0.410	- -	0.908	**2.95**	0.140	0.948	0.944	0.643	- -
			R-60	0.100	- -	0.001	**2.94**	**2.90**	0.006	- -	0.042	0.415	- -	0.913	**2.77**	0.141	0.869	0.809	0.648	- -
			R-61	0.094	0.095	0.001 U	**2.63**	- -	0.006	- -	0.044	0.399	- -	0.904	**2.43**	0.131	0.941	- -	0.674	0.678
Vinyl Chloride	µg/L	0.29*	R-57	0.20 U	0.20 U	0.20 U	- -	- -	0.20 U	- -	0.22	0.20 U	0.20 U	**0.63**	0.27	0.27	**0.65**	- -	0.20 U	- -
			R-58	0.20 U	- -	0.20 U	**0.30**	- -	0.20 U	0.20 U	0.20 U	0.20 U	- -	**0.64**	0.24	0.20 U	**0.54**	- -	0.20 U	0.20 U
			R-59	0.20 U	0.20 U	0.20 U	**0.31**	- -	0.20 U	- -	0.20 U	0.20 U	- -	**0.41**	0.22	0.20 U	**0.56**	**0.52**	0.20 U	- -
			R-60	0.20 U	- -	0.20 U	**0.31**	**0.32**	0.20 U	- -	0.20 U	0.20 U	- -	**0.39**	**0.34**	0.20 U	**0.62**	**0.62**	0.20 U	- -
			R-61	0.20 U	0.20 U	0.20 U	0.20	- -	0.20 U	- -	0.20 U	0.20 U	- -	0.28	**0.30**	0.20 U	**0.47**	- -	0.20 U	0.20 U
1,2-dichloroethane	µg/L	5	R-57	1.0 U	1.0 U	1.0 U	- -	- -	1.0 U	- -	4.4	1.0 U	1.0 U	1.0 U	1.0 U	2.7	4.7	- -	1.0 U	- -
			R-58	1.0 U	- -	1.0 U	1.0 U	- -	1.0 U	1.0 U	3.8	1.0 U	- -	1.0 U	1.0 U	2.1	4.1	- -	1.0 U	1.0 U
			R-59	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	4.5	1.0 U	- -	1.0 U	1.0 U	2.4	4.7	4.6	1.0 U	- -
			R-60	1.0 U	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	3.9	1.0 U	- -	1.0 U	1.0 U	2.6	4.9	**5.1**	1.0 U	- -
			R-61	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	3.0	1.0 U	- -	1.0 U	1.0 U	2.0	4.0	- -	1.0 U	1.0 U

Notes:

ROD =Record of Decision.
R-57 = Round 57, May 2010
R-58 = Round 58, May 2011
R-59 = Round 59, May 2012
R-60 = Round 60, May 2013
R-61 = Round 61, May 2014
a =Cleanup levels established in the Final USEPA ROD for the Midway Landfill Site, September 6, 2000.
= Exceeds cleanup level established in the Final ROD for the Midway Landfill Site, September 6, 2000.
U =Indicates the compound was undetected at the reported concentration.
DUP =Duplicate.
* =The revised cleanup level for vinyl chloride is 0.29 µg/L using the MTCA adjusted cancer risk of 1e-5.
UP or DOWN in column title denotes whether the well is located upgradient or downgradient of the landfill's influence.

Table B-2. Summary of Detected Groundwater Quality Parameters Not Included in the ROD and Comparison to Regulatory Standards, 2010-2014 Data Summary, Midway Landfill, Kent, Washington

					Upper Gravel Aquifer					Sand Aquifer									Southern Gravel Aquifer							
					MW-8A	MW-16	MW-16 Dup	MW-21A	MW-27B	MW-7B	MW-7B Dup	MW-8B	MW-8B Dup	MW-11A	MW-17B	MW-18A	MW-21B	MW-21B Dup	MW-28	MW-14B	MW-20B	MW-23B	MW-29B	MW-29B Dup	MW-30C	MW-30C Dup
Compound	Units	MCL[a]	MTCA B[b]	Round	UP	UP		UP	UP	DOWN		UP		UP	UP	UP	UP		UP	DOWN	DOWN	DOWN	DOWN		DOWN	
Field Parameters																										
pH	s.u.	6.5-8.5		R-57	- -	7.40	- -	6.51	- -	- -	- -	6.45	- -	- -	6.34	- -	6.79	- -	- -	6.46	6.73	6.23	6.23	- -	6.57	- -
				R-58	- -	7.71	- -	6.70	- -	6.58	- -	7.17	- -	- -	6.83	- -	6.94	- -	- -	6.56	6.79	6.44	6.47	- -	7.04	- -
				R-59	7.64	7.69	- -	6.67	7.34	6.63	- -	6.89	- -	7.09	6.81	7.12	6.92	- -	6.77	6.54	6.84	6.44	6.55	- -	7.07	- -
				R-60	- -	7.52	- -	6.61	- -	6.60	- -	6.52	- -	- -	6.43	- -	6.82	- -	- -	6.61	6.85	6.35	6.29	- -	6.78	- -
				R-61	- -	7.68	- -	6.74	- -	6.69	- -	6.69	- -	- -	6.81	- -	6.97	- -	- -	6.59	6.83	6.51	6.51	- -	7.09	- -
Conductivity	µmhos/cm			R-57	- -	280	- -	331	- -	- -	- -	155	- -	- -	335	- -	681	- -	- -	703	1303	569	705	- -	320	- -
				R-58	- -	290	- -	338	- -	696	- -	207	- -	- -	353	- -	676	- -	- -	685	1260	555	694	- -	297	- -
				R-59	143	278	- -	326	341	666	- -	167	- -	191	317	471	658	- -	486	653	1111	528	674	- -	301	- -
				R-60	- -	285	- -	335	- -	614	- -	201	- -	- -	315	- -	658	- -	- -	649	1062	523	661	- -	301	- -
				R-61	- -	284	- -	328	- -	552	- -	162	- -	- -	316	- -	624	- -	- -	632	991	511	648	- -	309	- -
Temperature	C			R-57	- -	11.4	- -	11.8	- -	- -	- -	11.0	- -	- -	11.5	- -	11.1	- -	- -	13.1	12.1	11.1	10.0	- -	9.6	- -
				R-58	- -	11.1	- -	11.7	- -	13.3	- -	11.3	- -	- -	11.6	- -	11.2	- -	- -	14.0	11.9	11.1	9.8	- -	9.5	- -
				R-59	11.6	11.6	- -	11.6	11.5	12.7	- -	11.0	- -	10.9	11.7	11.7	11.5	- -	13.3	13.9	11.6	11.2	10.2	- -	10.3	- -
				R-60	- -	11.9	- -	12.1	- -	13.3	- -	11.6	- -	- -	11.9	- -	11.4	- -	- -	14.1	12.0	11.9	10.6	- -	10.3	- -
				R-61	- -	11.9	- -	12.0	- -	13.2	- -	12.0	- -	- -	12.4	- -	11.6	- -	- -	15.3	12.6	12.0	10.5	- -	10.2	- -
Conventional Parameters																										
Chloride	mg/L	250**		R-57	- -	8.4	8.3	6.6	- -	- -	- -	5.3	- -	- -	9.6	- -	15.0	15.2	- -	18.0	44.7	14.8	32.9	- -	12.9	- -
				R-58	- -	8.6	- -	6.9	- -	25.0	- -	7.6	7.5	- -	8.8	- -	15.5	- -	- -	19.4	44.9	13.7	31.8	- -	13.5	13.2
				R-59	- -	8.3	8.4	6.7	- -	28.1	- -	6.9	- -	- -	8.9	- -	14.5	- -	- -	16.6	35.2	12.1	26.6	26.5	11.8	- -
				R-60	- -	8.3	- -	6.5	- -	18.6	19.7	7.1	- -	- -	9.5	- -	14.1	- -	- -	16.3	30.6	11.0	26.1	26.1	11.9	- -
				R-61	- -	8.5	8.3	6.5	- -	14.4	- -	5.4	- -	- -	10.1	- -	13.1	- -	- -	14.8	26.6	10.2	23.4	- -	12.6	11.6
Sulfate	mg/L	250**		R-57	- -	28.4	27.9	39.1	- -	- -		17.9	- -	- -	23.7	- -	133	133	- -	30.9	8.9	33	23	- -	12.9	- -
				R-58	- -	26.7	- -	39.8	- -	39.2	- -	24.8	24.9	- -	22.4	- -	106	- -	- -	32.2	10.1	33.3	23.7	- -	13.5	13.7
				R-59	- -	28.3	28.2	31.2	- -	27.9	- -	23.5	- -	- -	23.2	- -	106	- -	- -	34.6	13.0	36.5	26.8	27.2	15.5	- -
				R-60	- -	22.6	- -	33.2	- -	29.4	28.9	23.0	- -	- -	18.4	- -	103	- -	- -	24.8	11.5	26.5	18.9	18.7	12.7	- -
				R-61	- -	24.5	23.5	35.7	- -	29.9	- -	18.2	- -	- -	19.7	- -	101	- -	- -	25.2	9.9	28.1	19.1	- -	14.0	13.9
Chemical Oxygen Demand	mg/L			R-57	- -	5.00 U	5.00 U	5.36 J	- -	- -		5.00 U	- -	- -	5.68 J	- -	11.8 J	5.00 U	- -	5.00 U	17	5.68 J	10.4	- -	6.00 J	- -
				R-58	- -	5.00 U	- -	5.00 U	- -	5.00 U	- -	5.00 U	5.00 U	- -	5.00 U	- -	5.00 U	- -	- -	6.31	20.2	5.00 U	5.00 U	- -	5.00 U	5.00 U
				R-59	- -	5.00 U	5.00 U	5.00 U	- -	5.00 U	- -	5.00 U	- -	- -	5.00 U	- -	5.00 U	- -	- -	9.34	14.3	5.00 U	6.94	5.00 U	5.00 U	- -
				R-60	- -	5.00 U	- -	5.00 U	- -	5.00 U	9.25	11.8	- -	- -	5.00 U	- -	5.00 U	- -	- -	8.31	17.1	5.00 U	5.00 U	6.75	5.00 U	- -
				R-61	- -	10.0 U	10.0 U	10.0 U	- -	10.0 U	- -	16.0	- -	- -	10.0 U	- -	10.0 U	- -	- -	10.0 U	13.1	10.0 U	10.0 U	- -	10.0 U	10.0 U
Total Organic Carbon	mg/L			R-57	- -	1.50 U	1.50 U	1.50 U	- -	- -		1.50 U	- -	- -	1.50 U	- -	1.50 U	1.50 U	- -	2.30	6.47	1.90	2.37	- -	1.50 U	- -
				R-58	- -	1.50 U	- -	1.50 U	- -	1.66	- -	1.50 U	1.50 U	- -	1.93	- -	1.50 U	- -	- -	2.73	6.15	1.79	2.50	- -	1.50 U	1.50 U
				R-59	- -	0.50 U	27.0 R	0.50 U	- -	1.10	- -	0.50 U	- -	- -	0.76	- -	0.50 U	- -	- -	1.20	4.80	0.84	1.60	1.60	0.50 U	- -
				R-60	- -	1.50 U	- -	1.50 U	- -	1.50 U	1.50 U	1.50 U	- -	- -	1.50 U	- -	1.50 U	- -	- -	1.53	4.26	1.50 U	1.57	1.62	1.50 U	- -
				R-61	- -	1.50 U	1.50 U	1.50 U	- -	1.50 U	- -	1.50 U	- -	- -	1.50 U	- -	1.50 U	- -	- -	1.63	4.17	1.50 U	1.77	- -	1.50 U	1.50 U

Table B-2. Summary of Detected Groundwater Quality Parameters Not Included in the ROD and Comparison to Regulatory Standards, 2010-2014 Data Summary, Midway Landfill, Kent, Washington (continued)

					Upper Gravel Aquifer					Sand Aquifer									Southern Gravel Aquifer							
					MW-8A	MW-16	MW-16 Dup	MW-21A	MW-27B	MW-7B	MW-7B Dup	MW-8B	MW-8B Dup	MW-11A	MW-17B	MW-18A	MW-21B	MW-21B Dup	MW-28	MW-14B	MW-20B	MW-23B	MW-29B	MW-29B Dup	MW-30C	MW-30C Dup
Compound	Units	MCL[a]	MTCA B[b]	Round	UP	UP		UP	UP	DOWN		UP		UP	UP	UP	UP		UP	DOWN	DOWN	DOWN	DOWN		DOWN	
Dissolved Metals																										
Iron	mg/L	0.3**		R-57	- -	0.25	0.25	0.05 U	- -	- -	- -	0.05 U	- -	- -	0.05	- -	0.05 U	0.05 U	- -	11.2	9.48	8.67	15	- -	2.74	- -
				R-58	- -	0.24	- -	0.05 U	- -	3.57	- -	0.05 U	0.05 U	- -	0.06	- -	0.05 U	- -	- -	11.0	8.80	8.08	14.9	- -	2.62	**2.60**
				R-59	- -	0.22	0.23	0.05 U	- -	3.57	- -	0.05 U	- -	- -	0.05 U	- -	0.05 U	- -	- -	10.1	8.17	8.26	14.6	14.4	2.43	- -
				R-60	- -	0.20	- -	0.05 U	- -	3.32	3.28	0.05 U	- -	- -	0.05 U	- -	0.05 U	- -	- -	10.3	7.53	7.95	12.9	12.0	2.41	- -
				R-61	- -	0.18	0.17	0.05 U	- -	3.05	- -	0.09	- -	- -	0.05 U	- -	0.05 U	- -	- -	10.3	6.86	7.89	14.4		2.48	**2.50**
Semi-Volatile Organics																										
1,4-dioxane	µg/L		0.44	R-57	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	2.4	- -	5.3	5.8	- -	17	- -	- -	- -	- -	- -	- -
				R-58	- -	2.0 U	- -	2.0 U	- -	4.3	- -	2.0 U	2 U	- -	2.4	- -	4.2	- -	- -	13	53	4.4	21	- -	7.4	**6.2**
				R-59	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	6.0	- -	0.4 U	- -	0.4 U	2.2	0.4 U	4.2	- -	0.4 U	12	48	3.5	21	22	7.1	- -
				R-60	- -	0.4 U	- -	0.4 U	- -	3.4	3.6	0.4 U	- -	- -	1.9	- -	3.7	- -	- -	9.3	39	2.3	17	18	6.2	- -
				R-61	- -	0.4 U	0.4 U	0.4 U	- -	2.0	- -	0.4 U	- -	- -	1.9	- -	3.4	- -	- -	9.1	35	2.4	15	- -	6.3	**5.1**
Volatile Organics																										
Chloroethane	µg/L			R-57	- -	1.0 U	1.0 U	1.0 U	- -	- -	- -	1.0 U	- -	- -	1.4	- -	1.0 U	1.0 U	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -
				R-58	- -	1.0 U	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
				R-59	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.1	- -	1.0 U	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-60	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	1.0 U	- -	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-61	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
1,1-dichloroethene	µg/L	7*	0.0729	R-57	- -	1.0 U	1.0 U	1.0 U	- -		- -	1.0 U	- -	- -	2.6	- -	3.6	3.6	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -
				R-58	- -	1.0 U	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	- -	2.2	- -	3.2	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
				R-59	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	2.2	- -	4.2	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-60	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	1.0 U	- -	- -	1.8	- -	3.3	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-61	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.7	- -	3.1	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
1,1-dichloroethane	µg/L		800	R-57	- -	1.0 U	1.0 U	1.0 U	- -	- -	- -	1.0 U	- -	- -	36	- -	3.6	3.6	- -	1.5	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -
				R-58	- -	1.0 U	- -	1.0 U	- -	2.1	- -	1.0 U	1.0 U	- -	31	- -	2.8	- -	- -	1.3	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
				R-59	- -	1.0 U	1.0 U	1.0 U	- -	2.9	- -	1.0 U	- -	- -	30	- -	3.7	- -	- -	1.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-60	- -	1.0 U	- -	1.0 U	- -	2.1	2.2	1.0 U	- -	- -	21	- -	3.2	- -	- -	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-61	- -	1.0 U	1.0 U	1.0 U	- -	1.9	- -	1.0 U	- -	- -	22	- -	2.9	- -	- -	1.1	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
cis-1,2-dichloroethene	µg/L	70*	80	R-57	- -	1.0 U	1.0 U	1.0 U	- -	- -	- -	1.0 U	- -	- -	3.8	- -	1.0 U	1 U	- -	4.5	1.0 U	3.4	1.0	- -	1.0 U	- -
				R-58	- -	1.0 U	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	- -	3.7	- -	1.0 U	- -	- -	3.8	1.0 U	3.2	1.0 U	- -	1.0 U	1.0 U
				R-59	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	3.2	- -	1.0 U	- -	- -	3.9	1.0 U	2.8	1.1	1.2	1.0 U	- -
				R-60	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	1.0 U	- -	- -	3.1	- -	1.0 U	- -	- -	3.3	1.0 U	2.4	1.0 U	1.0	1.0 U	- -
				R-61	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	3.0	- -	1.0 U	- -	- -	3.1	1.0 U	2.6	1.0 U	- -	1.0 U	1.0 U
1,1,1-Trichloroethane	µg/L	200*	7200	R-57	- -	1.0 U	1.0 U	1.0 U	- -	- -	- -	1.0 U	- -	- -	1.0 U	- -	3.8	3.9	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -
				R-58	- -	1.0 U	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	- -	1.0 U	- -	2.5	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U
				R-59	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	- -	3.2	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-60	- -	1.0 U	- -	1.0 U	- -	1.0 U	1.0 U	1.0 U	- -	- -	1.0 U	- -	2.8	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	- -
				R-61	- -	1.0 U	1.0 U	1.0 U	- -	1.0 U	- -	1.0 U	- -	- -	1.0 U	- -	2.1	- -	- -	1.0 U	1.0 U	1.0 U	1.0 U	- -	1.0 U	1.0 U

Table B-2. Summary of Detected Groundwater Quality Parameters Not Included in the ROD and Comparison to Regulatory Standards, 2010-2014 Data Summary, Midway Landfill, Kent, Washington (continued)

					Upper Gravel Aquifer																															
					MW-8A	MW-16		MW-16 Dup		MW-21A		MW-27B	MW-7B		MW-7B Dup		MW-8B		MW-8B Dup		MW-11A	MW-17B		MW-18A	MW-21B		MW-21B Dup		MW-28	MW-14B		MW-20B		MW-23B		MW-29B		MW-29B Dup		MW-30C		MW-30C Dup	
Compound	Units	MCL[a]	MTCA B[b]	Round	UP	UP				UP		UP	DOWN				UP				UP	UP		UP	UP				UP	DOWN		DOWN		DOWN		DOWN				DOWN			
Trichloroethene	µg/L	5*	3.98	R-57	- -	1.0	U	1.0	U	1.0	U	- -	- -		- -		1.0	U	- -		- -	1.0	U	- -	4.8		5.1		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	- -	
				R-58	- -	1.0	U	- -		1.0	U	- -	1.0	U	- -		1.0	U	1.0	U	- -	1.0	U	- -	4.7		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U
				R-59	- -	1.0	U	1.0	U	1.0	U	- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	5.3		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-60	- -	1.0	U	- -		1.0	U	- -	1.0	U	1.0	U	1.0	U	- -		- -	1.0	U	- -	5.5		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-61	- -	1.0	U	1.0	U	1.0	U	- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	5.3		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U
Tetrachloroethene	µg/L	5*	0.858	R-57	- -	1.0	U	1.0	U	1.0	U	- -	- -		- -		1.0	U	- -		- -	1.0	U	- -	130		130		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	- -	
				R-58	- -	1.0	U	- -		1.0	U	- -	1.0	U	- -		1.0	U	1.0	U	- -	1.0	U	- -	110		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U
				R-59	- -	1.0	U	1.0	U	1.0	U	- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	120		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-60	- -	1.0	U	- -		1.0	U	- -	1.0	U	1.0	U	1.0	U	- -		- -	1.0	U	- -	120		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-61	- -	1.0	U	1.0	U	1.0	U	- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	120		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U
Trichloro fluoromethane	µg/L		2400	R-57	- -	1.0	U	1.0	U	2.5		- -	- -		- -		1.0	U	- -		- -	1.0	U	- -	4.4		4.3		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	- -	
				R-58	- -	1.0	U	- -		1.9		- -	1.0	U	- -		1.0	U	1.0	U	- -	1.0	U	- -	2.9		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U
				R-59	- -	1.0	U	1.0	U	2.4		- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	3.6		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-60	- -	1.0	U	- -		1.8		- -	1.0	U	1.0	U	1.0	U	- -		- -	1.0	U	- -	2.8		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	- -	
				R-61	- -	1.0	U	1.0	U	1.6		- -	1.0	U	- -		1.0	U	- -		- -	1.0	U	- -	2.2		- -		- -	1.0	U	1.0	U	1.0	U	1.0	U	- -		1.0	U	1.0	U

Notes:

=Exceeds Federal MCL or MTCA Method B Cleanup Level for groundwater.

* =Primary MCL Standards; USEPA National Primary Drinking Water Regulations (40 CFR 141 59 FR 34322).

** =Secondary MCL Standards; USEPA National Primary Drinking Water Regulations (40 CFR 141 59 FR 34322).

*** =Testing for 1,4-dioxane in selected groundwater samples was recommended by Ecology and USEPA.

[a] =MCL/Federal maximum contaminant level.

[b] =MTCA B/Model Toxics Control Act (WAC 173-340) Method B Cleanup Level. CLARC II Database, Ecology.

R-57 = Round 57, May 2010

R-58 = Round 58, May 2011

R-59 = Round 59, May 2012

R-60 = Round 60, May 2013

R-61 = Round 61, May 2014

U = Indicated the compound was undetected at the reported concentration.

J = Indicated the compound was detected at an estimated concentration.

R = Rejected based on QC review. See report for details.

- - =Not analyzed

Dup = duplicate

U = upgradient; D = downgradient

APPENDIX C

City of Seattle
Seattle Public Utilities

September 11, 2015

Ching-Pi Wang
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue S. E.
Bellevue, WA 98008-5452

RE: Midway Landfill Annual Groundwater Conditions Report
Informational – No Action Required

Dear Mr. Wang:

Enclosed is the annual notice of groundwater conditions in affected areas down-gradient of the Midway Landfill for 2014. This is being sent to you pursuant to the requirements in the Midway Landfill Record of Decision (ROD) between the City of Seattle and the United States Environmental Protection Agency. The 2015 report will be sent in early fall 2016.

If you have any questions or require additional information, please contact me at jeff.neuner@seattle.gov or at 206-684-7693.

Sincerely,

Jeff Neuner
Midway Landfill Manager

Enclosure

CC: Yolanda Pon, Public Health Seattle King County
Highline Water District
Lakehaven Utility District
Active Well Drillers in King County
(Washington State Department of Ecology list)
Owner of Well 37

Ray Hoffman, Director
Seattle Public Utilities
PO Box 34018
Seattle, WA 98124-4018

Tel (206) 684-5851
Fax (206) 684-4631
TDD (206) 233-7241
http://www.seattle.gov/util

APPENDIX D

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Midway Landfill	**Date of Inspection: June 10, 2015**
Location and Region: Kent, WA; Region10	**EPA ID: WAD980726061**
Agency, Office or Company Leading the Five-Year Review: EPA Region 10	**Weather/Temperature: Sunny, clear**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☒ Surface water collection and treatment
- ☐ Other: _____
- ☒ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Jeff Neuner (Name) Landfill Manager (Title) 06/10 /2015 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone: 206-684-7693
   Problems, suggestions ☐ Report attached: _____
2. **O&M Staff** Min-Soon Yim (Name) Utility Manager II (Title) 06/10/2015 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone: 206-233-2629
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

Agency Washington Department of Ecology
Contact Ching-Pi Wang (Name) | Project Manager (Title) | 6/10/2015 (Date) | _____ (Phone No.)
Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____Name | _____ (Title) | _____ (Date) | _____ (Phone No.)
Problems/suggestions ☐ Report attached:_____

Agency _____
Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
Problems/suggestions ☐ Report attached:_____

Agency _____
Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
Problems/suggestions ☐ Report attached:_____

4. **Other Interviews** (optional) ☐ Report attached: _____

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

4.	**Permits and Service Agreements**			
	☒ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: Puget Sound Clean Air Agency Permit			
5.	**Gas Generation Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Aerial topographic survey to be performed in 2015			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
	IV. O&M COSTS			
1.	**O&M Organization**			
	☐ State in-house	☐ Contractor for state		
	☐ PRP in-house	☐ Contractor for PRP		
	☐ Federal facility in-house	☐ Contractor for Federal facility		
	☒ City of Seattle in-house and contractor			

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: $432,000-%535,000 annually ☐ Breakdown attached

Total annual cost by year for review period if available

From: 01/01 /2014	To: 12/31/2014	281,387.89	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01 /2013	To: 12/31/2013	280,508.21	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2012	To: 12/31/2012	289,940.98	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2011	To: 12/31/2011	264,583.50	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2010	To: 12/31/2010	263,760.67	☐ Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Fencing in good condition and gates locked.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signage in good condition

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): monthly full walk through; daily drive through

Frequency: _____

Responsible party/agency: City of Seattle

Contact	Jeff Neuner	Landfill Manager	06/10/2015	206-684-7693
	Name	Title	Date	Phone no.

Reporting is up to date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☐ No vandalism evident

Remarks: Minimal, has been repaired when it occurs.

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: Mowing in progress during Site Inspection

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1.	**Settlement** (low spots)	☐ Location shown on site map	☒ Settlement not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	**Cracks**	☐ Location shown on site map	☒ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☒ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☒ Grass	☒ Cover properly established
	☒ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☒ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1.	**Flows Bypass Bench**	☐ Location shown on site map	☒ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☒ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☒ N/A or okay
	Remarks: _____		
C. Letdown Channels		☒ Applicable	☐ N/A
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** (Low spots)	☐ Location shown on site map	☒ No evidence of settlement
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☒ No evidence of degradation
	Material type:_____		Arial extent: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☒ No evidence of erosion
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Undercutting**	☐ Location shown on site map	☒ No evidence of undercutting
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Obstructions**	Type: _____	☒ No obstructions
	☐ Location shown on site map	Arial extent: _____	
	Size: _____		
	Remarks: _____		
6.	**Excessive Vegetative Growth**	Type: _____	
	☒ No evidence of excessive growth		
	☐ Vegetation in channels does not obstruct flow		
	☐ Location shown on site map	Arial extent: _____	
	Remarks: _____		
D. Cover Penetrations		☒ Applicable	☐ N/A

1.	**Gas Vents**	☒ Active		☐ Passive
	☐ Properly secured/locked	☒ Functioning	☒ Routinely sampled	☒ Good condition
	☐ Evidence of leakage at penetration		☐ Needs maintenance	☐ N/A
	Remarks: _____			
2.	**Gas Monitoring Probes**			
	☐ Properly secured/locked	☒ Functioning	☒ Routinely sampled	☒ Good condition
	☐ Evidence of leakage at penetration		☐ Needs maintenance	☐ N/A
	Remarks: _____			
3.	**Monitoring Wells** (within surface area of landfill)			
	☐ Properly secured/locked	☒ Functioning	☒ Routinely sampled	☒ Good condition
	☐ Evidence of leakage at penetration		☐ Needs maintenance	☐ N/A
	Remarks: _____			
4.	**Extraction Wells Leachate**			
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
	☐ Evidence of leakage at penetration		☐ Needs maintenance	☒ N/A
	Remarks: _____			
5.	**Settlement Monuments**	☐ Located	☐ Routinely surveyed	☒ N/A
	Remarks: _____			
E. Gas Collection and Treatment		☐ Applicable	☐ N/A	
1.	**Gas Treatment Facilities**			
	☒ Flaring	☒ Thermal destruction		☐ Collection for reuse
	☒ Good condition	☐ Needs maintenance		
	Remarks: _____			
2.	**Gas Collection Wells, Manifolds and Piping**			
	☒ Good condition	☐ Needs maintenance		
	Remarks: _____			
3.	**Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)			
	☒ Good condition	☐ Needs maintenance		☐ N/A
	Remarks: _____			
F. Cover Drainage Layer		☐ Applicable	☒ N/A	
1.	**Outlet Pipes Inspected**	☐ Functioning		☒ N/A
	Remarks: _____			
2.	**Outlet Rock Inspected**	☐ Functioning		☒ N/A
	Remarks: _____			
G. Detention/Sedimentation Ponds		☒ Applicable	☐ N/A	

1.	**Siltation**	Area extent: _____	Depth: _____	☐ N/A
	☐ Siltation not evident			
	Remarks: Wetland characteristics are decreasing turbidity as planned.			
2.	**Erosion**	Area extent: _____	Depth: _____	
	☒ Erosion not evident			
	Remarks: _____			
3.	**Outlet Works**	☒ Functioning		☐ N/A
	Remarks: _____			
4.	**Dam**	☐ Functioning		☒ N/A
	Remarks: _____			
H. Retaining Walls		☐ Applicable	☒ N/A	
1.	**Deformations**	☐ Location shown on site map	☐ Deformation not evident	
	Horizontal displacement: _____		Vertical displacement: _____	
	Rotational displacement: _____			
	Remarks: _____			
2.	**Degradation**	☐ Location shown on site map	☐ Degradation not evident	
	Remarks: _____			
I. Perimeter Ditches/Off-Site Discharge		☐ Applicable	☒ N/A	
1.	**Siltation**	☐ Location shown on site map	☐ Siltation not evident	
	Area extent: _____		Depth: _____	
	Remarks: _____			
2.	**Vegetative Growth**	☐ Location shown on site map	☐ N/A	
	☐ Vegetation does not impede flow			
	Area extent: _____		Type: _____	
	Remarks: _____			
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident	
	Area extent: _____		Depth: _____	
	Remarks: _____			
4.	**Discharge Structure**	☐ Functioning	☐ N/A	
	Remarks: _____			
VIII. VERTICAL BARRIER WALLS		☐ Applicable	☒ N/A	
1.	**Settlement**	☐ Location shown on site map	☐ Settlement not evident	
	Area extent: _____		Depth: _____	
	Remarks: _____			

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☒ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps and Electrical**

☒ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

D. Monitoring Data	
1. **Monitoring Data**	
☒ Is routinely submitted on time	☐ Is of acceptable quality
2. **Monitoring Data Suggests:**	
☒ Ground water plume is effectively contained	☒ Contaminant concentrations are declining
E. Monitored Natural Attenuation	
1. **Monitoring Wells** (natural attenuation remedy)	
☐ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition	
☐ All required wells located ☐ Needs maintenance ☐ N/A	
Remarks: _____	

X. OTHER REMEDIES
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). The LF gas collection system is function to effectively control soils gas emissions, and maintain containment.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Implementation of O&M activities for LF gas are currently providing long-term protectiveness through decreasing LF gas and groundwater COC concentrations over time.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. No such problems have been noted during this FYR period.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. LF gas probe AM-S is outside of the LF boundary. However, it has methane concentrations over the LEL.

SITE INSPECTION PHOTOGRAPHS

View of Midway Landfill (facing north)

Mowing of Landfill Vegetative Cover

Landfill Gas Wells

Retention Pond

Landfill Gas Extraction System Mechanical Room

Landfill Gas Blowers

Landfill Gas Flares (current flare on left, backup on right)

Natural Gas Flow Controls