

Five-Year Review Report

**Third Five-Year Review Report
for
Lakewood/Ponders Corner Superfund Site
Tacoma, Washington**

September 2002

PREPARED BY:

**Washington State Department of Ecology
Toxics Cleanup Program**

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EXECUTIVE SUMMARY

The Lakewood/Ponders Corner Superfund Site is located south of the city of Tacoma in Pierce County, Washington. In 1981, the U. S. Environmental Protection Agency (EPA) sampled the Lakewood Water District drinking water supply wells H1 and H2. The tests indicated that wells H1 and H2 were contaminated with volatile organic compounds (VOC), i.e., tetrachloroethylene (PERC), trichloroethylene (TCE) and cis-1,2 dichloroethylene (cis-1,2 DCE). The source of contamination was identified as Plaza Cleaners, a dry cleaning and laundry facility.

The Lakewood/Ponders Corner Superfund site was listed on the National Priorities List (NPL) on December 30, 1982. The Remedial Investigation and Feasibility Studies were completed during August 1984 through July 1985.

Selected remedies to address soil contamination at Plaza Cleaners include the excavation of contaminated soils, removal of contaminated sludge and off-site disposal. A Record of Decision was signed on September 30, 1985 and amended in November 14, 1986 to include the installation of a soil vapor extraction system (SVES) for treating a small portion of contaminated soil in the vadose zone. The soil remediation was completed in 1993 and EPA announced in the Federal Register, the partial deletion of the Lakewood site "Soil Unit" from the NPL, effective November 27, 1996.

The selected remedy for the groundwater was the pump and treat system and institutional controls. By November 1984, two air strippers were constructed at Lakewood Water District production wells H1 and H2 and began operating to treat the contaminated groundwater. The groundwater treatment system is still in operation, since the groundwater cleanup levels have not been achieved throughout the site.

On September 15, 1992, an Explanation of Significant Difference (ESD) was issued to establish site-specific cleanup levels for contaminants in soil and groundwater, and revise the institutional control requirements at the site.

EPA conducted five-year reviews in 1992 and 1997. The 1986 ROD amendment triggered the first five-year review. The current five-year review was triggered by the previous five-year review report dated September 28, 1997. The assessment of this five-year review found that the groundwater remedy is effective and functioning as per the design. The current data indicates that the groundwater treatment is likely to continue beyond the five to ten years initially projected. Because the long term response action through the treatment of groundwater at Lakewood Water District wells H1 and H2 continues to be effective, the site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Lakewood/Ponders Corner Superfund Site		
EPA ID (from WasteLAN): WAD050075662		
Region:	State: WA	City/County: Tacoma/Pierce
SITE STATUS		
NPL status: : <input checked="" type="checkbox"/> Final <input checked="" type="checkbox"/> Deleted (Soil Unit) <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating (GW)		
Multiple OUs?* <input type="checkbox"/> YES	Construction completion date: 11/30/1984	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: : <input type="checkbox"/> EPA <input checked="" type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Panjini Balaraju		
Author title: Project Manager	Author affiliation: Department of Ecology	
Review period: 03/01/2002 TO 09/16/2002		
Date(s) of site inspection: July 03, 2002		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion)		
Review number: : <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <input type="checkbox"/> Actual RA On-site Construction at OU # ____ <input type="checkbox"/> Actual RA Start at OU# ____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
Triggering action date (from WasteLAN): 09/28/1997		
Due date (five years after triggering action date): 09/28/2002		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, (continued)

Issues:

- Deteriorating equipment/mechanical parts associated with the groundwater pump and treat system
- Y2K compliance of treatment equipment, computer software, etc.
- Notify/remind residents, businesses and well drillers of the groundwater administrative control restrictions on the installation and use of drinking water wells within the contaminated area

Recommendations and Follow-up Actions:

- All the deteriorating treatment equipment/mechanical parts were replaced during June 1998 through June 1999.
- Inspected all treatment equipment, computer software, etc. for Y2K compliance. Necessary changes/upgrades were made to the computer software. In addition, the new equipments/mechanical parts that were replaced as part of a major overhaul of the treatment system as stated above were in compliance with Y2K requirements.
- During the next five-year review, Ecology will develop and mail a fact sheet to residents, businesses and well drillers notifying/reminding these parties of the recommended continued suspension of using private wells or drilling new wells in the zone of contamination.

Protectiveness Statement(s):

All risks at the site have been addressed through the removal and off-site disposal of contaminated soils and sludge exceeding the site-specific cleanup level and implementing the pump and treat system for treating the contaminated groundwater. The current data indicates that the groundwater treatment is likely to continue beyond the five to ten years initially projected. Because the long-term response action through the groundwater pump and treat system continues to be effective, the site is protective of human health and the environment.

Long-term Protectiveness:

Removal and off-site disposal of contaminated soil and sludge, has proven effective in the remediation of the source of groundwater contamination. The pump and treat system has been effective in the treatment of the contaminated groundwater plume.

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 Washington State Department of Ecology (Ecology) is preparing this Five-Year Review report pursuant to Section 420 of the Model Toxics Control Act Cleanup Regulation (MTCA), Chapter 173-340 WAC (February 12, 2001). In addition, Ecology is preparing this 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 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) 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.

The Washington State Department of Ecology (Ecology) conducted the five-year review of the remedy implemented at the Lakewood/Ponders Corner Superfund site in Tacoma, Washington. This review was conducted by the Ecology Project Manager for the site from March 2002 through September 2002. This report documents the results of the review.

This is the third five-year review for the Lakewood/Ponders Corner Superfund site. The triggering action for this is the previous five-year review report dated September 28, 1997. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above the levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table A: Chronology of Site Events

Event	Date
Lakewood Water District drinking water production wells (H1 and H2) were sampled by EPA and revealed contamination of volatile organic compounds (VOC) i.e., tetrachloroethylene (PERC), trichloroethylene (TCE) and cis-1,2 dichloroethylene (cis-1,2 DCE)	07/1981
Lakewood Water District wells H1 and H2 were temporarily taken out of service while monitoring wells were installed	08/1981
Source of contamination is suspected to be Plaza Cleaners located approximately 800 feet north (upgradient) of the Lakewood Water District production wells	1981
Final listing on EPA National Priorities List	12/30/1982
Stipulated agreement for remedial action reached between Ecology and Plaza Cleaners	09/1983
Cleanup of site soils, removal of drummed sludge, liquid and contaminated solids from septic tanks	1983-1987
EPA completed a focused feasibility study (FFS) identifying an Initial Remedial Action (IRM)	05/1984
Remedial Investigation conducted by EPA contractor	08/1984 - 07/1985
Two air strippers installed at Lakewood Water District production wells H1 and H2 to treat contaminated groundwater	11/1984
EPA confirmed source of soil and groundwater contamination to be effluent discharges from septic tanks behind the Plaza Cleaners building and sludge disposal on the ground surface	1985
Feasibility Study made available to public	07/1985
Record of Decision (ROD) selecting the remedy is signed	09/30/1985
Amended ROD is signed for modifications to the soils unit cleanup, i.e. installation of a soil vapor extraction system (SVES) for treatment of soils in place, reduction in the amount of septic tank contents to be removed and treated off-site, and continued soil and vapor testing until soil treatment was deemed complete	11/14/1986
Soil excavation alternative implemented	06/1992 - 07/1992
Explanation of Significant Differences (ESD) issued by EPA, primarily to (1) establish site-specific cleanup levels for contaminants in soil and groundwater; (2) eliminate the requirement to implement institutional controls on land and ground water use; and (3) document revisions to the remedial action necessary to remove the source of contamination at the site	09/15/1992

Event	Date
First five-year review report prepared by EPA	09/1992
Certification of completion for the Soils Unit Cleanup	05/06/1993
EPA announced, in the Federal Register, the partial deletion of the Lakewood site "Soil Unit" from the NPL	11/27/1996
EPA sent letter to residences, businesses, and well drillers regarding administrative control restrictions	02/24/1997
Operation & Maintenance (O & M) responsibility for the site was transferred to Ecology as a part of the on-going long term response action	07/1997
Second five-year review report prepared by EPA	09/1997

III. BACKGROUND

Physical Characteristics

The Lakewood/Ponders corner site is located in Pierce County, Washington, south of the city of Tacoma on Pacific Highway Southwest. It includes the property upon which Plaza Cleaners has operated a dry cleaning business for many years. The regional aquifer was contaminated within an approximate 2,000-foot radius downgradient of Plaza Cleaners. The Plaza Cleaners property is located at 12509 Pacific Highway Southwest in Tacoma and is bounded by Interstate 5 to the south, and surrounded on the remaining three sides by a commercial/light industrial area. Farther north is a predominantly residential area. Lakewood Water District has two of its production wells (H1 and H2) on a fenced area south of Plaza Cleaners, across Interstate 5. The production wells H1 and H2 serves approximately 150 homes. Residential property lies to the east and McChord Air Force Base to the southeast, of the wells. Figure 1 shows the location of the site.

Land and Resource Use

A dry cleaning facility continues to operate at the former location of Plaza Cleaners. The current land use for the surrounding area is residential and commercial. The Lakewood Water District wells (H1 and H2) are located approximately 800 feet downgradient of the Plaza Cleaners facility. It is anticipated that a mix of land uses similar to that described will continue into the future. Soil remediation has been completed at the Plaza Cleaners facility.

The groundwater aquifer underlying the site is currently used as a drinking water source. Treatment of groundwater continues via air stripping at the Lakewood Water

District production wells (H1 and H2). Treated water discharged to the distribution system consistently meets the drinking water system discharge criteria.

History of Contamination

In July of 1981, EPA sampled drinking water wells in the Tacoma area for contamination by volatile organic compounds. The tests indicated that the Lakewood Water District's production wells H1 and H2 were contaminated with trichloroethylene (TCE), tetrachloroethylene (PERC) and cis-1, 2 dichloroethylene (cis-1 2 DCE). The source of the contamination was determined to be Plaza Cleaners, a dry cleaning and laundry business, located approximately 800 feet north of the Lakewood Water District production wells.

It was confirmed that contamination had resulted from the dumping of PERC into three on-site bottomless septic tanks behind Plaza Cleaners, causing contamination of the soils. It was also confirmed that sludge was disposed of on the ground surface. In August of 1981, H1 and H2 were temporarily taken out of service while monitoring wells were installed and contaminated surficial soil in the source area was excavated.

The Lakewood/Ponders Corner Site was added to the National Priorities List (NPL) on December 30, 1982.

A stipulated agreement for remedial action was reached between the Washington Department of Ecology (Ecology) and Plaza Cleaners in September of 1983. Plaza Cleaners agreed to discontinue their prior solvent disposal practices, install a system for reclaiming cleaning solvents, send stored drummed waste water and contaminated soil to a suitable off-site disposal facility, and cooperate in the immediate cleanup of the sludge disposal areas. Plaza Cleaners successfully fulfilled the terms of the agreement.

In May of 1984, EPA completed a focused feasibility study (FFS) identifying an Initial Remedial Action (IRM) needed to address those contaminant problems posing the most immediate threat at the site. The objectives of the IRM were to:

- Restrict the spread of contamination within the aquifer
- Restore normal water service to the area; and,
- Initiate groundwater treatment as quickly as possible.

By November 15, 1984, two air strippers had been installed and were operating to treat wells H1 and H2. The Puget Sound Air Pollution Control Agency issued a permit for the H1 and H2 air stripping towers treatment facility. The stack emissions from the air stripping towers at the extraction wells met all technical requirements and ambient air quality standards for discharge.

From August 1984 to July 1985, EPA's contractor conducted a Remedial Investigation (RI) to further determine the extent of groundwater contamination at the site, test the soil at Plaza Cleaners for remaining contaminants, and determine whether

other sources were contributing to the groundwater problem.

The RI indicated that PERC contamination in soils was highest where the solvent-contaminated wastes were intentionally disposed on the ground surface. Most of the PERC from the soil borings and test pit was located in the upper 12 to 13 feet of soil in the immediate vicinity of the dry cleaner's septic tanks and drain field. PERC concentrations in soil ranged from 11 ppb to 3,800 ppb. Maximum TCE and cis-1,2-DCE concentrations in soil were 5 ppb and 4 ppb respectively.

The RI also indicated that the PERC concentration in the two production wells (H1 and H2) ranged from 100 ppb to 500 ppb prior to initiating the groundwater treatment. Contaminant concentrations decreased rapidly after several days of pumping, and continued to decrease. The maximum and mean concentrations in other groundwater monitoring wells prior to treatment were: PERC at 922 ppb and 16 ppb, respectively, and TCE at 57 ppb and 3 ppb, respectively. The only detected concentration for cis-1, 2-DCE was 85 ppb in a monitoring well upgradient of the production wells.

IV. REMEDIAL ACTIONS

Selected Remedy

The Feasibility Study for the Lakewood site was published in July 1985, and the Record of Decision (ROD) was signed shortly thereafter on September 30, 1985.

The selected remedy in the ROD consisted of the following major elements:

- Continued operation of the H1 and H2 production wells treatment system to clean up the aquifer. Installation of higher efficiency equipment or modification of existing equipment used in the treatment system.
- Installation of additional monitoring wells upgradient of existing production wells, and continuation of routine sampling and analysis of the aquifer to monitor progress and provide early warning of potential new contaminants.
- Excavation and removal of contaminated septic tanks and drain field piping to avoid the possible spread of contamination via uncontrolled excavation (i.e. future property development). The septic tanks were found to be bottomless, and, therefore, they were not removed.
- Placement of administrative restrictions on the installation and use of groundwater wells and on excavation into the contaminated soils to minimize the potential for use of contaminated groundwater and reduce the risks associated with uncontrolled excavation.

Four major areas affecting the original remedial decision necessitated amending the original ROD. An Amended ROD was signed on November 14, 1986. All of the selected remedies and administrative restrictions in the September 30, 1985, ROD for the aquifer unit remained the same. Additions or modifications to the soils unit cleanup were as follows:

- Installation of a soil vapor extraction system (SVES) covering the area of soil contamination over and around the historical on-site drain filed to extract PERC from the remaining contaminated soil.
- Reduction in the amount of septic tank contents to be removed and treated off-site.
- Soil and vapor testing continued until soil treatment was deemed complete.

Three issues which were not addressed in either the original ROD or the Amended ROD were included in a September 15, 1992, Explanation of Significant Differences (ESD). The issues included: (1) additional final remedial action necessary to fully remove the source of contamination at the site; (2) establishment of site-specific cleanup levels for contaminants in soil and groundwater; and, (3) elimination of the requirement to implement institutional controls on land use. A brief summary of these issues are presented as follows:

- Additional Final Remedial Action: Cleanup of the site soils began in 1983 when the owners of Plaza Cleaners agreed to send the drummed sludge from the on-site removal areas to an approved off-site disposal facility. This removal was conducted by a consultant hired by the owner of Plaza Cleaners.

In 1987, EPA removed contaminated solids and water from within the three septic tanks located behind Plaza Cleaners for off-site disposal. However, not all the solids could be excavated from Tank 1 and were solidified in-place by adding rice-hull ash.

Further soil remediation was conducted during 1987 with the installation of a soil vapor extraction system (SVES) within the contaminated area, in and around the historical drain field. The purpose of the SVES was to extract PERC from the shallow unsaturated soil at the site. The SVES was operated intermittently between 1988 and April 1989. However, the follow-up soil sampling conducted in October 1990 indicated elevated concentrations of PERC at approximately 10 to 12 feet below ground surface within septic Tank 1. Based on the uncertainty of reducing PERC concentrations in the septic tank sludge below 500 ppb using the SVES, EPA decided to excavate the contaminated sludge and soil from within and around Septic Tank 1 for off-site disposal. The SVES was

decommissioned and dismantled for final disposition off-site.

o Site Specific Cleanup Levels:

Soil: EPA established the cleanup level in unsaturated soil above the groundwater table at 500 ppb for PERC. This cleanup level was in compliance with state regulatory requirements, is within EPA's acceptable risk range of 10^{-4} to 10^{-6} for soil exposure pathways including dermal contact and ingestion, and is protective of the groundwater. Based on the results of confirmation samples collected subsequent to the final soil remedial action of June-July 1992, site-wide surface and subsurface soil concentrations are well below 500 ppb.

Groundwater: PERC, TCE and cis-1, 2 DCE are the contaminants of concern in groundwater at this site. A review of federal and state regulatory levels for these contaminants in groundwater yielded the following in parts per billion (ppb):

<u>Ground Water Standards</u>	<u>PERC</u>	<u>TCE</u>	<u>cis-1, 2-DCE</u>
Federal MCL	5.0	5.0	70.0
MTCA Method-A	5.0	5.0	----

MCL: Maximum Contaminant Level

o Institutional Controls: The Institutional Controls requirement on soil and groundwater, as called for in the ROD and Amended ROD, was addressed in the ESD as follows:

- (i) The success of the final soil remedial action eliminated the need for institutional controls (as called for in the original ROD) on land use.
- (ii) Since initiation of the groundwater treatment program, EPA has utilized public outreach and education to implement administrative restrictions on the installation and use of drinking water wells within the contaminated area. Homeowners who currently have or could potentially install private drinking water wells within the plume of the contamination and well drillers were notified and will be reminded of potential risks associated with groundwater use in the area. In February of 1997, EPA sent letters to these parties recommending the continued suspension of using private wells or drilling of new wells in the zone of contamination. During the next five year review, Ecology will develop and send a fact sheet to these parties regarding the potential risks associated with groundwater use in the area. Residents whose properties

overlie the existing groundwater contaminant plume continue to obtain drinking water from the Lakewood Water District.

- (iii) Other institutional control measures on groundwater use such as deed restrictions are considered unnecessary. The use of Public outreach and education, including written notification of current limitations on the groundwater use, are sufficiently protective of human health and the environment. Once the groundwater standards have been achieved, these measures will no longer be necessary.

V. PROGRESS SINCE LAST REVIEW (CURRENT STATUS)

A. Prior Five-Year Reviews

The previous two Five-Year reviews were conducted by EPA in September 1992 and September 1997. These reviews determined that the soil and groundwater remedies have been effective; working as per the intended design and the site remains protective of human health and the environment. A brief summary of previous Five-Year review findings and recommendations are as follows:

- The implemented soil cleanup remedy, i.e., excavation and removal of contaminated soils and sludge coupled with the soil vapor extraction were effective, eliminating the source of the groundwater contamination. The final remediation of the soil was also effective, meeting the cleanup level of 500 ppb for PERC. It was determined that no further action at the “Soil Unit” was necessary to protect human health and the environment. EPA announced, in the Federal Register, the partial deletion of the Lakewood site “Soil Unit” from the NPL, effective November 27, 1996.
- The on-going groundwater treatment of Lakewood Water District’s production wells H1 and H2, via air strippers, continues to be effective in protecting public health and the environment. The treatment system has been operated by the Lakewood Water District since November of 1984.
- It was recommended that treatment of groundwater via air stripping continue under the long term response action (LTRA) until cleanup goals are met, and the groundwater treatment method continue as it has successfully provided the surrounding area with potable water.
- The 1997 Five-Year review identified some signs of deteriorating equipment parts associated with the treatment system. This was attributed to the long period of equipment operation. Although the equipment was observed to be fully operational and functioning, EPA recommended that the deteriorating parts be replaced.

B. GROUNDWATER - Actions between 1997 and 2002

(i) System Operation/Operation and Maintenance

EPA carried out the O & M responsibilities associated with this site for a 10-year period, which ended in November of 1994, ten years after construction, installation and commencement of the groundwater treatment system. In July of 1997, O & M responsibility for the Lakewood Site was transferred to Ecology as part of the long term response action. Ecology's O & M responsibilities include:

- Activities involving O & M of the air stripping facility and existing groundwater monitoring wells,
- Compliance monitoring of the air stripping facility,
- Decommissioning, dismantling, and disposing of the air strippers and associated equipment; and,
- Abandonment and decommissioning of existing groundwater monitoring wells.

To date, the routine O & M of the groundwater treatment system (air strippers) is being performed by the Lakewood Water District and the periodic groundwater monitoring is being conducted by Ecology. No significant cost increases or problems regarding the routine O & M of the treatment system has been reported to Ecology by the Lakewood Water District. The number of existing monitoring wells and their sampling frequency are presented in Table 2.

(ii) Treatment system equipment/mechanical parts replacement

The groundwater treatment system has been in operation since November of 1984. Since 1984, the routine operation and maintenance of the treatment system has been conducted by the Lakewood Water District. Due to this long period of operation, some of the treatment equipment/mechanical parts were deteriorating. The Lakewood Water District identified the deteriorated treatment equipment/mechanical parts and submitted a list (including the approximate costs) to Ecology in May of 1998. Two Inter Agency Agreements (IAA) were developed in June 1998 and 1999 between Ecology and the Lakewood Water District providing a total of \$117,607 as grants to the Lakewood Water District for replacing the necessary treatment system equipment/mechanical parts. The table in Enclosure 3 presents a list of equipment/mechanical parts that were replaced. Please see Enclosure 3 for more details.

(iii) Monitoring well network and air stripping towers

Since 1990, twenty-seven (27) monitoring wells have been properly abandoned by Ecology. In June of 1996, EPA properly abandoned twelve (12) monitoring wells (Table 2, Figure 2). Currently, Ecology is conducting the periodic monitoring of twelve (12) groundwater monitoring wells, and two production wells (H1 and H2). Figure 3 and Table 2 present the well locations and their sampling frequency respectively. Sample results are provided to EPA by Ecology on a regular basis. Treated water consistently meets the drinking water system discharge criteria. In addition, stack emissions from the air stripping towers at the extraction wells continue to meet all technical requirements and ambient air quality standards for discharge.

(iv) Year 2000 (Y2K) Compliance

Ecology began working with the Lakewood Water District in October of 1998 to address the Y2K compliance issues. On November 17, 1998, Ecology sent a letter to the Lakewood Water District requesting them to inspect all the treatment equipment, computer software etc. for Y2K compliance. The Lakewood Water District hired a contractor to check the treatment system equipment and computer software for Y2K compliance. Necessary changes to the computer software were made to comply with Y2K. No problems were encountered regarding the treatment system operation during the Y2K transition. Please see Enclosure 4 for details.

C. Long Term Response Action (Groundwater Treatment)

Remediation of the groundwater is currently ongoing under a long-term response action, as cleanup goals have not yet been achieved through out the contaminant plume. Two air strippers, operating on wells H1 and H2, are treating the main plume located near Plaza Cleaners. The PERC concentrations for monitoring wells MW-20B, MW-16A and the production wells H-1 and H-2 are presented below. See Table 1 for detailed results and Figure 2 for a well location map. A figure depicting the current approximate plume size is presented in Figure 4.

<u>Monitoring Well-20B</u>	January 1997	February 2002
PERC	373 ppb	248 ppb
TCE	100U ppb	200U ppb*
cis-1, 2 DCE	6.4 J ppb	100U ppb*
 <u>Monitoring Well-16A</u>		
PERC	54 ppb	47 ppb
TCE	1.1 ppb	0.8 J ppb
cis-1, 2 DCE	3.1 ppb	2.3 ppb
 <u>Wells H-1/H-2</u>		
PERC	18 ppb	12 ppb
TCE	0.4 J ppb	0.2 J ppb
cis-1, 2 DCE	0.4 J ppb	0.2 J ppb

* high detection limit is due to interferences

D - Analysis performed at second dilution.

U - The analyte was not detected at or above the reported result.

J - The analyte was positively identified. The associated numerical result is an estimate.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Component

Ecology staff notified Lakewood Water District staff of the initiation of the five-year review in March of 2002. The Lakewood/Ponders Corner Five-Year Review team was led by Panjini Balaraju, Ecology Project Manager. Monica Tonel and Judi Schwarz, both of EPA, assisted in the review of the Five-Year Review report.

Community Involvement

Activities to involve the community in the five-year review were not conducted as no activities requiring such involvement were identified by Ecology. During the next five year review, Ecology will develop and send a fact sheet to residents, businesses and well drillers recommending the continued suspension of using private wells or drilling of new wells in the zone of contamination.

Document Review

This five-year review consisted of a review of relevant documents including O & M records and monitoring data (See attached Tables and Figures).

Groundwater Monitoring

Ground water of concern at this site can be found in two water bearing zones. The primary aquifer "A" (advance outwash - semi to confined aquifer) is at a depth of approximately 38.30 feet below ground surface (bgs) (MW-20A) and zone "B", Vashon till (unconfined aquifer) which is at a depth of approximately 41 feet bgs (MW-20B). The Lakewood Water District production wells H1 and H2 are screened in advance outwash deposits (Zone "A"). The ground water elevation data through time has shown a downward vertical gradient from zone "B" to "A". It is unknown whether this vertical direction of flow is naturally occurring or if it is being influenced from the pumping of Lakewood Water District wells H1 and H2. The horizontal ground water flow direction based on the ground water monitoring wells is unknown due to the influence of pumping from production wells H1 and H2. See Figure 7 for a presentation of the north-south cross section between Plaza Cleaners and production wells H1 and H2.

In July 1981, a pump test as conducted by EPA, in which the Lakewood Water District production wells H1 and H2 were shut down for a period of 72 hours to obtain static water levels in wells H1 and H2. It was reported from this test that the natural flow direction of ground water is toward the northwest. This flow direction is towards two lakes, Gravelly Lake and Steilacoom Lake. Gravelly lake has a depth of 55 feet and Steilacoom Lake has a depth of 120 feet from the ground surface. It appears that these lakes are the ground water discharge point for the advance outwash sands (Zone "A").

The groundwater monitoring data shows that, monitoring wells MW-16A and MW-20B, as well as the Lakewood Water District Production wells H1/H2 continue to have PERC concentrations exceeding the federally established maximum contaminant level (MCL) of 5 ug/l. Groundwater sample results for the other monitoring wells has been either non-detect or below cleanup levels. Monitoring well MW-20B had the highest contaminant concentrations during sampling events in January 1997 (373 ppb) and February 2002 (248 ppb). Analytical results of samples collected from MW-16A during the January 1997 and February 2002 sampling events revealed the presence of PERC at concentrations of 54 ppb and 47 ppb, respectively. EPA established the cleanup level for ground water at 5.0 ppb for PERC and TCE, and 70.0 ppb for cis-1,2 DCE consistent

with the federal MCLs. Compliance with these cleanup goals is required throughout the contaminated groundwater plume.

Though the analytical results of PERC concentrations in monitoring wells MW-20B and MW-16A exceed the MCL, the overall trend shows a steady decrease in PERC concentrations since the inception of the groundwater remedy (Figures-5&6). Currently, detections of PERC at concentrations exceeding its MCL are limited to monitoring wells MW-20B, MW-16A and production wells H1 and H2. The current groundwater plume is presented in Figure-4.

Analytical results of samples collected from wells MW-20A, MW-31, and MW-32 for the period of January 1997 through February 2002 revealed the presence of low levels of PERC and cis-1,2 DCE. Well MW-19A water sample results also showed the presence of TCE at low levels (Table 1). The low levels of PERC and TCE detected in all of the above wells were estimates and were at or near the quantitation limits.

Site Inspection

An inspection at the site was conducted on July 3, 2002, by the Ecology Project Manager and another Ecology staff person. The purpose of the inspection was to assess the protectiveness of the remedy. Ecology staff inspected the treatment system, monitoring wells and the Lakewood Plaza Cleaners area.

No significant issues have been identified at any time regarding the treatment system, the monitoring wells or the Lakewood Plaza Cleaners area. The physical inspection of Lakewood Plaza Cleaners area did not indicate any change in the land use pattern, or any new development or construction that would impact the property. The land use remains the same as identified during the RI and is presented in section III of this report. Since there is no change in the land use pattern, the exposure pathways considered under the "Public Health Evaluation" section in the Feasibility Study in assessing the site risk are still valid for both soils and groundwater (FS, July 1985, pages 1-39 through 1-59). Hence, the cleanup levels established in the ESD for the soils and groundwater are still valid.

Administrative control restrictions on the installation and use of drinking water wells within the contaminated area continue to be necessary. A letter or fact sheet notifying and reminding residents, businesses, and well drillers of the potential risks associated with groundwater use in the area has not been developed by Ecology since the June 1997 letter generated and sent by EPA to the above mentioned parties. During the next five year review, Ecology plans to develop and send a fact sheet to residents, businesses and well drillers recommending the continued suspension of using private wells or drilling of new wells in the zone of contamination.

A drive-by and visual inspection of all remaining monitoring wells was conducted. All wells were found to be properly secured and functional.

Interviews

Interviews were conducted with various parties connected to the site. During the site inspection of July 3, 2002, Mr. Jeff Jennison of the Lakewood Water District briefly explained the treatment train, equipment, influent and effluent sampling. The treatment system was observed to be fully operational and functioning properly. The Lakewood Water District collects influent and effluent water samples every month. These water samples are analyzed for VOCs using analytical method 524.2 with a detection limit of 0.5 ppb. The Lakewood Water District representative said that the treated water has always been clean before it is put into the distribution system. In addition, the stack emissions from the air stripping towers at the extraction wells continue to meet all technical requirements and ambient air quality standards for discharge.

VII. TECHNICAL ASSESSMENT

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

The review of documents, risk assumptions, and the results of the site inspection indicates that the remedy for the groundwater remediation is functioning as intended by the ROD and amended ROD, as modified by the ESD. The on-going groundwater treatment of Lakewood Water Districts' production wells H1 and H2, via air strippers, continues to be effective and the treated water consistently meets the drinking water system discharge criteria.

Administrative control restrictions on the installation and use of drinking water wells within the contaminated area continue to prevent exposure to, or ingestion of, contaminated groundwater. The long term response action is still in progress because the groundwater cleanup goals have not yet been achieved throughout the contaminant plume. The MCLs for PERC, TCE and cis-1, 2 DCE have not changed. Hence, the cleanup goals established for this site remain protective of human health.

No indication of potential remedy problems has been identified and no additional institutional controls or other measures have been identified. The monitoring well network provides sufficient data to assess the progress of achieving cleanup goals throughout the contaminated groundwater plume. The data indicates that it will take longer than the projected five to ten years to achieve groundwater cleanup goals.

No activities were observed that would have violated the administrative control restrictions. The groundwater treatment system (air strippers) at the Lakewood Water District production wells is secured within a locked fence. The fence around the production wells and air strippers is in tact and in good repair.

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

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards

Groundwater cleanup goals that still must be met at this time and that have been evaluated include the Safe Drinking Water Act (SDWA) (40 CFR 141.11-141.16) from which the groundwater cleanup levels were derived - [Maximum Contaminant Levels (MCLs)]. There have been no changes in these MCLs affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

There have been no changes in the exposure pathways and toxicity factors for the contaminants of concern in ground water at Lakewood. The contaminants of concern in ground water are PERC, TCE and cis-1, 2 DCE. No change to the cleanup levels developed from them is warranted. Results of water samples collected during routine monitoring well sampling indicate that cleanup levels will not be achieved by within the five to ten years previously projected. It is unknown when groundwater cleanup levels will be met.

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

There is no other information that calls into question the protectiveness remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the ROD and amended ROD, as modified by the ESD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. ISSUES

An issue identified during the 1997 five year review activities conducted by EPA, i.e. site inspection involved the visual observation of deteriorating groundwater treatment equipment/mechanical parts. This observation did not, however, affect current or future protectiveness. The issue has since been addressed by Ecology and the Lakewood Water District through the purchase and installation of new equipment/mechanical parts. Another issue identified by EPA and Ecology in 1998 involved the Year 2000 Readiness

(Y2K compliance) of the treatment equipment, computer software, etc. No other issues were identified during the previous five year reviews of 1992 and 1997.

Issues identified during this five year review include the need for Ecology to notify and remind residents, businesses and well drillers of the groundwater administrative control restrictions on the installation and use of drinking water wells within the contaminated area. This issue does not affect current or future protectiveness. No other issues were identified during this five year review.

Table B: **ISSUES**

ISSUE	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Evidence of deteriorating equipment/mechanical parts associated with the pump and treat system.	N	N
Y2K compliance of treatment equipment, computer software, etc.	N	N
Notify and remind residents, businesses and well drillers of the groundwater administrative control restrictions on the installation and use of drinking water wells within the contaminated area.	N	N

IX. Table C: **RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

Issue	Recommendations Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N) Current Future
Worn out equipment/mechanical parts associated with pump and treat system	Replaced worn out parts with new parts	Lakewood Water District	Ecology	06/30/99	N N
Y2K Compliance	Inspected all treatment equipment, computer software, etc. for Y2K compliance	Lakewood Water District	Ecology	03/31/99	N N
Groundwater administrative control restrictions	Notify and remind residents, businesses and well drillers of the groundwater administrative control restrictions on the installation and use of drinking water wells within the contaminated area.	Ecology	Ecology	09/31/07	N N

X. PROTECTIVENESS STATEMENT

All contaminated soils and sludge exceeding the site specific cleanup level of (500 ppb for PERC), were excavated and properly disposed of, eliminating the source of the groundwater contamination. It was determined that no further action at the “Soil Unit” was necessary to protect human health and the environment. EPA Region 10 delisted the Soil Unit of the Lakewood Ponders Site from the National Priorities List effective November 27, 1996.

The on-going long term response action through the treatment of ground water at Lakewood Water District public water supply wells H1 and H2, via air strippers, continues to be effective and treated water consistently meets the drinking water system discharge criteria. Because the remedial action is effective, the site is protective of human health and the environment.

Current data indicates that groundwater treatment is likely to continue beyond the five to ten years initially projected.

XI. NEXT FIVE-YEAR REVIEW

The next five-year review for the Lakewood/Ponders Corner Superfund Site is required by September 2007, five years from the date of this review.

Approved by:

James J. Pendowski, Program Manager
Toxics Cleanup Program
WA State Dept. Of Ecology
Date: _____

Michael F. Gearheard, Director
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U.S. EPA Region 10
Date: _____