

Second Five-Year Review Report
for
NORTHSIDE LANDFILL SUPERFUND SITE
Spokane, Spokane County, Washington

SEPTEMBER 2002

Prepared by:

United States Environmental Protection Agency
Region 10
Seattle, Washington

Approved by:

Date:



Michael F. Gearheard, Director
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9/30/02

Executive Summary

The remedy for the Northside Landfill in Spokane, Washington included: the closing and capping of a 60 year old municipal landfill; controlling the groundwater contamination in the aquifer from the landfill by a groundwater extraction and treatment system; institutional controls; and groundwater and air monitoring. The construction completion of the 125-acre cap occurred in 1993. The trigger for this Five-Year Review was the completion of the First Five-Year Review that was completed on September 19, 1997.

The assessment of this Second Five-Year Review confirmed the findings of the First Five-Year Review and found that the remedy is still functioning and operating as specified in the Record of Decision (ROD). The operation and maintenance (O&M) includes groundwater monitoring which is confirming a reduction in the concentration of the contaminants of concern (COCs) at the compliance well. The remedy at Northside Landfill is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. Because the remedial actions are protective, the site is protective of human health and the environment.

Five-Year Review Summary Form

Site Identification

Site Name: Northside Landfill
EPA ID Number: WAD980511778
Region: 10
State: Washington
City/County: City of Spokane/Spokane County

Site Status

NPL Status: Final
Remediation Status: Operating under O&M
Number of OUs: Entire Site is Single OU
Construction Completion Date: September 2, 1993

Review Status

Lead Agency: Joint Lead; EPA and Ecology
O&M Lead Ecology

Author Name: Neil E. Thompson
Author Title: Project Manager
Author Affiliation: EPA, Region 10

Review Period: March 2002 through September 2002
Date of Site Inspection: July 29, 2002
Type of Review: Post-SARA
Five-Year Review Number: Second

Triggering Action: Previous Five-Year Review Report
Triggering Action Date (WasteLAN): September 19, 1997
Due Date: September 19, 2002

Issues

A pilot project to discharge the extracted groundwater to the on-site storm water

infiltration basin instead of the sanitary sewer line was nearly completed. A change in the discharge location and the associated treatment of the volatile organic compounds (VOCs) will require proper changes in the county issued landfill permit and state compliance with groundwater recharge permit requirements. Currently the treatment of the VOCs is in the publically owned treatment plant (POTW). If the discharge is changed to the landfill's storm water infiltration basin, then treatment of the VOCs will have to be documented in another system. The pilot system that was tested utilized the aeration of the groundwater as it cascaded over rip-rap in the storm water channel as a water to air, air stripping process. Since this site is in the operation and maintenance (O&M) phase, the Washington Department of Ecology (Ecology) is the lead agency to evaluate this change in treatment and discharge location.

The groundwater monitoring is indicating concentration of the contaminants of concern (COCs) are approaching the cleanup goals established in the Record of Decision (ROD). The O&M of the groundwater extraction and treatment system will probably be optimized by varying the pumping cycle of the extraction well until full compliance of the groundwater cleanup is reached.

Recommendations and Follow-up Actions

The O&M changes that will be evaluated by Ecology will be important as this site approaches the state where the active extraction of contaminated groundwater can be terminated.

The change in the treatment and discharge location need to be reviewed by EPA, and EPA will need to decide if an explanation of significant difference (ESD) is required.

Protectiveness Statement

The remedy at the Northside Landfill is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. Because the remedial actions at this site are protective, the site is protective of human health and the environment.

Second Five-Year Review Report

Northside Landfill Spokane, Washington

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 and the National Contingency Plan (NCP). CERCLA §121 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 judgement 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.

EPA, Region 10 conducted the first and second five-year reviews of the remedy implemented at the Northside Landfill Superfund site in Spokane, Washington. This review was conducted by the EPA remedial Project Manager (RPM) for the entire site from

March 2002 through September 2002. This report documents the results of the review.

This is the second five-year review for the Northside Landfill site. The triggering action for this statutory review is the completion of the First Five-Year Review Report, dated September 19, 1997. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 Chronology of Site Events

<u>Event</u>	<u>Date</u>
Site Discovery	February 1, 1980
NPL Listing	June 10, 1986
Remedial Investigation/Feasibility Study completed	September 30, 1989
ROD Signature	September 30, 1989
Consent Decree for RD/RA	January 23, 1991
Remedial Design Start	February 11, 1991
Remedial Design Complete	March 10, 1992
Remedial Action Start	March 16, 1992
Construction Completion Date (PCOR)	September 2, 1993
Remedial Action Complete	March 15, 1995
Remedial Action Close Out Report	March 17, 1995
First Five-Year Review	September 19, 1997

III. BACKGROUND

The Northside Landfill is located in the northwest corner of the City of Spokane, in Spokane County, Washington (Figures 1 and 2). The landfill site covers 345 acres and is totally surrounded by a chain-link fence. The area around the landfill is being developed as residential now that the old landfill is closed. The older landfill which covered about 125 surface acres was closed and capped under the Superfund Program. A new small active landfill was constructed on about 15 acres of the site to create a disposal area for non-combustible waste and construction debris. The new landfill, which meets the current standards for landfills, provides the City a place to store overflow municipal waste and by-pass from the regional waste incinerator.

The older landfill, was closed to disposal on December 31, 1991, at which

time the municipal solid waste stream was diverted to a new waste incinerator. The landfill was operational since the 1930's using various fill and cover techniques. Initial site investigation into water quality began in 1981. Samples taken of the groundwater indicated the presence of low concentrations of volatile organic compounds (VOCs). In 1983, VOCs were found in neighboring private residential wells. The City provided alternative water to the affected homes and later in 1984 extended the municipal water system into the area affected by the plume.

The site was proposed for the NPL in 1984 and listed in 1986. An RI/FS was completed in 1988 which identified a steady-state plume extending approximately one-quarter mile down gradient of the landfill boundary which impacted domestic wells. The ROD was signed in September 1989, and specified that the landfill be capped, and a groundwater extraction and treatment system be installed as remedial actions. The City of Spokane entered into a Consent Decree (signed in September 1991) with EPA and the Washington State Department of Ecology to implement the ROD.

Construction contracts were actually awarded beginning in 1990, prior to the completion of the ROD and Consent Decree. Although work was started outside of the Superfund process, it became integrated into the final EPA approved work plans for construction of the remedial actions. Five different contracts were awarded by Spokane for construction work to close and cap the landfill and install the single extraction well. Treatment of the extracted contaminated groundwater is done at the City's POTW. All of the construction (extraction well, landfill cap, new solid waste cell, etc.) was completed in 1994, with the EPA final inspection done on April 1, 1994.

Basis for Taking Action

The results of the 1989 risk assessment stated that the average human exposure due to use of an off-site well was assumed to be the mean of all the observations over time for all of the off-site wells. For 1,1,1-tetrachloroethylene (PERC), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA), these mean concentrations were 3, 1, and 1 µg/l, respectively. For exposure due to the use of the most contaminated off-site well, the average concentration for PERC, TCE, and TCA is 28, 5, and 4 µg/l respectively; and the highest concentration observed in any off-site well was 38, 8, and 10 µg/l for PERC, TCE, and TCA respectively. Three other VOCs were included in the ROD contaminants of concern (COCs). They are: 1,1-dichloroethane (DCA); trans-1,2-dichloroethene (DCE); and vinyl chloride. However, PERC, TCE, and TCA have been the only contaminants that have been identified regularly either on-site or off-site since the RI/FS, and the only contaminants that have exceeded the cleanup goals. Data for the three COCs of current interest is shown in Table 2; an entire data set is in Appendix B.

Table 2 Contaminants of Concern
(Off-Site Points of Compliance)

<u>COC</u>	<u>Highest Conc. ug/l</u>	<u>Current Conc. (2002) ug/l</u>	<u>MCL ug/l</u>
PERC	38	4.7 (Pellow Well)	5.0
TCE	8	non detect	5.0
TCA	10	non detect	200

IV. REMEDIAL ACTIONS

On September 30, 1989, the Record of Decision (ROD) was signed by EPA requiring the following elements:

- ▶ Closing the landfill;
- ▶ Capping the landfill after closure;
- ▶ Constructing an extraction and treatment system to reduce the contamination in the aquifer;
- ▶ Monitoring the ground water and performance of the extraction system;
- ▶ Providing an alternate drinking water supply;
- ▶ Controlling landfill gas emissions; and,
- ▶ Enacting administrative restrictions to protect the remedial actions.

Negotiations with the City of Spokane, the single Potentially Responsible Party (PRP), commenced after the ROD was signed. The city agreed to implement the remedial actions stated in the ROD and a Consent Decree signed by the City of Spokane, EPA, and Ecology was entered on January 23, 1991.

The construction of the cap and associated gas collection, extraction and treatment system, and other ROD remedial action requirements were completed on September 2, 1993. Monitoring of the groundwater has been done regularly and has demonstrated that the remedial action controls are functioning as designed. The groundwater contamination from the landfill has been slowly decreasing since the cap was completed.

Operation and Maintenance

The City of Spokane continues to provide operation and maintenance (O&M) at this site. There is still a portion of the landfill property that is actively receiving waste and the

gas collection system has added two generators which produce electric power to the local system using the methane gas generated by the closed landfill. These activities require that staff be present on a daily basis to provide O&M of the site and maintain security. The original annual O&M budget was about \$75,000 per year. In 2001 the City spent about \$950,000. This increase was due to a change in scope of the O&M and includes the study to change the discharge from the POTW to the surface water infiltration basin located on-site.

V. PROGRESS SINCE LAST REVIEW

There were no specific recommendations in the First Five-Year Review document that needed to be addressed during the last five years of operation.

VI. FIVE-YEAR REVIEW PROCESS

The representatives for City of Spokane and Washington Department of Ecology were notified in February 2002 that a Five-Year review was required. The review team would be lead by Neil Thompson the EPA Project Manager for the Northside Landfill site. The review consisted of:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report and Its Review

The schedule was for completion during September 2002.

Community Involvement

The Spokane Solid Waste Department takes care of the interactions with the community on a regular basis. This is part of the O&M for the site. The results of this Five-Year Review will be contained in a Fact Sheet that will be delivered to the community. The community was very active during the planning and implementation of the remedy. However, since the landfill has been capped and the current activities at the small new landfill are very limited, the residential community has grown around the landfill. The capped landfill is viewed as open space that will not block the territorial views from the houses built on the property line.

Document and Data Review

Groundwater monitoring is done quarterly and the data is submitted to EPA. The contamination trends have been consistently decreasing in concentration. The contaminant concentrations in the groundwater off-site are right at the cleanup goals which are the MCLs. This fact has led to a field study by Spokane to evaluate a future discharge and treatment location at the on-site infiltration basin and to evaluate the possibility of cycling the extraction pump into on-and-off periods. The results of these studies will have to be approved by Ecology and EPA prior to implementation beyond the study phase.

The groundwater data summary report for the last year of data is contained in Appendix B. The primary groundwater compliance well is Monitoring Well BB located just downgradient from the Pollution Extraction Well (PEW), see Figure 2. Several private domestic wells are still monitored. All of these private wells have been replaced with municipal water, but several wells are used for monitoring the groundwater quality in the plume downgradient from the landfill property. PERC is the one contaminant that is not well below the MCL and cleanup goal for the site. All other COCs are consistently below their MCL and cleanup goal.

As part of the landfill closure, a gas collection system was installed. This system was approved by the Spokane County Air Pollution Authority and has functioned as designed. In 2001, two gas fired turbines were installed to utilize the methane generated by the landfill. These have added about 75 KWH of power to the local system.

Site Inspection

The inspection was conducted on July 29, 2002, by the EPA Project Manager (See Site Inspection Checklist, Appendix A). The purpose of the inspection was to assess the protectiveness of the remedy, including site security, access restrictions, institutional controls, and the integrity of the cap and its structures. The participants included:

<u>Inspection Participants</u>	<u>Representing</u>
Neil Thompson, Project Manager Site Cleanup Unit #4 U.S. Environmental Protection Agency 1200 Sixth Ave., Seattle, WA 98101 206-553-7177 thompson.neil@epa.gov	EPA
Bill Fees, Environmental Engineer Toxics Cleanup Program Eastern Regional Office	Ecology

Department of Ecology
N. 4601 Monroe, Spokane, WA 99205-1295
509-625-5190

Dean Fowler, Project Manager
City of Spokane, Solid Waste Management
1225 E. Marietta Avenue
Spokane WA 99207-2787
509-625-7890
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PRP, City of Spokane

There were no significant issues identified regarding the cap, surface drainage, gas collection and treatment/power generation, or access/security. The closure met and continues to meet all of the permit requirements of the county and state for both the closed and operating landfills. Some minor repairs are needed in the old closed landfill to correct a narrow separation trench that is occurring along the northwest perimeter of the cap. The gap is about one inch wide and runs for approximately 25 feet. This separation in the topsoil layer of the cap did not compromise any of the protectiveness of the cap.

The institutional controls are in place. The fence surrounding the site is intact and the entrance/security gate is locked each night. The city has zoning that currently identifies the landfill property and restricts its use. All of these controls are actions which continue to protect the cap.

VII. TECHNICAL ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Document?

The review of documents and data, ARARs, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD. The cap on the landfill is controlling the release of contaminants to the groundwater as seen by the decreasing trend in the monitoring data. The cap also prevents the dermal, ingestion, and respiratory routes of exposure from the landfill contents.

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

There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The remedy is still protective even though the surrounding area is becoming residential because the cap is intact and all of the new residences are served by municipal water. No wells in the contaminated portion of the aquifer are currently being used.

Changes in Standards and To Be Considereds

Since the signing of the ROD, the only ARAR that has changed is the MCL for arsenic. The new MCL for arsenic of 10 ug/l is more stringent than the previous concentration limit of 50 ug/l. This is not a problem at this site. Arsenic never has been a concern and the monitoring data indicates less than 10 ug/l for current sample results.

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

No issues have come to light that would indicate that the remedy as it has been implemented is not protective.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD. There have been no physical changes of the site that would affect the effectiveness of the implemented remedial actions. The change in the arsenic MCL does not change any of the RAOs for the site. There is no other information that calls into question the protectiveness of the remedy.

VIII. ISSUES

There were no issues identified that will require follow up action. The site is well managed and O&M actions are taken as needed.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The only follow-up actions that were identified are the potential future changes in the discharge and treatment location and the shift from continuous to cycled pumping of the extraction well. These will have to be acceptable to Ecology as well as EPA. For O&M issues such as these, Ecology is the designated lead agency. If the treatment location is changes, EPA will have an ESD that will have to be issued.

X. PROTECTIVENESS STATEMENT

Because the remedial actions at this site are protective, the site is protective of human health and the environment.

XI. NEXT REVIEW

The next Five-Year review for the Northside Landfill Superfund site is required by September 2007, five years for this review.

APPENDICES

APPENDIX A

Site Inspection Checklist

APPENDIX B

Groundwater Monitoring Data
Fourth Quarter 2001

APPENDIX B
Groundwater Monitoring Data

NORTH LANDFILL

FOURTH QUARTER 2001

	<u>pH</u>	<u>NOTE1</u>	<u>Total Alkalinity</u>	<u>BICARBONATE</u>	<u>WELL</u>	<u>DATE</u>	<u>TIME</u>	<u>BY</u>	<u>DEPTH(FT)</u>	<u>PUMP DEPTH</u>	<u>PURGE TIME</u>	<u>TEMP</u>	<u>COND</u>
					<u>AMMONIA</u>								
MW-208	10/08/01 <0.02	10:15_)	RPS	73.34	85	30	56.66	534	7.47			206	206
MW-BB	10/15/01 <0.02	10:40_)	RPS	116.17	124	15	57.02	640	7.23			233	233
MW-C	10/15/01 <0.02	09:30_)	RPS	83.77	100	15	55.76	485	7.38			174	174
P.E.W.	10/09/01	09:30_)	RPS	128.99	141	15	57.92	803	7.09				
MW-E	10/02/01 0.07	11:45_)	RPS	55.17	105	60	55.40	427	7.48				
MW-F	09/25/01	09:45_)	RPS	48.18	68	40	54.32	409	7.41				
MW-G	09/24/01	09:25_)	RPS	67.64	80	30	55.04	421	7.35				
MW-H	09/24/01	09:10_)	RPS	34.26	60	30	53.60	460	8.02				
MW-I	09/26/01	09:40_)	RPS	63.62	80	30	54.50	463	7.78				
MW-J	09/26/01	12:45_)	RPS	75.57	81	25	56.12	603	7.08		QC DUP		
MW-J	09/26/01	12:45_)	RPS		81	25					QC DUP		
MW-K	10/02/01 0.06	09:30_)	RPS	61.22	80	40	53.78	472	7.57		QC DUP		
MW-K	10/02/01 0.07	09:30_)	RPS		80	40					QC DUP		
MW-L	09/26/01	09:00_)	RPS	74.30	81	25	54.86	532	7.58				
MW-M	10/09/01	08:50_)	RPS	127.63	140	15	58.82	997	6.83		QC DUP		

MW-M	10/09/01 08:50_)	RPS		140	15					QC DUP		
MW-N	09/25/01 11:35_)	RPS	47.53	124	60	56.12	491	7.49		QC DUP		
MW-N	09/25/01 11:35_)	RPS		124	60					QC DUP		
MW-P	09/24/01 09:00_)	RPS	67.19	113	40	55.04	402	7.62				
MW-T	10/08/01 08:45_)	RPS	137.26	144	15	54.68	1007	6.92		QC DUP	463	463
	<0.02											
MW-T	10/08/01 08:45_)	RPS		144	15					QC DUP	474	474
	<0.02											
MW-U	09/24/01 10:00_)	RPS	68.74	113	60	55.58	322	7.67				
GRUVER	10/01/01 11:40_)	RPS	NA	NA	15	54.68	448	7.82				
LINDSKOG	10/01/01 11:20_)	RPS	NA	NA	15	57.20	460	7.41				
PELLOW	10/01/01 10:55_)	RPS	72.05	NA	15	57.20	635	7.26		QC DUP		
PELLOW	10/01/01 10:55_)	RPS		NA	15					QC DUP		

<u>WELL</u>	<u>DIS.SbCOD</u>	<u>CHLORIDE</u>	<u>LAB.COND</u>	<u>FLUORIDE</u>	<u>HARDNESS</u>	<u>NITRATE</u>	<u>NITRITE</u>	<u>SOLIDS (TDS)</u>	<u>SULPHATE</u>	<u>ORGANIC.CARBON</u>	<u>ORGANIC.HALIDES</u>	<u>DIS.AI</u>
MW-208	<5 <0.001	13.4	393	<0.1	259	3.3	<0.1	331	27.7	<0.5		
MW-BB	<5 0.002	18.3	477	<0.1	319	3.6	<0.1	417	35.6	0.9		
MW-C	<5 0.005	13.2	429	<0.1	237	3.0	<0.1	361	29.4	0.7		
P.E.W.				<0.1		5.0						
MW-E	<5	9.4	562	<0.01	224	2.9	<0.1	396	24.5	0.6		
MW-F												
MW-G												
MW-H												
MW-I												
MW-J												
MW-J												
MW-K	<5	11.4	490	<0.01		3.7	<0.1	330	25.9	0.7		
MW-K	<5	12.4	397	<0.01		3.9	<0.1	294	24.5	0.8		
MW-L												
MW-M				<0.01		5.0						

MW-M				<0.01		5.0					
MW-N											
MW-N											
MW-P											
MW-T	<5 <0.001	6.1	631	<0.1	547	8.6	<0.1	531	23.0	2.1	
MW-T	<5	7.2 <0.001	1371lab error	<0.1	540	8.7	<0.1	515	22.9	2.2	
MW-U											
GRUVER											
LINDSKOG											
PELLOW											
PELLOW											

<u>WELL</u>	<u>DIS.Se</u> <u>DIS.As</u>	<u>DIS.Ba</u>	<u>DIS.Be</u>	<u>DIS.Cd</u>	<u>DIS.Cr</u>	<u>DIS.Co</u>	<u>DIS.Cu</u>	<u>DIS.Fe</u>	<u>DIS.Pb</u>	<u>DIS.Mn</u>	<u>DIS.Hg</u>	<u>DIS.Ni</u>
MW-208	0.006 <0.001	0.07	<0.001	<0.001	0.003	<0.001	0.001	0.13	<0.001	0.002		<0.001
MW-BB	0.001 <0.001	0.047	<0.001	<0.001	0.004	<0.001	0.001	0.2	<0.001	<0.001		0.001
MW-C	0.003 <0.001	0.052	<0.001	<0.001	0.005	<0.001	0.002	0.15	<0.001	0.002		<0.001
P.E.W.												
MW-E								0.12		0.002		
MW-F												
MW-G												
MW-H												
MW-I												
MW-J												
MW-J												
MW-K								0.13		0.003		
MW-K								0.14		0.003		
MW-L												
MW-M												
MW-M												
MW-N												
MW-N												

MW-P

MW-T	0.002 0.002	0.049	<0.001	<0.001	0.005	<0.001	0.002	0.27	<0.01	<0.001	0.001
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MW-T	0.002 <0.001	0.051	<0.001	<0.001	0.003	<0.001	0.002	0.28	<0.01	<0.001	0.001
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MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

<u>WELL</u>	<u>Cobalt</u>	<u>DIS.Ag</u>	<u>DIS.Tl</u>	<u>DIS.V</u>	<u>DIS.Zn</u>	<u>Aluminum</u>	<u>Antimony</u>	<u>Arsenic</u>	<u>Barium</u>	<u>Beryllium</u>	<u>Cadmium</u>	<u>Calcium</u>	<u>Chromium</u>
MW-208	<0.001	<0.001	0.003	0.012				0.006	0.076		<0.001	51.5	0.003
MW-BB	<0.001	<0.001	0.003	0.01				0.001	0.045		<0.001	74.7	0.002
MW-C	<0.001	<0.001	0.002	0.014				0.003	0.054		<0.001	52.7	0.001
P.E.W.	<0.001							0.001	0.08		<0.001		0.002
MW-E				0.01				0.002	0.059		<0.001	56.7	0.001
MW-F													
MW-G													
MW-H													
MW-I													
MW-J													
MW-J													
MW-K				0.012				0.003	0.059		<0.001	58.7	0.001
MW-K				0.01				0.003	0.055		<0.001	57.6	0.001
MW-L													
MW-M								0.002	0.09		<0.001		0.002
MW-M								0.002	0.098		<0.001		0.001
MW-N													
MW-N													

MW-P

MW-T	<0.001	<0.001	0.002	0.013	0.002	0.054	<0.001	123	0.005
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MW-T	<0.001	<0.001	0.002	0.014	0.002	0.054	<0.001	120	0.003
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MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

<u>WELL</u>	<u>Copper</u>	<u>Iron</u>	<u>Lead</u>	<u>Magnesium</u>	<u>Manganese</u>	<u>Mercury</u>	<u>Nickel</u>	<u>Potassium</u>	<u>Selenium</u>	<u>Silver</u>	<u>Sodium</u>	<u>Thallium</u>
MW-208	0.001	0.21	<0.001	31.7	0.003	<0.0002		4.3	<0.001	<0.001	6.6	
MW-BB	<0.001	0.19	<0.001	32.1	<0.001	<0.0002		4.7	<0.001	<0.001	7.6	
MW-C	0.001	0.23	<0.001	25.7	0.002	<0.0002		3.6	<0.001	<0.001	6.2	
P.E.W.			0.001			<0.0002			0.001	<0.001		
MW-E	<0.001	0.22	<0.001	20	0.004	<0.0002		3.3	<0.001	<0.001		
MW-F												
MW-G												
MW-H												
MW-I												
MW-J												
MW-J												
MW-K	0.001	0.43	<0.001	22.3	0.003	<0.0002		3.4	0.001	<0.001		
MW-K	0.001	0.36	<0.001	21.7	0.003	<0.0002		3.5	<0.001	<0.001		
MW-L												
MW-M			<0.001			<0.0002						
MW-M			<0.001			<0.0002						
MW-N												

MW-N

MW-P

MW-T	0.002	0.28	<0.001	58.2	<0.001	0.0001	8.2	0.002	<0.001	6.6
------	-------	------	--------	------	--------	--------	-----	-------	--------	-----

MW-T	0.002	0.28	<0.001	58.3	<0.001	<0.0002	8	<0.001	<0.001	6.6
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MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

<u>WELL</u>	<u>ZINC</u>	<u>TOTAL COLIFORM</u>	<u>FECAL COLIFORM</u>	<u>Chloroform</u> 100mg/L	<u>1,1-dichloroethane</u> DCA (no MCL)	<u>trichloroethane</u> TCA (200 ug/L)	<u>tetrachloroethene</u> perc (5ug/L)	<u>trans-1,2-dichloroethene</u> DCE (no mcl)	<u>trichloroethene</u> TCE (5ug/L)	<u>vinyl chloride</u> 2ug/L	<u>acetone</u>	<u>acrylonitrile</u>
	<u>benzene</u>											
MW-208	0.012 <0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5
MW-BB	0.008 <0.5	<2	<2	<0.5	<0.5	<0.5	3.7	<0.5	<0.5	<0.5	<2.5	<0.5
MW-C	0.013 <0.5	<2	<2	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<2.5	<0.5
P.E.W.	<0.5	<2	<2	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	<2.5	<0.5
MW-E	0.01	<2	<2	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.3		
MW-F				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-G				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-H				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-I				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-J				<0.5	<0.5	<0.5	2.9	<0.5	0.5	<0.3		
MW-J				<0.5	<0.5	<0.5	2.8	<0.5	0.5	<0.3		
MW-K	0.012	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-K	0.01	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-L				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		

MW-M		4	<2	<0.5	<0.5	<0.5	5.5	<0.5	0.5	<0.3		
MW-M		17	<2	<0.5	<0.5	<0.5	5.2	<0.5	0.6	<0.3		
MW-N				<0.5	<0.5	<0.5	2.1	<0.5	0.5	<0.3		
MW-N				<0.5	<0.5	<0.5	2.1	<0.5	0.5	<0.3		
MW-P				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3		
MW-T	0.013 <0.5	<2	<2	<0.5	<0.5	<0.5	4.9	<0.5	<0.5	<0.3	<2.5	<0.5
MW-T	0.014 <0.5	<2	<2	<0.5	<0.5	<0.5	4.7	<0.5	<0.5	<0.5	<2.5	<0.5
MW-U				<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.3		
GRUVER				<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.3		
LINDSKOG				<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.3		
PELLOW				<0.5	<0.5	<0.5	4.7	<0.5	0.5	<0.3		
PELLOW				<0.5	<0.5	<0.5	4.8	<0.5	0.5	<0.3		

<u>WELL</u>	<u>1,4-dichlorobenzene</u>	<u>1,2-dichlorobenzene</u>	<u>chlorobenzene</u>	<u>ethylbenzene</u>	<u>bromoform</u>	<u>2-butanone</u>	<u>trans-1,4-dichloro-2-butene</u>	<u>Carbon disulfide</u>	<u>carbon tetrachloride</u>	<u>1,1,1,2-tetrachloroethane</u>	<u>1,1,2-trichloroethane</u>	<u>1,1,2,2-tetrachloroethane</u>
	<u>1,2-dibromoethane</u>											
MW-208	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-BB	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-C	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P.E.W.												
MW-E												
MW-F												
MW-G												
MW-H												
MW-I												
MW-J												
MW-J												
MW-K												
MW-K												
MW-L												
MW-M												

MW-M

MW-N

MW-N

MW-P

MW-T	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
------	--------------	------	------	------	------	------	------	------	------	------	------	------

MW-T	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
------	--------------	------	------	------	------	------	------	------	------	------	------	------

MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

<u>WELL</u>	<u>iodomethane</u>	<u>1,2-dichloroethane</u>	<u>Chloroethane</u>	<u>1-1-dichloroethene</u>	<u>cis-1,2-dichloroethene</u>	<u>2-hexanone</u>	<u>Bromomethane</u>	<u>bromochloromethane</u>	<u>bromodichloromethane</u>	<u>chloromethane</u>	<u>dibromomethane</u>	<u>dibromochloromethane</u>	<u>dichloromethane</u>
MW-208	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-BB	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-C	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P.E.W.	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-E													
MW-F													
MW-G													
MW-H													
MW-I													
MW-J													
MW-J													
MW-K													
MW-K													
MW-L													
MW-M													
MW-M													

MW-N

MW-N

MW-P

MW-T	<0.5 <0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
------	--------------	------	------	------	------	------	------	------	------	------	------	------

MW-T	<0.5 <0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
------	--------------	------	------	------	------	------	------	------	------	------	------	------

MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

<u>WELL</u>	<u>trichlorofluoromethane</u>	<u>4-methyl-2-pentanone</u>	<u>1,2-dibromo-3-chloropropane</u>	<u>1,2-dichloropropane</u>	<u>1,2,3-trichloropropane</u>	<u>cis-1,3-dichloropropene</u>	<u>trans-1,3-dichloropropene</u>	<u>styrene</u>	<u>toluene</u>	<u>vinyl acetate</u>	<u>m+p-xylene</u>	<u>o-xylene</u>
MW-208	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-BB	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-C	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P.E.W.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-E												
MW-F												
MW-G												
MW-H												
MW-I												
MW-J												
MW-J												
MW-K												
MW-K												
MW-L												
MW-M												
MW-M												

MW-N

MW-N

MW-P

MW-T <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5

MW-T <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5

MW-U

GRUVER

LINDSKOG

PELLOW

PELLOW

(volatile organics in µg/L...others in mg/L)

APPENDIX C

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OFFICE OF ENVIRONMENTAL CLEANUP
Superfund Program

FIVE - YEAR REVIEW
Type I

Northside Landfill
Spokane, Washington

I. Introduction

Authority Statement.

EPA Region 10 conducted this review pursuant to CERCLA Section 121(c), NCP Section 300.44(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991), and 9355.7-02A (July 26, 1994). This is a statutory review. The purpose of a five-year review is to ensure that a remedial action remains protective of public health and the environment and is functioning as designed. This document will become a part of the Site File.

Site Characteristics.

The Northside Landfill is located in the northwest corner of the City of Spokane, in Spokane County, Washington. The landfill covers 345 acres and is totally surrounded by a chain-link fence. The older landfill which covered about 125 surface acres was closed and capped under the Superfund Program. A new small active landfill was constructed on about 15 acres of the site to create a disposal area for non-combustible waste and construction debris. The new landfill, which meets the current standards for landfills, provides the City a place to store overflow municipal waste and by-pass from the regional waste incinerator. A caretaker lives on-site and provides after hours security.

The landfill was closed to disposal on December 31, 1991, at which time the municipal solid waste stream was diverted to a new waste incinerator. The landfill was operational since the 1930's using various fill and cover techniques. Initial site investigation into water quality began in 1981. Samples taken of the groundwater indicated the presence of low concentrations of volatile organic compounds (VOCs). In

1983, VOCs were found in neighboring private residential wells. The City provided alternative water to the affected homes and later in 1984 extended the municipal water system into the area affected by the plume.

The site was proposed for the NPL in 1984 and listed in 1986. An RI/FS was completed in 1988 which identified a steady-state plume extending approximately one-quarter mile down gradient of the landfill boundary which impacted domestic wells. The ROD was signed in September 1989, and specified that the landfill be capped, and a groundwater extraction and treatment system be installed as remedial actions. The City of Spokane entered into a Consent Decree (signed in September 1991) with EPA and the Washington State Department of Ecology to implement the ROD.

Construction contracts were actually awarded beginning in 1990, prior to the completion of the ROD and Consent Decree. The City began contracts which were part of the landfill closure process. Although they were started outside of the Superfund process, they became integrated into the final EPA approved work plans for construction of the remedial actions. Five different contracts were awarded by Spokane for construction work to close and cap the landfill and install the single extraction well. Treatment of the extracted contaminated groundwater is done at the City's POTW. All of the construction (extraction well, landfill cap, new solid waste cell, etc.) was completed in 1994, with the EPA final inspection done on April 1, 1994.

Community relations activities kept the local residents apprised of the construction activities and solicited their input into some design issues such as: landscaping, future use, public access, etc. During the construction period, a quarterly newsletter was published by the City for the residents located around the site.

The cost of constructing the remedial action was about \$22 million in contracts. Additional costs are being incurred during the operation and maintenance phase of the project. O&M manuals have been written for the continued operation of the project to assure compliance with the Consent Decree. Groundwater monitoring is done on a quarterly basis for the on-site and off-site monitoring wells.

The remedial actions are functioning properly and human health and the environment are being protected. No changes to the O&M or long-term monitoring plan are being proposed at this time.

II. Discussion of Remedial Objectives; Areas of Non-compliance

The groundwater cleanup criteria established in the ROD are the EPA Drinking

Water Maximum Contaminant Levels (MCLs). These MCLs are considered protective of public health and have not changed for the contaminants of concern for this site.

The goal of the remedial actions are to control contamination from the old landfill and to restore the groundwater in the area to drinking water quality. Before the remedial actions, contaminant concentrations of tetrachloroethylene at the site (landfill property) boundary was between 20-30 ug/l. After the landfill cap and extraction system control systems were in place, the tetrachloroethylene concentrations in the monitoring wells along the site boundary and the down gradient compliance monitoring well, ranged from 5-10 ug/l. The concentrations of tetrachloroethylene normally don't vary much throughout the year.

Based on the groundwater monitoring data, the concentration of contaminants in the groundwater is decreasing. There was an initial drop when the extraction system began pumping. The next major decrease in the groundwater contamination will be after the impact of the cap is realized as a source control. It was initially predicted that the cap would be effective at controlling the contaminant leaching into the groundwater in approximately five to ten years. It is anticipated that the cap will provide sufficient control that the extraction system can be turned off.

All of the monitoring data from the quarterly groundwater monitoring is compiled and sent to EPA and the state in an electronic format. There have been no non-compliance issues since the construction was completed in 1994. The 1 ug/l concentration line does not extend as far down gradient as it did before the remedial actions.

All systems are being maintained and are currently operating as they were designed. The cap shows no signs of aging or lack of care. Small repairs such as reseeded occur as needed. Maintenance of the mechanical systems especially the active gas flare system requires a trained staff to operate effectively. The City has personnel assigned and an adequate budget to operate and maintain these systems. The Washington Department of Ecology (Ecology) has taken over the oversight of the operations and maintenance of this site. Ecology and the City have a formal agreement to operate the closed landfill for 30 years.

III. Recommendations

Based on the file review and Five-Year Review site inspection on August 14, 1997, no specific recommendations are being made. The operation and maintenance of the facility is being adequately managed and funded by the City. They are making every effort

to keep this project from becoming an operational or community relations problem.

IV. Statement on Protectiveness

I certify that the remedies selected for this site remain protective of human health and the environment.

V. Next Five-Year Review

Since there are no compliance or operations issues, I conclude that the next statutory Five-Year Review should be conducted by September, 2002.

/s/ Randall F. Smith

September 19, 1997

Randall F. Smith, Director
Office of Environmental Cleanup

Date

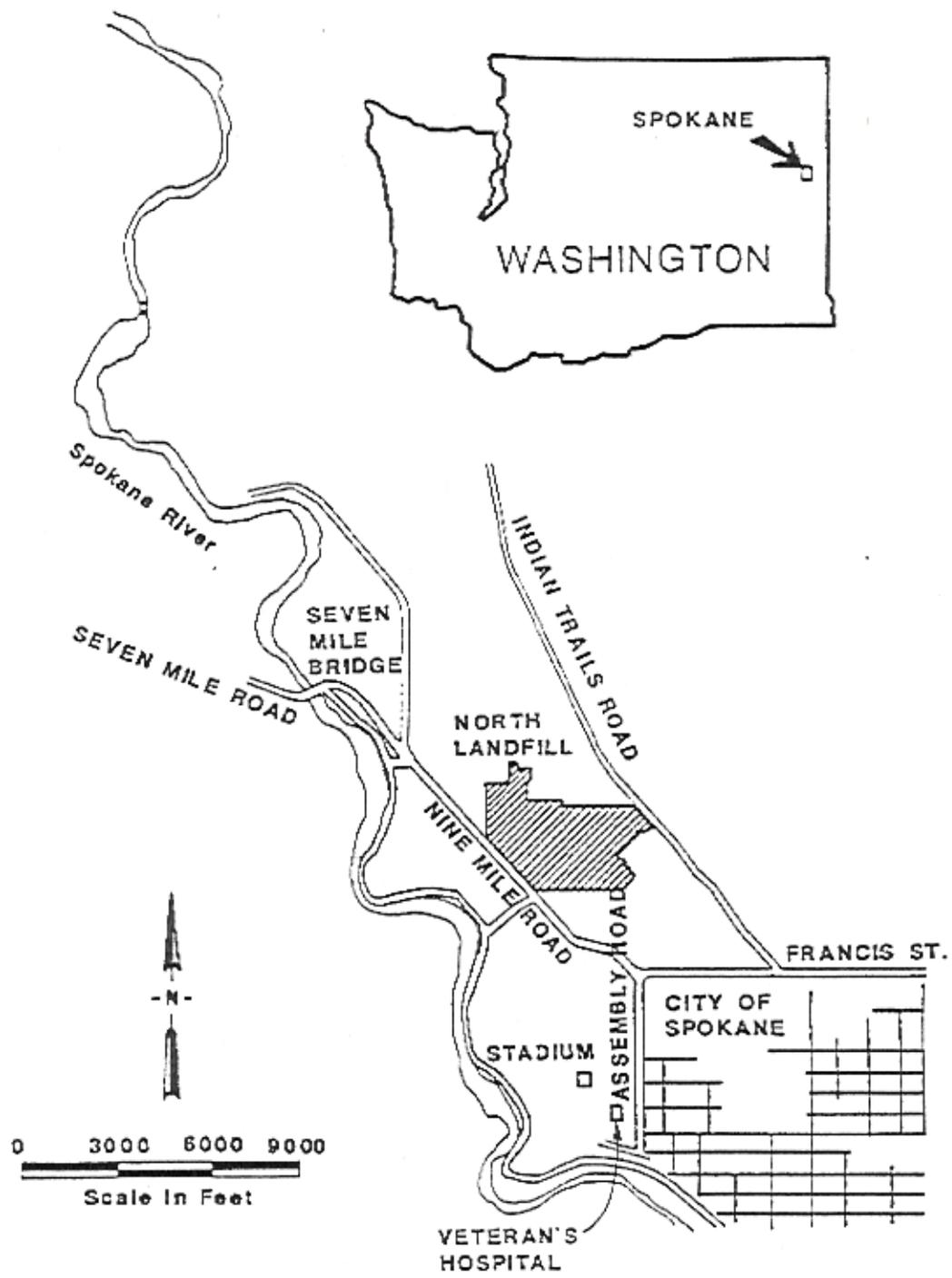
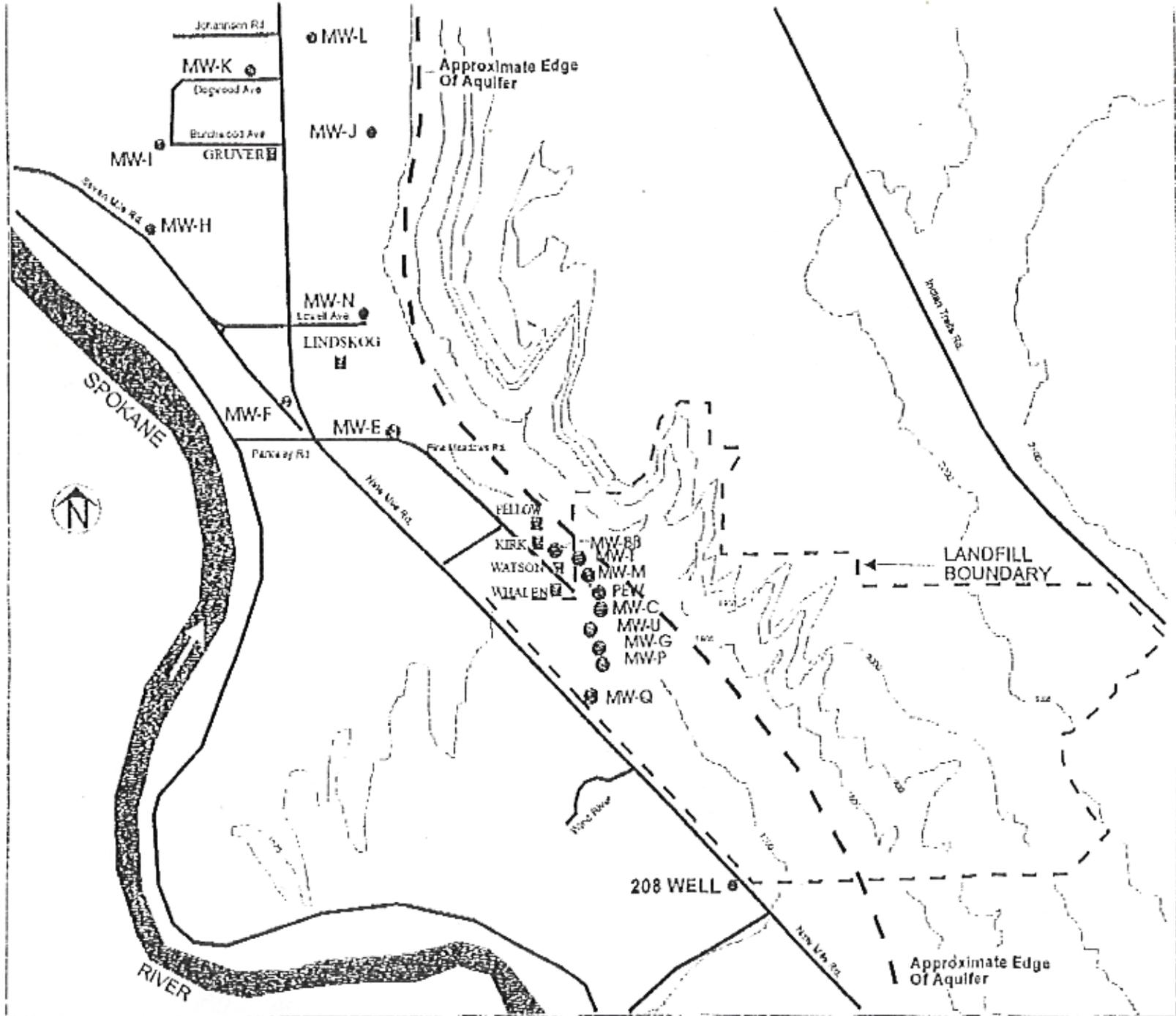


Figure 1
Vicinity Map



City of Spokane
 Northside Landfill

- Domestic Wells
- Monitoring Wells

Figure 2

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, etc.) Fill in all that apply.

Agency Ecology
 Contact Bill Fees Fenu Engineer 7/29/02
 Name Title Date Phone no.
 Problems; suggestions; Report attached Eastern Region Office 509-625-5790
N. 4601 Monroe 99205-1295

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.

Monica
Disposal Operations Supervisor

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents <input checked="" type="checkbox"/> O&M manual <input checked="" type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan <input checked="" type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks <u>Managers of Landfill Operation (State Reg)</u> <u>WISHA Right to Know</u>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	Permits and Service Agreements <input checked="" type="checkbox"/> Air discharge permit <input checked="" type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits Remarks <u>Substantive requirements for red charge</u>	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	Gas Generation Records Remarks <u>NEO Corp. Private part</u> <u>2 x 750 Kw generators</u>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	Discharge Compliance Records <input checked="" type="checkbox"/> Air <input checked="" type="checkbox"/> Water (effluent) Remarks _____	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks <u>Records of haulers</u> <u>Daily activity log for workers</u>	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

IV. O&M COSTS

1. O&M Organization

- | | |
|--|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input checked="" type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other _____ | |

2. O&M Cost Records

- Readily available Up to date
 Funding mechanism/agreement in place
 Original O&M cost estimate 75,000 yr Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From <u>2001</u>	To _____	<u>\$ 950,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> 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 _____

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks Controlled by fencing - on-site personnel

C. Institutional Controls (ICs)				
1.	Implementation and enforcement	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not properly implemented	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) <u>self reporting/drive by</u>			
	Frequency <u>daily 5/wk</u>			
	Responsible party/agency <u>Spokane</u>			
	Contact <u>Dean Fowler</u>			
	Name	Title	Date	Phone no.
	Reporting is up-to-date	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached			

2.	Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks <u>verify deed notation</u>			

D. General				
1.	Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			

2.	Land use changes on site	<input checked="" type="checkbox"/> N/A		
	Remarks _____			

3.	Land use changes off site	<input checked="" type="checkbox"/> N/A		
	Remarks _____			

VI. GENERAL SITE CONDITIONS				
A. Roads				
	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
Areal extent _____ Depth _____
Remarks _____

2. **Cracks** Location shown on site map Cracking not evident
Lengths 20' Widths 6" Depths 6"
Remarks _____

3. **Erosion** Location shown on site map Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Holes** Location shown on site map Holes not evident
Areal 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 (armored rock, concrete, etc.)** N/A
Remarks _____

7. **Bulges** Location shown on site map Bulges not evident
Areal extent _____ Height _____
Remarks _____

8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____	
9.	Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____		
B. Benches <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> 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 Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay	
2.	Bench Breached Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay	
3.	Bench Overtopped Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay	
C. Letdown Channels <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____		
2.	Material Degradation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____		
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____		
4.	Undercutting <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of undercutting Areal extent _____ Depth _____ Remarks _____		

5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Size _____ Remarks _____	Areal extent <input checked="" type="checkbox"/> No obstructions _____	
6.	Excessive Vegetative Growth Type _____ <input checked="" type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks _____	Areal extent _____	
D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Gas Vents <input checked="" type="checkbox"/> Active <input type="checkbox"/> Passive <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> N/A Remarks _____	<input checked="" type="checkbox"/> Routinely sampled <input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> N/A
2.	Gas Monitoring Probes <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input checked="" type="checkbox"/> Routinely sampled <input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition <input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition <input checked="" type="checkbox"/> N/A
5.	Settlement Monuments <input type="checkbox"/> Located Remarks _____	<input type="checkbox"/> Routinely surveyed	<input checked="" type="checkbox"/> N/A

E. Gas Collection and Treatment		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Gas Treatment Facilities <input checked="" type="checkbox"/> Flaring <input checked="" type="checkbox"/> Good condition Remarks _____	<input checked="" type="checkbox"/> Thermal destruction <input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Collection for reuse 2 x 750 kva generators
2.	Gas Collection Wells, Manifolds and Piping <input checked="" type="checkbox"/> Good condition Remarks _____	<input type="checkbox"/> Needs Maintenance	
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input checked="" type="checkbox"/> Good condition Remarks _____	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Outlet Pipes Inspected Remarks _____	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
2.	Outlet Rock Inspected Remarks _____	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
G. Detention/Sedimentation Ponds		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Siltation Areal extent _____ Depth _____ <input checked="" type="checkbox"/> Siltation not evident Remarks _____		<input checked="" type="checkbox"/> N/A
2.	Erosion Areal extent _____ Depth _____ <input checked="" type="checkbox"/> Erosion not evident Remarks _____		
3.	Outlet Works Remarks _____	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
4.	Dam Remarks _____	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A

H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1	Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____	
2	Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks _____	
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident Areal extent <u>perimeter</u> Depth _____ Remarks _____	
2.	Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____	
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____	
4.	Discharge Structure <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____	
VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____	
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____	

IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ <i>Water level low this season - near well shut off level</i>
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3.	Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____
B. Surface Water Collection Structures, Pumps, and Pipelines <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Collection Structures, Pumps, and Electrical <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ <i>N/A</i>
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ <i>N/A</i>

C. Treatment System		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Treatment Train (Check components that apply)	<input type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation
		<input checked="" type="checkbox"/> Air stripping	<input type="checkbox"/> Carbon adsorbers
		<input type="checkbox"/> Filters	<input type="checkbox"/> Bioremediation
		<input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____	
		<input type="checkbox"/> Others _____	
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
		<input type="checkbox"/> Sampling ports properly marked and functional	
		<input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date	
		<input checked="" type="checkbox"/> Equipment properly identified	
		<input type="checkbox"/> Quantity of groundwater treated annually <u>1 MGD</u>	
		<input type="checkbox"/> Quantity of surface water treated annually _____	
	Remarks _____		
2.	Electrical Enclosures and Panels (properly rated and functional)	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition
			<input type="checkbox"/> Needs Maintenance
	Remarks _____		
3.	Tanks, Vaults, Storage Vessels	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Proper secondary containment	<input type="checkbox"/> Needs Maintenance
	Remarks _____		
4.	Discharge Structure and Appurtenances	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition
			<input type="checkbox"/> Needs Maintenance
	Remarks _____		
5.	Treatment Building(s)	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition (esp. roof and doorways)
			<input type="checkbox"/> Needs repair
	<input type="checkbox"/> Chemicals and equipment properly stored		
	Remarks _____		
6.	Monitoring Wells (pump and treatment remedy)	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning
		<input checked="" type="checkbox"/> All required wells located	<input checked="" type="checkbox"/> Routinely sampled
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks _____		
D. Monitoring Data			
1.	Monitoring Data	<input checked="" type="checkbox"/> Is routinely submitted on time	<input checked="" type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input checked="" type="checkbox"/> Groundwater plume is effectively contained	<input checked="" type="checkbox"/> Contaminant concentrations are declining

D. Monitored Natural Attenuation			
1.	Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
Remarks _____			
X. OTHER REMEDIES			
If there are remedies applied at the site which are 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 to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).			

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.			

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.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
