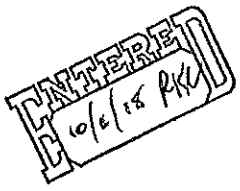
Bellevue
Lust # 2910

Interim Action Report
Tiki Car Wash

Washington State Department of Ecology
Mixed Funding LUST Sites

Prepared for

Washington State Department of Ecology
Toxics Cleanup Program
3190 – 160th Avenue Southeast
Bellevue, Washington 98008-5452



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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Regulations
AS	Air sparging
bgs	Below ground surface
BTEX	Benzene, toluene, etheylbenzene, and xylene
DRO	Diesel range organics
Ecology	Washington State Department of Ecology
EDB	1,2-Dibromoethane
EDC	1,2-Dichloroethane
EFR	Enhanced fluid recovery
Enviros	Enviros, Inc.
ERH	Electrical resistive heating
ft	Feet
GRO	Gasoline range organics
LRO	Lubricant oil range organics
MPE	Multi-phased extraction
MTBE	Methyl tertiary butyl ether
MTCA	Model Toxics Control Act
MW	Monitoring well
SVE	Soil vapor extraction
µg/L	Micrograms per liter
UST	Underground storage tank
WAC	Washington Administrative Code

1. INTRODUCTION

In accordance with the consent decree between Washington State Department of Ecology (Ecology) and Tiki Enterprises, Inc., the Tiki Car Wash site is being investigated to assess the extent and degree of petroleum contamination at the site. Numerous site investigations have been conducted since 1990 as specified Model Toxics Control Act (MTCA). The results of these investigations indicate that petroleum contaminated soil and groundwater are located on the Tiki Car Wash property, and the contaminated groundwater is migrating onto neighboring properties. This document evaluates technologies and selects one that will be used as an interim action to address contaminant migration from the site.

1.1 Purpose

The purpose of this document is to summarize the process that was used to select a remedial technology for an interim action on the Tiki property, and describe how the technology will be evaluated at the site. Because this site is a routine petroleum contamination site with limited remedial alternatives, this document is streamlined (*i.e.,* focused), and the interim action selection is limited to technologies known to be applicable for petroleum site remediation.

1.2 Report Organization

This document is organized as follows:

Section 1	Introduction
Section 2	Background
Section 3	Interim Action Goals and Objectives
Section 4	Evaluation of Interim Action Alternatives
Section 5	Selected Approach
Section 6	References.

2. BACKGROUND

The Tiki Car Wash site is a gasoline station with an exterior car washing facility located at 11909 NE 8th Street in Bellevue, King County, Washington (Figure 1). The facility was reportedly constructed in 1971 and purchased by the current owner in 1973.

2.1 Site Characterization

Numerous sites in the vicinity of the Tiki Car Wash are currently or were formerly impacted by petroleum contamination, primarily gasoline. A brief history of the site investigations is provided below. Additional history of these investigations and other impacted sites is provided in reports prepared for Ecology by Enviros (Enviros, Inc. 1993) and EA (EA 2005).

During July 1990, a consultant working for a neighboring property owner conducted an investigation of the Tiki property. Soil borings were drilled and a monitoring well was installed on the Tiki site. Results of the investigation indicated the presence of gasoline contamination on the Tiki property, however the source of the contamination was not determined.

In May 1993, soil and groundwater sampling was performed by Enviros for Ecology. Groundwater samples were collected from available monitoring wells in the site area. In addition, 10 hand augered soil borings were advanced and sampled on and adjacent to the Tiki site. One soil sample, collected from the northern portion of the site, exceeded the MTCA Method A cleanup criteria for GRO.

An air sparging (AS) and soil vapor extraction (SVE) soil and groundwater remediation system was installed by Ecology at the site in 1995, but system operations were discontinued in 1996 due to a lack of funding. The remediation system was prone to repeated shut-downs due to water accumulation in the moisture separator tank. The SVE/AS curtain was designed to prevent or limit offsite migration of contaminants and to remediate soil inaccessible for removal (Enviros, Inc. 1993). During fuel line upgrades performed prior to system installation, approximately 40 cubic yards of contaminated soil were removed from under the delivery pumps, above the tanks, and along the south and west property boundaries.

Since the early 1990s, groundwater monitoring wells were installed to delineate a plume of gasoline in groundwater, extending onto a neighboring property west of the Tiki property, owned by Bellevue Properties. The monitoring wells have been sampled infrequently and by a number of different parties during investigations of other nearby sites. Since installation, a number of wells have been damaged or abandoned. In February 2003, nearby monitoring wells were sampled by two consulting firms for different clients, not related to the Tiki Car Wash site (Hart Crowser 2003; EAI 2003). Results of the 2003 investigation conducted by Hart Crowser indicated that the plume boundary had expanded to the southwest.

On 31 May 2005, EA inspected and sampled available monitoring wells on and near the Tiki Car Wash site. Former monitoring well MW-21 had been abandoned. Nearby monitoring wells MW-2, MW-5, MW-6, MW-7 and MW-12 were found to be damaged during the redevelopment. Well casings for these wells had stood open during construction activities at the site. Monitoring wells MW-20, MW-23, and MW-29 were sampled and analyzed for GRO, BTEX, diesel range organics (DRO), methyl tertiary butyl ether (MTBE), 1,2-dichloroethane (EDC), 1,2-dibromoethane (EDB), and total lead.

In 2006, EA was able to repair monitoring wells MW-2 and MW-6; however MW-5, MW-7 and MW-12 had to be abandoned. Since then, monitoring wells MW-2, MW-6, MW-20, MW-23, and MW-29 have been sampled and analyzed for GRO, BTEX, diesel range organics (DRO), and total lead. The analytical results from the last few years are summarized on Table 1. Groundwater concentrations were highest in MW-29, the only well located on the Tiki property. In this well concentrations of GRO have fluctuated, but have remained very high (140,000 µg/L) for the last 10 years. This suggests the presence of free product and/or an ongoing release. GRO was also detected at concentration exceeding MTCA cleanup levels in monitoring wells MW-2 and MW-6.

EA's conducted a limited Geoprobe investigation in April 2006 that concentrated on identifying current contaminant concentrations in soil and groundwater. GRO and BTEX constituents were detected at concentrations exceeding the MTCA Method A cleanup levels in groundwater and soil throughout the Tiki property, and to the west and south of the site on neighboring properties. The results of the geoprobe investigation are presented in Figure 2.

2.2 Geology and Hydrogeology

A description of the site geology was presented in a 1993 report from Enviros (Enviros 1993). According to that report, the site is underlain by Holocene fill and Pleistocene Vashon Drift. The fill is a loose mixture of silt, fine to medium grained sand and gravel with occasional peat deposits. The Vashon Drift in this area varies from a weathered glacial till to a stratified alluvium. The till is an unsorted, unstratified, compact mixture of boulders, cobbles, pebbles, sand, silt, and clay.

Field investigations performed in the area indicate that the site is covered by 3 to 5 ft of fill material, underlain by at least 16 ft of weathered till-like material (Enviros 1993). The upper 3 ft of fill generally consists of fine to medium-grained gravelly sand with intermittent lenses of medium stiff clay.

Shallow groundwater underlying the site area is believed to occur within a perched water table aquifer, which is contained by impermeable glacial till. This aquifer is not used for drinking water (Enviros, Inc. 1993). Water levels reported in the site area range from about 2 to 14 ft bgs. The groundwater flow direction appears to be to the southwest.

3. INTERIM ACTION GOALS AND OBJECTIVES

The presence of contaminated soil and groundwater on the Tiki property is well documented in the site record. Consistent implementation of an interim action on the Tiki property is expected to reduce the mass of contaminants migrating onto neighboring properties.

3.1 Goals and Objectives

There are three primary goals and objectives for work at the Tiki site. These goals are:

- Remove contaminant mass from the soil on the Tiki property.
- Remove petroleum contaminants from the groundwater on the Tiki property.
- Reduce the migration of petroleum compounds in the groundwater from the Tiki property.

In addition, there are three secondary goals and objectives of an interim action on the Tiki property:

- The interim action will need to minimize impacts to the operating business.
- The interim action should not require long-term operation and maintenance since funding may not be available over the long term.
- The data collected will be used to evaluate ongoing releases at the site.

Controlling the migration of contaminants off the Tiki property will complement future remedial actions and decrease the overall site cleanup time.

3.2 ARARs

MTCA requires that all cleanup actions comply with applicable state and federal laws [Washington Administrative Code (WAC) 173-340-360(2)]. MTCA defines applicable state and federal laws to include "legally applicable requirements" and "relevant and appropriate requirements" (ARARs). A list of potential ARARs was selected and evaluated as shown in Appendix A. ARARs for the implementation of the remedial action at this site follow and are described in further detail in the table presented in Appendix A.

Federal Requirements

- Clean Water Act

- Safe Drinking Water Act (National Primary and Secondary Drinking Water Regulations) (42 U.S.C. 300f, 40 CFR Part 141, 40 CFR Part 143)
- Clean Air Act
- Resource Conservation and Recovery Act (RCRA)
- Occupational Safety and Health Act (29 CFR 1910)
- Rules for Transport of Hazardous Waste (49 CFR 107, 171).

State Requirements

- Model Toxics Control Act (WAC 173-340)
- Dangerous Waste Regulations (WAC 173-303)
- Minimum Standards for Construction and Maintenance of Wells, Regulation and Licensing of Well Contractors and Operators (WAC 173-160, 162)
- Air Pollution Control Regulations (WAC 173-400, 173-600)
- Washington Industrial Safety and Health Act, (WAC 296-62)
- Water Pollution Control Act, Chapter 90.48 RCW
- Water Quality Standards for Surface Waters of the State of Washington, (WAC 173-201A)
- Underground Injection Control (WAC 173-218)Water Quality Standards for Groundwater of the State of Washington (WAC 173-200)
- Maximum Environmental Noise Levels (WAC 173-60).

4. EVALUATION OF INTERIM ACTION ALTERNATIVES

4.1 Technology Screening

Cleanup actions at gasoline stations with petroleum contamination are well understood and commonly considered routine; however this site has physical constraints that will make application of the standard technologies difficult. As a result, the technology evaluation process focused on those technologies that meet the primary and secondary goals and objectives of the interim action (Section 3.1), and can be applied successfully at the site. A number of technologies known to be effective for petroleum remediation were considered for the Tiki property interim action as summarized below.

Cleanup Technology	Feasible Interim Action?	Discussion
Air sparging	NO	This technology was previously tried and failed at this site.
Bioremediation	NO	Bioremediation is an effective and inexpensive means to remediate low levels of petroleum contamination. However, at this site, petroleum concentrations are too high in the source area for bioremediation to be effective.
Cut off wall, sheet piles or clay barrier	NO	Installing a cut off wall would require major construction, closing the service station. Any cut off wall installed will need to either include a means for groundwater extraction to prevent pushing the petroleum contamination to other location, or will need to completely encircle the site.
Dual/Multi-Phased Extraction (MPE)	YES	This technology will allow extraction of contaminated groundwater, and free product if found on the site. Does not require long term operation and maintenance.
Electrical resistive heating (ERH)	NO	Requires shutdown of the service station
Excavation	NO	Petroleum contamination exists throughout the subsurface of the Tiki property. To adequately address the site contamination by removal, demolition and rebuilding of the service station would be required.
In-situ chemical oxidation	MAYBE	In-situ chemical oxidation is an effective and inexpensive means to remediate petroleum contamination. However it will not be effective if free product is present.
Pump and treat	NO	Silty weathered till and a thin perched aquifer limit groundwater volume and well yield. In addition, pump and treat technology requires long term operation and maintenance, which is not appropriate for a short term interim action.
Soil vapor extraction (SVE)	NO	This technology was previously tried and failed at this site. Shallow groundwater makes this technology inappropriate.

Based on this screening, the technology that has the most potential to meet the goals of the interim action is the dual/multi-phased extraction (MPE). *In-situ* chemical oxidation may be

applicable at the site, however, before implementing this option, it is important to identify whether free product exists on site. Each of these technologies is described in more detail in the following sections.

4.2 Technology Description

4.2.1 Dual/Multi-Phased Extraction

Dual or multi-phase extraction, as the name implies, simultaneously removes liquid phase (free product, contaminated groundwater) and gas phase (soil vapor) contaminants. There are a number of systems of this kind available in the marketplace. Enhanced Fluid Recovery (EFR) is one form of a multi-phased extraction system aimed at removing free product and contaminants from the smear zone. A monitoring well where free product has been observed, is connected to a vacuum truck and a vacuum is applied. Free product, contaminated groundwater, and soil vapors are drawn from the well into the truck. The water/product is hauled offsite for disposal at a permitted facility.

EFR can be a relatively inexpensive treatment method. There are no upfront costs, unless additional wells are needed. A typical EFR event lasts for one day and multiple wells can be treated at one time. EFR events typically need to be repeated at widely spaced time intervals in order to sufficiently reduce contaminant concentrations (FRTR 2006).

The effectiveness of EFR at sites with small quantities of free product and/or very high hydrocarbon concentrations, such as Tiki, can be improved by the use of a surfactant to increase the mobility of the free product and hydrocarbons adsorbed to the soil.

EFR can be also used to improve the contact of chemical oxidants and hydrocarbon contaminants.

4.2.2 In-Situ Chemical Oxidation

In-situ chemical oxidation technologies can be used for *in-situ* destruction and decomposition of petroleum contaminants. A variety of chemical oxidants and application techniques are commercially available that can be used at sites contaminated with petroleum compounds. With sufficient contact time, chemical oxidants are capable of converting the petroleum hydrocarbon mass to carbon dioxide and water, ultimately reducing concentrations of petroleum hydrocarbons in soil and groundwater. In contrast to many other remedial technologies, contaminant reduction can be seen relatively quickly (e.g., weeks or months) (EPA 2004).

While many of the chemical oxidants on the market have been used in wastewater treatment for decades, only recently have they been used to treat hydrocarbon contaminated groundwater and soil *in-situ*. Chemical oxidation technologies are predominantly used to address contaminants in the source area saturated zone and capillary fringe

At petroleum contaminated UST sites, the most commonly used chemical oxidants are hydrogen peroxide/Fenton's reagent and ozone. Sodium or Potassium Permanganate has been used, but experience with these compounds is more limited.

The performance of chemical oxidation systems are negatively impacted by the presence of free product. While the chemical reaction is capable of treating free product, the concentration of contaminants requires large quantities for the chemical oxidants. Although it may be possible to provide a sufficient dose of the chemical oxidant to breakdown the free product, it is difficult to control the contact time between the free product and the oxidant, reducing the effectiveness of the treatment process.

Hydrogen peroxide/Fenton's Reagent chemical oxidation of hydrocarbons is an exothermic reaction. At an active service station, such as Tiki, the heat generated could cause damage to pavement, and underground piping and utilities. Prior to the application of this technology the chemical oxidant shall be selected and applied with this consideration.

5. SELECTED APPROACH

The selected interim action for the Tiki property is EFR, primarily because the potential for free product at the site makes chemical oxidants ineffective. However, a pilot test is required to determine if EFR will be an effective interim action, and to determine well spacing.

The initial step of the pilot test will be to install 4 additional monitoring wells on the property to provide permanent monitoring locations in areas where the geoprobe investigation identified high petroleum concentrations in the groundwater. Wells should be installed on the north, west and east sides of the pump island canopy. A fourth well could be installed near the southern property line. These locations are presented in Figure 3. Following well installation, the wells will be developed and sampled. Groundwater collected will be analyzed in an attempt to determine the age of the fuel release.

Following well sampling, an EFR event with surfactant injection will be conducted. MW-29 and the new wells will be used in this EFR event. Water levels will be measured in surrounding wells while the test is being performed to assess drawdown effects of the test. Also, vacuum readings will be recorded from surrounding wells to assess the radius of influence the EFR is having at the site. A surfactant will be injected at the end of the first day of this EFR event. Two to three days later EFR will be used to remove the surfactant along with petroleum released from the soil.

Following the EFR event, the water level and vacuum readings will be analyzed and recommendations for the installation of additional wells will be made.

The groundwater will be allowed to equilibrate for two weeks, followed by collection of groundwater samples from the Tiki property wells and if desired, other site wells. Groundwater samples will be analyzed for GRO/BTEX. The analytical results will be used to determine if EFR is an appropriate interim action or if an additional test should be conducted adding *in-situ* chemical oxidation.

Reporting

Reports will be prepared to document the test as it will apply to an interim action. The first report will be prepared following the first EFR event. It will document the new monitoring well installation as well as the EFR with surfactant injection event. This report will include the analysis of the water level and vacuum data along with the recommendation for additional monitoring wells. Reports will be prepared following each EFR event and each groundwater monitoring event.

6. REFERENCES

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TABLE

TABLE 1. SUMMARY OF GROUNDWATER ANALYTICAL DATA, TIKI CAR WASH

Well ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (total) (µg/L)	GRO (µg/L)	DRO (µg/L)	LRO (µg/L)	MTBE (µg/L)	EDB (µg/L)	EDC (µg/L)	Lead (µg/L)
TK-MW-2	6/6/2006	2.16	0.5 U	13.4	6.32	1,410	268 D-08	485 U	NA	NA	NA	0.00100 U
TK-MW-2	9/6/2006	21.4	18.3	188	394	6,550	508 D-08	495 U	NA	NA	NA	0.00100 U
TK-MW6	6/6/2006	3,120	16,600	2,980	17,800	116,000	2,060 D-08	500 U	NA	NA	NA	0.01190
TK-MW6D*	6/6/2006	3,040	16,100	2,770	16,700	103,000	1,790 D-08	472 U	NA	NA	NA	0.01000
TK-MW6	9/6/2006	3,600	15,000	2,960	18,500	102,000	2,650 D-08	495 U	NA	NA	NA	0.01440
TK-MW6D*	9/6/2006	3,800	15,200	2,820	16,900	91,800	2,570 D-08	495 U	NA	NA	NA	0.01440
TK-MW-20	5/31/2005	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	250 U	500 U	1.00 U	0.010 U	0.200 U	0.00100 U
TK-MW20	2/13/2006	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	240 U	481 U	NA	NA	NA	0.00100 U
TK-MW20	6/6/2006	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	236 U	472 U	NA	NA	NA	0.00106
TK-MW20	9/6/2006	0.500 U	2.000 U	1.000 U	1.50 U	100.0 U	236 U	472 U	NA	NA	NA	0.00100 U
TK-MW-23	5/31/2005	0.500 U	0.806	0.500 U	1.44	50.0 U	250 U	500 U	1.00 U	0.010 U	2.00 U	0.00100 U, E
TK-MW23	2/13/2006	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	238 U	476 U	NA	NA	NA	0.00100 U
TK-MW23D*	2/13/2006	0.500 U	0.500 U	0.500 U	1.00 U	50.0 U	238 U	476 U	NA	NA	NA	0.00100 U
TK-MW23	6/6/2006	0.500 U	0.500 U, Q-41	0.500 U	1.00 U, Q-41	50.0 U, Q-41	240 U	481 U	NA	NA	NA	0.00220
TK-MW23	9/6/2006	0.500 U	2.000 U	1.000 U	1.50 U	100.0 U	243 U	485 U	NA	NA	NA	0.00100 U
TK-MW-29	5/31/2005	14,100	21,500	3,370	20,400	123,000	2,380 D-08	250 U	1.00 U	0.207 P-03	166 E	0.03240
TK-MW-29D*	5/31/2005	14,800	22,800	3,430	20,600	131,000	2,280 D-08	250 U	1.00 U	0.242 P-03	141 E	0.03310
TK-MW29	2/13/2006	8,750	17,900 E	3,450	20,400	145,000	2,630 D-08	1,660	NA	NA	NA	0.02270
TK-MW29	6/6/2006	11,300	20,600	3,690	22,300	143,000	7,370 D-08	10,900	NA	NA	NA	0.03960
TK-MW29	9/6/2006	9,030	15,200	2,650	17,100	121,000	2,680 D-08	4,850 U	NA	NA	NA	0.04940
MTCA Method A Cleanup Criteria		5	1,000	700	1,000	800/1,000	500	500	20	0.01	5	0.015

NOTES:

NA = Not Analyzed.

µg/L = micrograms per liter.

* = Duplicate Sample.

DRO = Diesel Range organics.

EDB = 1,2-Dibromoethane.

EDC = 1,2-Dichloroethane.

GRO = Gasoline range organics.

Shaded cells indicate the results exceed the cleanup criteria.

MTCA Method A cleanup level for gasoline is 800 ug/L instead of 1,000 ug/L when benzene is present.

P-03 = Greater than 40 percent difference between two dissimilar columns. After evaluation, the lower result has been reported.

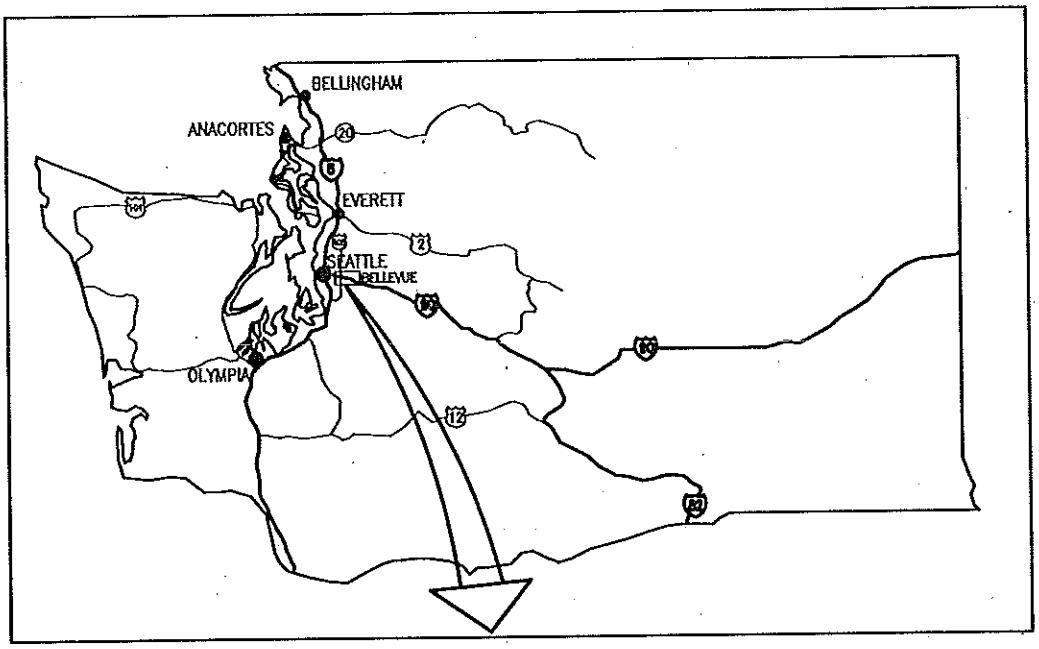
D-08 = Results in the diesel organics range are primarily due to overlap from a gasoline range product.

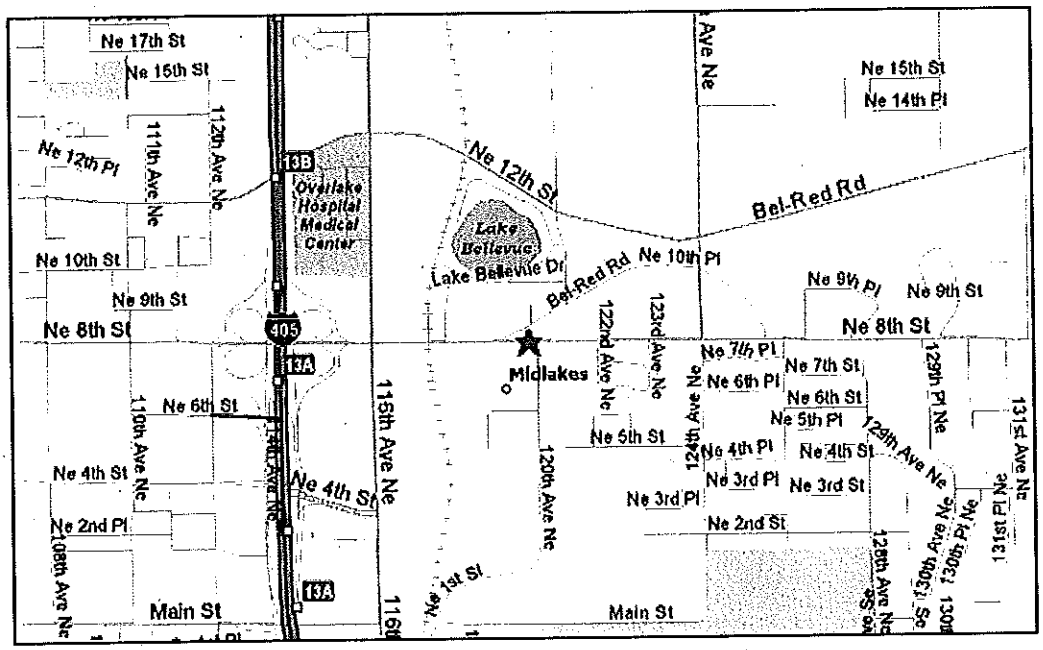
Q-41 = The analyte had a high bias in the associated calibration verification standard.

E = Estimated value. The reported value exceeds the calibration range of the analysis. For TK-MW-23 lead, the analysis was performed on an unpreserved sample.

U = Not detected at or above the specified reporting limit.

FIGURES





MAP A

Figure 1. Site Location Map, Tiki Car Wash, Bellevue, Washington

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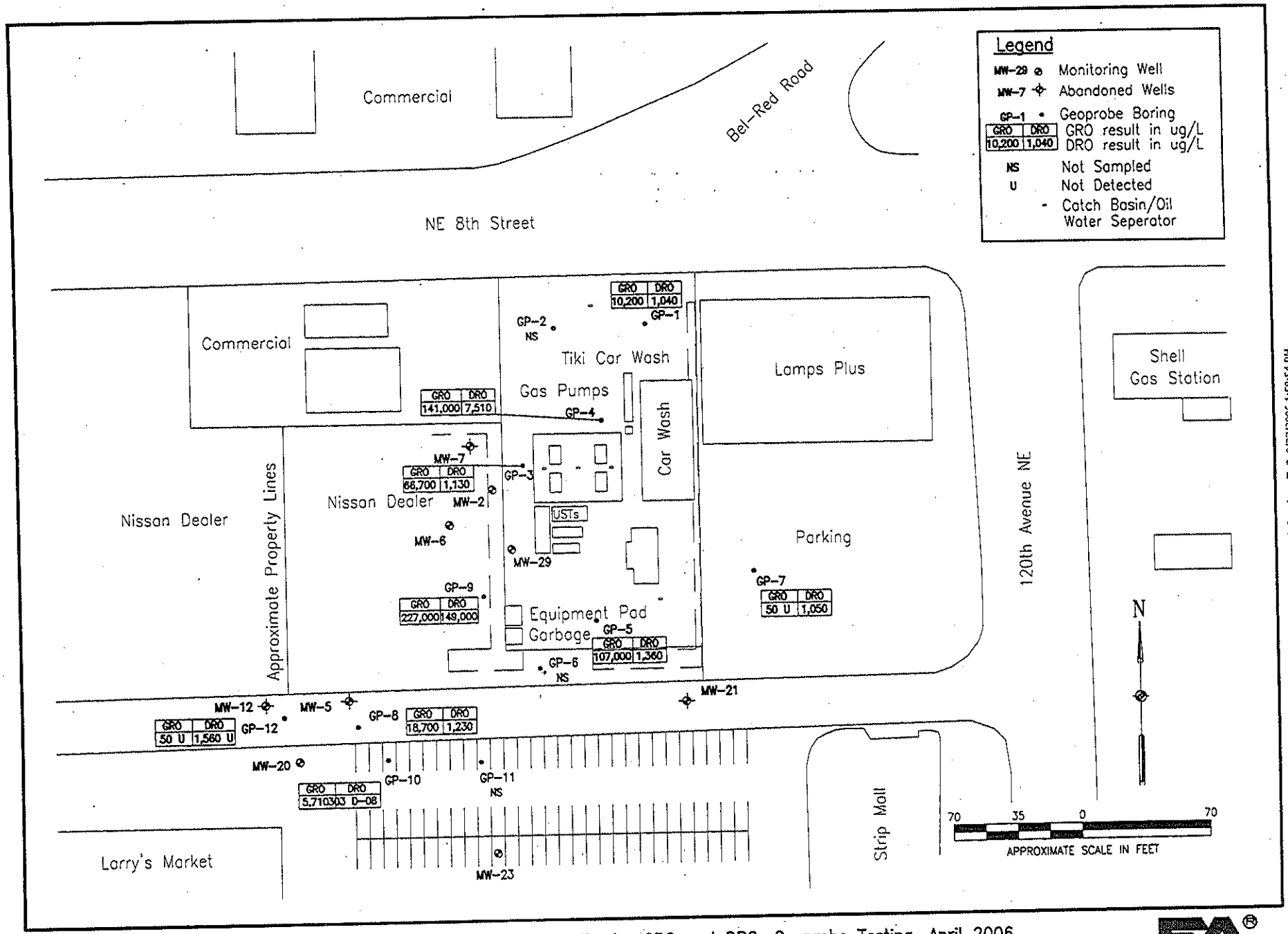

Figure 2. Groundwater Analytical Results for GRO and DRO, Geoprobe Testing, April 2006.

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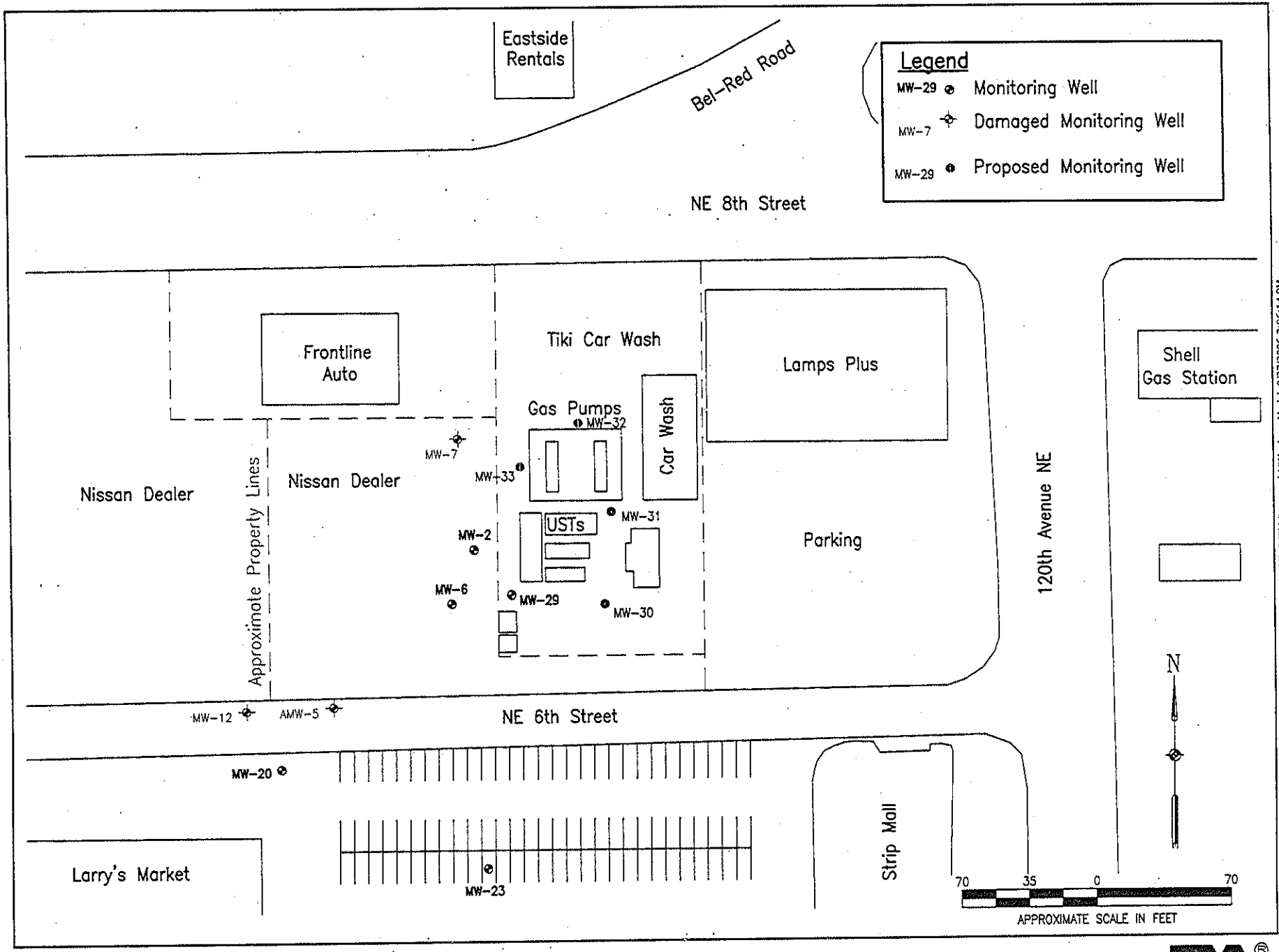

Figure 3. Proposed Monitoring/Test Well Locations – Tiki Car Wash

Appendix A

Evaluation of ARARs for Tiki Interim Actions

Evaluation of ARARs for Tiki Interim Action

Requirement	ARAR?	Rationale
FEDERAL		
Clean Water Act National Pollution Discharge Elimination System 40 CFR Part 122 The National Pollution Discharge Elimination System establishes permitting requirements, technology-based limitations and standards, control of toxic pollutants, and monitoring of effluents to assure discharge permit conditions and limits are not exceeded.	YES	Applicable if groundwater will be extracted from ground and discharged.
Safe Drinking Water Act (National Primary and Secondary Drinking Water Regulations) (42 U.S.C. 300f, 40 CFR Part 141, 40 CFR Part 143) The Safe Drinking Water Act provides a national framework to ensure the quality and safety of drinking water. The primary standards establish MCLs and MCLGs for chemical constituents in drinking water. Secondary standards pertain primarily to the aesthetic qualities of drinking water. MCLs are enforceable standards set as close to the MCLGs as feasible, considering available treatment technology.	YES	The removal action is being conducted to reduce chemical concentrations in soil and groundwater, with a goal of meeting cleanup levels at the property boundary.
Clean Air Act, as Amended (42 U.S.C. 7401) The Clean Air Act is a comprehensive law which is designed to regulate any activities that affect air quality, and provides the national framework for controlling air pollution. The National Primary and Secondary Ambient Air Quality Standards (40 CFR Part 50) set standards for ambient pollutants which are regulated within a region. The National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 61) establishes numerical standards for hazardous air pollutants.	YES	The Clean Air Act is will be required if any remediation alternatives produce air emissions.
Endangered Species Act Prohibits jeopardizing federal threatened or endangered species, or adversely modifying habitats essential to their survival.	NO	Threatened or endangered species are not known to inhabit the area around this site. Site activities will not jeopardize threatened or endangered species.
National Historic Preservation Act, Archeological Resources Protection (16 U.S.C. 470 et seq.) The National Historic Preservation Act requires that historically significant properties be protected. Establishes requirements for the preservation of historic sites, buildings, or objects of significance. Undesirable impacts to such areas must be mitigated.	NO	No historically significant structures are found at the site. All site activities will occur in a previously disturbed area. Historically significant properties will not be disturbed.

Evaluation of ARARs for Tiki Interim Action

Requirement	ARAR?	Rationale
Resource Conservation and Recovery Act (RCRA) Provides the governing regulations for owners and operators of hazardous waste treatment, storage, and disposal facilities; and for the generators and transporters of hazardous waste. In the State of Washington, the RCRA implemented by the Dangerous Waste Regulations (WAC Chapter 173-303).	YES	All waste generated during the removal action will be characterized and handled per RCRA regulations, as implemented by WAC 173-303.
Occupational Safety and Health Act (29 CFR 1910) Establishes the worker health and safety requirements for operations at hazardous waste sites.	YES	Site activities will be conducted under appropriate Occupational Safety and Health Act standards.
Rules for Transport of Hazardous Waste (49 CFR 107, 171) The U.S. Department of Transportation establishes requirements for packaging, handling, and manifesting hazardous waste.	YES	Any hazardous waste generated during site activities will be characterized as needed to determine packaging, handling, and transport requirements.
STATE		
Model Toxics Control Act RCW 70.105D The act gives Ecology authority to apply administrative processes and standards to all facilities in the State of Washington where there has been a release, or a threatened release, of a hazardous substance that may pose a threat to human health or the environment. This act is implemented by MTCA, Cleanup Regulation, Chapter 173-340 WAC. MTCA provides a means of evaluating levels of contamination, and establishing site cleanup requirements. ARARs for the conduct of the removal action under MTCA are WAC 173-340-720, Groundwater Cleanup Standards, and WAC 173-340-740, Soil Cleanup Standards.	YES	Site cleanup will be conducted in accordance with the MTCA.
Dangerous Waste Regulations (WAC 173-303) The State of Washington Dangerous Waste Regulations implements the federal hazardous waste regulations pursuant to the Resource Conservation and Recovery Act. These regulations establish requirements for the generation, treatment, and disposal of dangerous waste. These requirements might be applicable as chemical-specific ARARs, depending on the chosen remedial action. WAC 173-303 may be applicable if dangerous wastes are generated by the chosen remedial alternative.	YES	WAC 173-303 will be followed for all offsite generation, treatment, and disposal of hazardous waste (if generated during the removal action).
Minimum Standards for Construction and Maintenance of Wells, Regulation and Licensing of Well Contractors and Operators (RCW 18.104, WAC 173-160, 162) Establishes standards for the design, construction, and maintenance of water wells in the State of Washington.	YES	Wells installed to implement the removal action will be constructed under these regulations.

Evaluation of ARARs for Tiki Interim Action

Requirement	ARAR?	Rationale
Air Pollution Control Regulations (WAC 173-400), Control of New Sources of Air Toxics (WAC 173-600), and Ambient Air Quality Standards for Particulate Matter (WAC 173-470) The Washington clean air regulations were enacted to comply with the federal Clean Air Act, as amended. The intent of this act is to ensure the protection of public health and the air resources of the state. The regulation is applicable to remedial activities and establishes technical and procedural standards for the control of air contaminant sources. Limits have been established for visibility, particulate, fugitive odor, and hazardous air emissions.	YES	All substantive requirements of the State air pollution control regulations will be followed during implementation of the remedial action.
Washington Industrial Safety and Health Act, Chapter 296-62 WAC Regulations guiding worker safety during the implementation of sampling efforts and/or remedial actions.	YES	Site activities will be conducted under appropriate Washington Industrial Safety and Health Act standards.
Water Pollution Control Act, Chapter 90.48 RCW This act prohibits the discharge of pollutants into water.	YES	Applicable if effluents are to be discharged from the treatment facility during implementation of the remedial action.
Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC The State of Washington has adopted the Federal Water Quality Criteria for Toxic Substances. These criteria are applied to all surface waters, regardless of the designated use of the water body.	YES	Applicable if effluents are to be discharged from the treatment facility during implementation of the remedial action.
Underground Injection Control (WAC 173-218) Limits injection into aquifers to protect groundwater for beneficial uses.	YES	Potentially applicable if substances are injected (re-injected) into groundwater during implementation of the remedial action.
Water Quality Standards for Groundwater of the State of Washington (WAC 173-200) The State of Washington has adopted these standards to ensure groundwater is protected.	YES	Establishes MCLs for groundwater.
Maximum Environmental Noise Levels (WAC 173-60) These rules are adopted pursuant to chapter 70.107 RCW, the Noise Control Act of 1974, in order to establish maximum noise levels permissible in identified environments, and thereby to provide use standards relating to the reception of noise within such environments.	YES	Relevant depending on remedial action selected
LOCAL		
Building Codes, Erosion Control Permits, Shoreline Management Act	YES	Local permits are required depending on the selected remedial action.

Evaluation of ARARs for Tiki Interim Action

Requirement	ARAR?	Rationale
NOTE: ARAR = Applicable or Relevant and Appropriate Requirement. MCL = Maximum Contaminant Level. MCLG = Maximum Contaminant Level Goal.		