AMENDED CLEANUP ACTION PLAN

Tiger Oil Facility
2312 West Nob Hill Boulevard
Yakima, Washington

Prepared by

Department of Ecology
Toxics Cleanup Program, Central Regional Office
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1.0 Introduction

1.1 Purpose

The purpose of this Amended Cleanup Action Plan (Amended CAP) is to identify the cleanup actions agreed upon by the Department of Ecology (Ecology) and the City of Yakima (Yakima) for the remediation and monitoring of contaminated groundwater and soils at the Tiger Oil Site (Site), located at 2312 West Nob Hill Boulevard, Yakima, Washington. This Amended CAP has been developed in accordance with the Model Toxics Control Act, RCW 70.105D (MTCA), and Chapter 173-340 of the Washington Administrative Code (WAC).[1] In accordance with WAC 173-340-360(2)(a), the selected cleanup actions meet the threshold requirements at the defined points of compliance; are protective of human health and the environment; comply with remedial action levels; comply with applicable state and federal laws; and provide for compliance monitoring.

This CAP outlines the cleanup action alternatives presented in the following documents:

- *Draft Revised Remedial Investigation/Feasibility Study, Tiger Oil Facility*, Kleinfelder, 1994.
- *Feasibility Study Addendum, Tiger Oil Facility*, Clearwater Group, Inc., 1997.
- *Draft Cleanup Action Plan, Tiger Oil Facility*, Foster Wheeler Environmental Corporation, 1998.
- *Draft Proposal for Remediation of Contamination at Tiger Oil Facility*, Foster Wheeler Environmental Corporation, 2001.

This CAP specifies the cleanup actions to take place at the Site. These cleanup actions include:

- Removal of all underground storage tanks (USTs), associated lines, and dispensers.
- Removal of petroleum contaminated soils (PCS).
- Free product investigation and possible removal through trenching
- Possible installation of a soil vapor extraction (SVE) system.
- Possible use of hydrogen peroxide or Oxygen Release Compound (ORC) to enhance aerobic degradation including possible installation of an infiltration gallery or manifold to remediate groundwater.
- Monitored Natural Attenuation (MNA)

In accordance with WAC 173-340-360, Ecology has selected the above cleanup actions based upon site-specific data provided in the following documents, which are on file at the Washington State Department of Ecology, Central Regional Office. These documents have been used either directly or by reference in the writing of the CAP:

Draft Revised Remedial Investigation/Feasibility Study, Tiger Oil Facility, Kleinfelder, 1994.

Revised Interim Remedial Action Plan, Clearwater Group, Inc., 1994.

Work Plan for Interim Remedial Action, Clearwater Group, Inc., 1994.

[1] This Cleanup Action Plan is based on the revised WAC 173-340, which became effective on August 15, 2001.

System Operation and Maintenance Plan, Clearwater Group, Inc., 1995.

Remedial System Installation, Startup and Monitoring Report, Tiger Oil Facility, Clearwater Group, Inc., 1996.

Feasibility Study Addendum, Tiger Oil Facility, Clearwater Group, Inc., 1997.

Draft Cleanup Action Plan, Tiger Oil Facility, Foster Wheeler Environmental Corporation, 1998.

Quarterly Monitoring Reports, Clearwater Group, Inc., QUEST, Foster Wheeler Environmental Corporation, 1997, 1998, 1999, 2000, 2001.

Tiger Oil Corporation's Draft Proposal For Remediation of Contamination at Tiger Oil Facility, 24th and West Nob Hill Blvd., Foster Wheeler Environmental Corporation, 2001.

All of the above mentioned firms are environmental consulting businesses hired by one or more of the potentially liable persons (PLPs) at the Site.

To review or obtain copies of the above documents, contact Jackie Cameron (Public Disclosure Coordinator) at Ecology's Central Regional Office in Yakima, Washington, at (509) 454-7658.

1.2 Cleanup Action Ownership

Yakima is responsible for the overall implementation and maintenance of the cleanup action. Yakima is performing the actions in this Amended CAP pursuant to the Amended Consent Decree, No. 02-2-00956-2 (Decree), entered with the Thurston County Superior Court. This CAP is Exhibit B to the Decree. The Tiger Oil Corporation (New Tiger) and Federated Service Insurance Company (Federated) are also parties to the Decree, but are not performing any of the work in this Amended CAP.

2.0 Background

2.1 Site Location and Description

The Tiger Oil Site (Site) is located in Yakima, Washington, at the southeast corner of the intersection of West Nob Hill Boulevard and South 24th Avenue within the NW ¼, SE ¼ of Section 26, Township 13 North, and Range 18 E.W.M. In this CAP, the terms "Site" and "Facility" are used interchangeably. According to WAC 173-340-200, "Facility" means any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well,…; or any site or area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. The Site is comprised of the Tiger Mart retail gasoline store and its underground storage tank system, monitoring wells and recovery wells, and any other areas where hazardous substances have come to be located, including, but not limited to, the soil, groundwater, and petroleum-contaminated surface water/captured groundwater in the Yakima

County Drainage Improvement District storm drain line #4 (DID line #4). The Site includes the Argo Yakima LLC property where the Safeway Shopping Center parking lot located in the eastern and southeastern portions of the Site, the property, the KSKC Properties LLC property located to the south of the Tiger Mart property, and the Three Sisters Holdings LLC restaurant property located to the east of the Tiger Mart property. Figure 1, attached, shows a map of the Site.

2.2 Hydrogeology/Geology

Depth to groundwater fluctuates from 5 to 15 feet below ground surface (b.g.s.) depending on the time of year, with an overall average of 10-12 feet b.g.s. Higher groundwater levels occur in the spring and summer; these correspond with an influx of water due to local and regional irrigation practices. The estimated rate of groundwater flow is 0.08 ft/day to 0.6 ft/day (Kleinfelder, 1994). Geology of the Site consists of silty/clayey to silty/sandy sediments coarsening downward to sandy/gravelly sediments that begin at about 15-25 feet b.g.s., depending on site location. More detailed hydrogeologic and geologic information is located in the RI/FS (Kleinfelder, 1994).

2.3 Site History

2.3.1 Release at Site and Early Investigations

In the early 1980s, petroleum products were released from the underground storage tank system at the Site. These free petroleum products (free product) contaminated the soil, groundwater, surface water/captured groundwater in DID line #4.

In April 1981, an explosion occurred in the DID line near the Site, injuring two City of Yakima workers. The explosion likely resulted from the presence of explosive levels of gasoline vapors in the line, caused by the presence of gasoline in and around the DID line. Initial investigations of the Site were conducted by Ecology and the City of Yakima between December 1980 and September 1982. These investigations resulted in locating a release of hazardous substances (petroleum products) from the Tiger Bin retail facility. On October 7, 1982, Ecology issued Enforcement Order No. DE 82-517 to Tiger Oil Company that required recovery of floating petroleum product and other remedial activities.

In a letter to Ecology dated May 18, 1983, Zaremba Claims, an independent claims adjuster, estimated that approximately 18,772 gallons of petroleum product had been released at the Site in 1982. Known additional releases of 2,000 gallons (Zaremba Claims) and 50 gallons (Kleinfelder, 1994) of petroleum product occurred in 1983 and 1984, respectively.

Federated contracted with Crowley Environmental (September 1982 to March 1983), Fuel Recovery Company (April 1983 to May 1985), and Soil Exploration Company (May 1985 to September 1985) for further investigation and petroleum product recovery.

In February 1989, staff from Riebe Well Drilling notified Ecology that they had discovered free petroleum product in monitoring wells at the Site. In July 1989, during an Ecology investigation, free petroleum product was found in monitoring wells MW-9, MW-11, MW-13, and MW-15. In

March 1990, Ecology issued Enforcement Order No. DE 90-C140, pursuant to MTCA, to New Tiger, who had purchased the gas station from the Tiger Oil Company in October 1987. The order required site stabilization and a Remedial Investigation/Feasibility Study (RI/FS). Subsequently, Enforcement Order No. DE 90-C140 was amended to include Tiger Oil Corporation and Federated Insurance.

In November 1990, New Tiger began recovery of free product through bailing. In September 1994, Ecology issued Enforcement Order No. DE 94TC-C432 to New Tiger , Tiger Oil Company, Federated, and M & E Company requiring installation of a free product recovery system designed to collect product, contaminated groundwater, contaminated soil vapors, and prevent contaminant migration into the DID line offsite. An interim remedial system consisting of a soil vapor extraction (SVE) and groundwater extraction (GWE) system commenced operation in August 1995. Additional information on the interim action is addressed later in this report.

In September 1998, Ecology issued Enforcement Order No. DE 98TC-C166 to all PLPs requiring the planning and implementation of a final cleanup action at the Site.

Free product levels near the UST system, as measured in MW-11, located at the southeast corner of the property, decreased from 1992-1998, increased from 1998-2001, and have decreased from 2001-2003.

2.3.2 Interim Remedial Action

Design and implementation of an interim remediation system occurred in August 1995. Clearwater Group, Inc. (Clearwater) oversaw design, installation and operation of the system until May 1997 when New Tiger hired QUEST, who oversaw system operation until April 1998. Since September 1998, Foster Wheeler has been in charge of overseeing operation of the interim remediation system. Periodically, the system has been shut down for repairs or due to the weather.

The interim remediation system was installed as a method of preventing off-site migration of free product. The system consisted of two trenches fitted with vacuum equipment designed to extract groundwater (groundwater extraction, GWE) and soil vapors (soil vapor extraction, SVE) from the subsurface and transport them to an on-site treatment facility. The treated water was discharged into the municipal sanitary sewer system, and vapors were passed through an air filter before being vented to the atmosphere. For a more detailed description of the interim treatment process, refer to the *Remedial System Installation Startup and Monitoring Report* (Clearwater, 1996).

In the *Remedial System Installation, Startup and Monitoring Report* (1996) submitted to Ecology, Clearwater stated that the interim remediation system was effective at removing contaminants from the subsurface and limiting contaminant migration into the DID line. In the *Groundwater Monitoring and Remediation System Report for 2nd Quarter, 1997,* Clearwater presented data indicating that approximately 1843 lbs. of hydrocarbons, 42 lbs. of which were benzene, had been extracted from the subsurface by the combined GWE/SVE system. In the

same report, Clearwater recommended that the combined GWE/SVE system remain in operation to protect the DID line from contaminants.

Although the interim remediation system was effective, it was limited in its scope. The location of the interim remediation system is presented in Figure 1. The radius of influence was calculated by Clearwater (1996) to be approximately 75 feet for the GWE system and approximately 50 feet for the SVE system. Whereas the system may be adequate for remediating the subsurface of portions of the Safeway parking lot, it did not target the areas where free product is present on the Tiger Oil property. According to WAC 173-340-450 (4)," …the UST owner or UST operator shall: Conduct free product removal to the maximum extent practicable and in a manner that minimizes the spread of hazardous substances, by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site. The objective of free product removal system must be, at a minimum, to stop the free product migration." The interim remediation system does not adequately address free product removal onsite. Therefore, the interim remediation system was not approved as a final cleanup action.

2.3.3 Actions Post September 2004

In October 2004, New Tiger and Federated entered into the 2004 Consent Decree (Decree) with Ecology, which was filed in Thurston County Superior Court on October 29, 2004. The 2004 Decree required implementation of Ecology's 2004 Cleanup Action Plan.

Under the 2004 Cleanup Action Plan, New Tiger was required to: (1) remove from the Site underground storage tanks (USTs), a minimum of 650 cubic yards of contaminated soils, and gasoline encountered during underground storage tank removal; (2) dig two trenches to determine the amount of gasoline floating on top of groundwater; and (3) install and operate a soil vapor extraction (SVE) system to treat contamination in the vicinity of the trenches (if free product and/or soil contamination was found present during or after trenching).

Between December 20 and 22, 2004, New Tiger removed the USTs, dug two trenches, discovered free product, and installed SVE piping on the New Tiger Parcel.

During sampling at the Site in April 2009, MW-7 contained 2.71 feet of free product and MW-11 contained 1.06 feet of free-phase gasoline.

3.0 Cleanup Alternatives

3.1 Cleanup Action Alternatives

The following is a brief description of the cleanup action alternatives presented in the RI/FS submitted by Kleinfelder (1994), which can be referred to for more detailed information.

K1) *Surface Capping/Compliance Monitoring*: This alternative consists of capping the Site with asphalt pavement and monitoring the Site. Restrictions would be placed on actions requiring soil excavation and groundwater removal from the Site.

K2) *In Situ Soil Vapor Extraction*: For this alternative, steps listed in K1 would be completed. In addition, an in situ soil-vapor extraction system would be installed to remove volatile vapors from the subsurface and transport them to an on-site treatment facility for processing. Oxygen would be injected into the subsurface in order to enhance aerobic biodegradation at the Site.

K3) *Air Sparging*: This alternative combines steps taken in alternatives K1 and K2 with installation of an air sparging system. This process involves injecting air into the subsurface below the water table. As air bubbles move upward through the groundwater, contaminants in the groundwater are volatilized and transported from the subsurface, through vacuum, to an on-site treatment facility.

The following additional alternatives were proposed in the FS Addendum presented by Clearwater Group, Inc. (1997), which can be referred to for more detailed information.

C1) *Vacuum Enhanced Total Fluids Recovery/Soil Vapor Extraction and Bioventing Wells*: This cleanup action consists of the installation of two horizontal slotted SVE wells and eight passive bioventing wells. A vacuum is used to draw free product, contaminated groundwater, and vapors out of the subsurface where they are directed to an on-site treatment facility and passed through an air/water separator. The groundwater mixture is passed through a coalescing oil/water separator and an air stripper for treatment before being discharged into the sanitary sewer system. Vapors are passed through an air filter before they are vented to the atmosphere. Bioventing wells would be installed to enhance the movement of air through soil and also allow for introduction of oxygen into the subsurface to enhance naturally occurring aerobic degradation. In addition, this alternative proposes that ORC (oxygen release compound) be injected in selective wells in order to enhance aerobic degradation.

C2) *Removal and Treatment or Disposal of Petroleum Contaminated Soils*: This alternative consists of excavating approximately 33,349 cubic yards of soil in the area of the dispenser islands at the Tiger Mart gas station extending out into the Safeway parking lot to the DID line. An estimated 27,088 cubic yards of this is contaminated soil that would be treated by thermal desorption or disposal in a landfill. Any water encountered during soil excavation at the Site would be treated to remove contaminants.

C3) *Air Sparging/Soil Vapor Extraction*: This alternative is similar to alternative K3. It calls for modifications to be made on the existing interim remediation system and for ORC injections into selected areas of the subsurface to enhance aerobic degradation.

The following additional alternative was proposed in the draft Cleanup Action Plan presented by Foster Wheeler (1998), which can be referred to for more detailed information.

F1) *Hydrogen Peroxide/ORC Injection and Monitoring*: This alternative consists of injecting hydrogen peroxide or other ORC mixtures into the subsurface to enhance aerobic degradation and chemical oxidation of contaminants at the Site. This would be done in conjunction with monitoring groundwater at the Site.

In addition to the above cleanup action alternatives, New Tiger presented a Draft Proposal for Remediation of Contamination at the Tiger Oil Facility (Foster Wheeler) to Ecology on June 1, 2001. The cleanup actions proposed in this document were:

- Removal of underground storage tanks (USTs), lines, and dispensers.
- Removal of petroleum contaminated soil (PCS) from the tank pit.
- Free product investigation through trenching or digging test pits.
- Free product removal.
- Installation of vertical risers.
- Possible design and installation of a SVE system, with additional excavation and disposal of PCS offsite, if necessary.
- Possible use of hydrogen peroxide and/or ORC to enhance degradation in areas that remain contaminated.

Finally, the following alternative was considered by Ecology:

Monitored Natural Attenuation: this alternative includes a variety of physical, chemical and/or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of hazardous substances in the environment. These in situ processes include: natural biodegradation; dispersion; dilution; sorption; volatilization; and, chemical or biological stabilization, transformation, or destruction of hazardous substances.

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- Interim Action, including demolition of the existing building and removal of PCS;
- Possible vapor intrusion investigation into buildings which will be occupied post remediation that are located within the Site;
- Possible use of hydrogen peroxide and/or ORC mixture(s) and/or other Ecology-approved in-situ treatment amendments including installation of infiltration manifolds or galleries ; and
- Possible installation and operation an SVE system.
- Monitored Natural Attenuation

PCS shall be excavated as dictated by the terms of Exhibit G to the Decree. *See* Exhibit G. Confirmation sampling and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan. Laboratory analyses shall be for all analytes associated with petroleum contamination. *See* Table at -830(1). Clean overburden soils may be used as post-interim-action backfill if approved by Ecology.

Waste soils shall be designated and transported to an accepting, permitted landfill or an Ecology approved soil treatment facility. All transported contaminated soil loads shall be covered. All contaminated soil shall be transported from the Site in dump trucks that use a tarp covering system.

Once excavation is completed and contaminated soil has been transported off-site, the excavation shall be filled with clean fill, graded, and compacted to the satisfaction of the Ecology.

3.2 Selected Cleanup Actions

Ecology has selected the following cleanup actions for the Site. The cleanup actions selected are those listed in the 2014 Cleanup Alternative.

3.2.1 Removal of PCS

In December of 2004, New Tiger removed PCS it encountered during UST, line, and dispenser removal. PCS removal consisted of removing approximately 650 cubic yards of PCS. The 650 cubic yards did not include the clean overburden excavated. Removal of additional PCS was authorized under the 2004 CAP.

An Interim Action shall result in excavation and removal of all accessible PCS saturated with LNAPL or containing concentrations of gasoline-range hydrocarbons as specified in Table 1 of the CAP that does not compromise the integrity of existing occupied buildings that will continue in use after completion of the soil removal, city or private infrastructure (streets, sidewalks, etc.) and/or soils than cannot be effectively removed due to groundwater levels at the time of this removal action. PCS encountered during excavation shall be stockpiled, sampled and managed according to Table 1.

Yakima shall remove the existing Tiger Mart convenience store building, which is necessary for the removal of PCS from underneath the building. Yakima shall submit plans for PCS removal and building removal to the Ecology Project Coordinator. Ecology shall review the proposal, provide comments and Ecology must approve any remedial actions before implementation.

During PCS excavation, Yakima will remove any free product encountered and dispose of the free product in a legally appropriate manner. Ecology must approve the disposal method(s) selected.

During PCS removal, soil samples from the excavated area and stockpiled soil will be taken in accordance with guidelines set forth in *Guidance for Remediation of Petroleum Contaminated Soils*, Washington State Department of Ecology Toxics Cleanup Program Publication No. 10-09-057, September, 2011 and *Guidance for Site Checks and Site Assessments for Underground Storage Tanks*. Pursuant to the Decree, Ecology and Yakima may take split samples at the site during PCS removal activities and trenching, in addition to other sampling activities that may take place at the Site.

Table 1. Tiger Oil Site PCS End Use Criteria

		Soil Concentration (mg/Kg)	
Analyte	**Method**	**Backfill***	**Treatment or disposal required**
heavy fuel	NWTPH-Dx	≤ 2000	> 2000
diesel	NWTPH-Dx	≤ 2000	> 2000
gasoline	NWTPH-Gx	≤ 30	> 30
benzene	8020 or 8021	≤ 0.03	> 0.03
ethylbenzene	8020 or 8021	≤ 6	> 6
toluene	8020 or 8021	≤ 7	> 7
xylene	8020 or 8021	≤ 9	> 9

*Backfill: Used for backfill on the Tiger Oil Site .

Values in this table were obtained from Table V in *Guidance for Remediation of Petroleum Contaminated Soils*, Washington State Department of Ecology Toxics Cleanup Program Publication No. 10-09-057, September, 2011.

3.2.2 Possible Installation and Operation of a Soil Vapor Extraction (SVE) System

Should free product be discovered beneath structures that will be occupied post remediation, installation of an SVE system may be necessary. Should SVE installation be necessary, the system shall be engineered to have sufficient radius of influence to remediate the hot spot contamination. Alternative methods to address protection of structures from vapor intrusion may be proposed by Yakima, and will be considered by Ecology.

3.2.3 Hydrogen Peroxide Injection and/or ORC

Hydrogen peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments may be added to the Site to enhance degradation of contaminants. Hydrogen peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments may also be injected/placed into the subsurface at or down-gradient of the source area, as a way of enhancing biodegradation of contaminants. Placement or injection of in-situ treatment amendments may utilize direct, one-time injections, or may utilize installed wells, piping/manifolds or infiltration galleries. Should Yakima decide to add hydrogen peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments, it shall submit an engineering plan to Ecology for review and approval. Existing monitoring wells specified for quarterly or other compliance sampling may not be used as hydrogen peroxide or ORC injection wells.

The above cleanup actions are to be used in conjunction with the existing institutional controls.

3.2.5 Monitored Natural Attenuation

MNA may be allowed for this site

MTCA allows for natural attenuation when:

(1) Source control (including removal and/or treatment of hazardous substances) has been conducted to the maximum extent practicable;
(2) Leaving contaminants on-site during the restoration time frame does not pose an unacceptable threat to human health and the environment;
(3) There is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site; and
(4) Appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.
(5) MNA will be effective in cleaning up the site in a reasonable restoration time frame.

WAC 173-340-370(7). The engineering design report to be written in accordance with this CAP shall include documentation that ensures compliance with WAC 173-340-370(7).

3.3 Monitoring Wells

Any monitoring wells removed during the remediation activities listed in this Amended CAP may need to be replaced. Yakima shall submit a monitoring well replacement plan within 30 days following any remediation activity that destroys or removes any monitoring wells at the Site. Yakima must respond to Ecology's review comments and produce an approved monitoring well replacement plan within 15 days following receipt of Ecology's review comment, and implement the plan within 30 days of Ecology approval of the plan.

4.0 Exposure Assessment

4.1 Chemicals of Concern

Chemicals of concern in the groundwater and soil at the Site include the compounds listed in Table 830-1 of WAC 173-340-900. These compounds are present above the Method A cleanup levels for groundwater found in Table 720-1, WAC 173-340-900 (List report from 2013 *Results of Groundwater Monitoring (September 2001) at Tiger Oil Corp. Facility, 2312 West Nob Hill Boulevard, Yakima, Washington*, Foster Wheeler, November 2001). If the presence of diesel range contaminants at concentrations above MTCA Method A levels are found in soil samples taken during PCS removal, then total petroleum hydrocarbons as diesel (TPH-D) will be added to the list of chemicals of concern for the Site.

4.2 Exposure Pathways

There is potential for humans to be exposed to contaminants at the Site through exposure to contaminated subsurface soil, groundwater, and vapors.

Subsurface soil: Activities that involve soil excavation may lead to contaminant exposure to humans through inhalation, ingestion, and dermal contact. The most likely population to be affected by this exposure pathway is utility workers and those participating in the installation of wells and remedial measures.

Groundwater: There is potential for humans to come into contact with groundwater during excavations at the Site. The most likely population to be affected by this exposure pathway are utility workers and those participating in the installation of wells and remedial measures. There is also the potential for contaminants dissolved in the groundwater to be transported offsite via the DID line that runs through the Site and discharges into surface water (Wide Hollow Creek). Contamination has impacted the shallow unconfined aquifer at the Site. Although residential wells in the area are not used for drinking water purposes, humans may come into contact with contaminants dissolved in the groundwater when using water from these wells for other purposes.

Vapors: There is potential for humans to come into contact with hazardous vapors that volatilize from soil and groundwater, for those who work in buildings located within the Site and those individual conducting the excavation of soil at the Site. In addition, contaminant vapors can pose a threat to human health and the environment when they are present at concentrations in confined spaces that exceed NIOSH (National Institute for Occupational Safety and Health) and/or OSHA (Occupational Safety and Health Administration) permissible exposure limits, or at high enough concentrations to create conditions that may lead to explosions. The most likely population to be affected by this exposure pathway is utility workers, those participating in the installation of wells and remedial measures and those who work in buildings within the Site.

During any Site activities, steps should be taken to minimize the risk to workers and the public. These steps will be outlined in the Safety and Health Plan.

5.0 Terrestrial Ecological Evaluation

This site is excluded from a terrestrial ecological evaluation based on WAC 173-340-7491(1)(b), which states, "All soil contaminated with hazardous substances is, or will be, covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to the soil contamination. To qualify for this exclusion, an institutional control shall be required by the department under WAC 173-340-440." This site will have appropriate institutional controls. Institutional controls are described in section 7.

6.0 Cleanup Standards

6.1 Cleanup Level

Method A cleanup levels for groundwater and soil, as described in sections -720 and -740 of WAC 173-340, were selected for the Site. Table 2 lists Method A cleanup levels for groundwater and soil for chemicals of concern at the Site.

Table 2. Method A cleanup levels for groundwater (WAC 173-340-900, table 720-1) and soil (WAC 173-340-900, table 740-1).

	Groundwater (μg/L)	**Soil** (mg/kg)
Benzene	5	0.03
Toluene	1000	7
Ethylbenzene	700	6
Xylenes	1000	9
TPH-G	800	30

Reasons for using Method A levels for groundwater and soil at the Site are as follows:

WAC 173-340-720(1)(a) states, "Ground water cleanup levels shall be based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site conditions." Due to private wells in the area, and the fact that groundwater discharges into the DID line and impacts surface water in Wide Hollow Creek, there is potential in the future for groundwater at the Site to be used for ingestion or other domestic uses. There is also potential for humans to be exposed to this groundwater. Therefore, Method A cleanup levels were chosen for the Site.

WAC 173-340-704(1) states, "Method A may be used to establish cleanup levels at sites that have few hazardous substances and that meet one of the following criteria: (a) Sites undergoing a routine cleanup action as defined in WAC 173-340-200; or (b) Sites where numerical standards are available in this chapter or applicable state and federal laws for all indicator hazardous substances in the media for which Method A cleanup levels are used."

6.1.1 Routine Cleanup Action

This site fulfills the requirements for undergoing a routine cleanup action, as defined in WAC 173-340-200. Following are a list of criteria to determine if a site is undergoing a "routine cleanup action," and how the cleanup actions for the Tiger Oil Site fulfill those criteria.

- *Cleanup standards for each hazardous substance addressed by the cleanup are obvious and undisputed, and allow for an adequate margin of safety for protection of human health and the environment.* – The cleanup standards for each hazardous substance at the Site are Method A cleanup levels, which allow for an adequate margin of safety for protection of human health and the environment.

- *It involves an obvious and limited choice among cleanup alternatives and uses an alternative that is reliable, has proven capable of accomplishing cleanup standards, and with which the department has experience.* – The selected cleanup actions, PCS removal, free product removal, possible SVE, and possible hydrogen peroxide injection and/or ORC use, have been proven to be successful at remediating sites.

- *The cleanup action does not require preparation of an environmental impact statement; and the site qualifies under WAC 173-340-7491 for an exclusion from conducting a simplified or site-specific terrestrial ecological evaluation, or if the site qualifies for a simplified ecological evaluation, the evaluation is ended under WAC 173-340-7492(2) or the values in Table 749-2 are used.* – This cleanup action does not require preparation of an environmental impact statement. The site qualifies under WAC 173-340-7491(1)(b) for an exclusion from conducting a site-specific terrestrial ecological evaluation.

6.1.2 Numerical Standards

This site also fulfills requirement WAC 173-340-704(b)(1) because numerical standards are available in Tables 720-1 and 740-1, WAC 173-340-900, for all indicator hazardous substances in the media for which Method A cleanup levels are used.

6.2 Clean Site Determination

To determine if Method A cleanup levels for groundwater, as defined in Table 2, have been met at the Site, four consecutive quarters or more of sampling shall commence upon the completion of the active remedial measures described in section 3.0. Whether more than four quarters of samples will be required will depend on Site specific conditions as determined by Ecology. Groundwater at the Site shall be considered clean when Method A cleanup levels for groundwater in WAC 173-340-720 (groundwater) and WAC 173-340-740 (soil), have been met for the Ecology determined amount of sampling events at all points of compliance described in this CAP.

Soil at the site shall be considered clean when Method A cleanup levels in soil are reached at the points of compliance.

6.3 Points of Compliance

6.3.1 Groundwater

Standard points of compliance shall be used to determine completion of remedial actions. *See* WAC 173-340-720(8)(b). To ensure that groundwater in the contaminant plume is reaching the established MTCA Method A cleanup levels, monitoring and reporting shall occur as specified in Sections 9.1 through 9.3 of this CAP.

6.3.1.1 Soil

WAC 173-340-740(6)(b) states, “For soil cleanup levels based on the protection of ground water, the point of compliance shall be established in the soils throughout the site.” Points of compliance for the Site include all areas where contaminants have come to be located.

7.0 Institutional Controls

Institutional Controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at the Site (WAC 173-340-440(1)).

7.1 Types of Institutional Controls

Institutional controls that shall be implemented for the Site include installation of physical measures such as fences, signs, and locks to prevent tampering with on-site wells, monitoring, and remediation equipment. Regular inspections of implemented institutional controls will be conducted and repairs made if necessary. Education of employees and the public about site contamination and ways to limit exposure are also forms of institutional controls to be conducted at the Site. A restrictive covenant pursuant to the requirements of WAC 173-340-440(9) and approved by Ecology has been recorded for this Site.

7.2 Placement of Institutional Controls

Institutional controls will be in place on all areas of the Site where cleanup levels have not been attained for soil and groundwater. If it is determined that cleanup levels for soil and groundwater have been attained in a portion of the site that is delineated by property boundaries, institutional controls may be removed from that property with the following limitations:

- Institutional controls will remain in place to prevent tampering with monitoring wells.
- Institutional controls will remain in place to prevent tampering with any equipment associated with the cleanup actions at the site.

8.0 Cleanup Actions

8.1 Selected Cleanup Actions

The cleanup actions selected for the Site shall fulfill the threshold requirements put forth in WAC 173-340-360(2)(a), which include protecting human health and the environment, complying with cleanup standards, and complying with applicable state and federal laws. Other requirements in WAC 173-340-360(2)(b) state the selected action shall use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns.

Between December 20 and 22, 2004, New Tiger removed the USTs dug two trenches, discovered free product, and installed SVE piping on the New Tiger Parcel.

The cleanup actions selected for the Site include removal of Underground Storage Tanks (USTs, completed), removal of petroleum contaminated soils (PCS), removal of free product, possible installation and use of an SVE system or other soil vapor control methods, and possible use of hydrogen peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments to

enhance aerobic degradation, and monitored natural attenuation (MNA). **These cleanup actions are to be used in conjunction with the current institutional controls.**

8.2 Justification for Selected Cleanup Action

Justification for the selected cleanup actions is provided in the following sections that detail how the cleanup actions fulfill the requirements for a cleanup action set forth in WAC 173-340-360.

8.2.1 Threshold requirements – WAC 173-340-360(2)(a)

- *Protection of Human Health and the Environment*
  The selected cleanup actions address removal of free product, contaminants in groundwater, soil and contaminants in the vapor and/or liquid phase from the subsurface. These actions will help to reduce the risk posed to humans and the environment at the Site.

- *Compliance with Cleanup Standards*
  The purpose of the selected cleanup actions is to reduce contaminant concentrations in the groundwater and soil at the Site to at or below Method A cleanup levels put forth in WAC 173-340-720 and WAC 173-340-740.

- *Compliance with Applicable State and Federal Laws*
  The selected cleanup actions comply with all applicable state and federal laws.

- *Compliance Monitoring*
  A Site Safety and Heath Plan (see section 9.4) will be used as guidance to protect workers and the public prior to, during, and after installation of the proposed cleanup system. Groundwater samples will be taken and analyzed to monitor contaminant concentrations in the subsurface to confirm that the cleanup actions are effective at reducing contaminant concentrations. Air and groundwater passing through the existing treatment system, and any additional SVE, will be monitored to assure that discharges to the atmosphere and sanitary sewer, respectively, are in compliance with applicable local, state and federal laws.

8.2.2 Other requirements – WAC 173-340-360(2)(b)

- *Permanent Solution*
  WAC 173-340-360(3) outlines the requirements and procedures for determining whether a cleanup action uses permanent solutions to the maximum extent practicable. Section 8.4, *Evaluation Criteria*, details how the selected cleanup actions are permanent to the maximum extent practicable.

- *Reasonable Restoration Time Frame*
  The cleanup actions described in this CAP provide for a reasonable restoration time frame, as is outlined in WAC 173-340-360 (4). According to the FS Addendum (Clearwater, 1997), the estimated restoration time frame using alternative C1 is 2 to 4 years; the estimated restoration time frame using alternative C3 is approximately 5+ years. The cleanup actions selected by Ecology calls for UST system removal according to WAC 173-360, PCS

excavation and removal, free product removal, possible installation and operation of an SVE system should an SVE be necessary, potential hydrogen peroxide injection and/or ORC use and/or other Ecology-approved in-situ treatment amendments, and MNA. PCS removal activities at the site, as outlined in section 3.2, are estimated to take no more than three months. PCS removal will provide for a quicker restoration time frame than the operation of the SVE at the Site. The combination of the selected alternatives at this Site is expected to restore soil and groundwater at the Site to concentrations below the cleanup levels within 10-15 years.

- *Public Concern*
  Public comments received during the comment period for this draft CAP will be considered and addressed by Ecology.

8.2.3 Disproportionate Cost Analysis

Because the Amended draft CAP is agreed upon by Ecology and Yakima, no disproportionate cost analysis is required.

8.3 Expectations for Cleanup Action Alternatives

Expectations for cleanup actions are listed in WAC 173-340-370. These expectations include, but are not limited to, the following:

- Emphasis on treatment technologies;
- Destruction, detoxification, and/or removal of hazardous substances;
- Use of engineering controls;
- Minimization of migration of hazardous substances;
- Consolidation, to the maximum extent practicable, of hazardous substances remaining onsite;
- Taking active measures to prevent/minimize the release of contaminants to surface water.

8.4 Evaluation Criteria

WAC 173-340-360(3)(f) puts forth the criteria for determining whether a cleanup action is "permanent to the maximum extent practicable." Following is a list of these criteria and a discussion of how the selected cleanup actions fulfill each of them.

8.4.1 Protectiveness– WAC 173-340-360(3)(f)(i)

The selected cleanup actions of the Amended CAP include the removal of the PCS, free product removal, and, if necessary, introduction or injections of Hydrogen peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments, possible installation and operation of an SVE system or other soil vapor control action to treat PCS left in situ, and possible MNA to remediate contamination in soil, groundwater, and subsurface vapors. PCS removal serves to remove free product and contaminants sorbed to soil particles, which will reduce leaching of contaminants to the groundwater; possible SVE or other soil vapor control actions (if shown to

be necessary) will address removal of contaminants in the vapor phase, and, in turn, contaminants sorbed to soil and contained in pore water. Possible MNA or use of hydrogen peroxide injections and/or other Ecology-approved in-situ treatment amendments will serve to enhance biodegradation of contaminants in the groundwater. These actions will help to reduce contaminant concentrations to Method A cleanup levels for groundwater defined in WAC 173-340-720. These actions also serve to reduce the risk of contaminant exposure to human health and the environment. The on-site risks resulting from implementing the alternative include the risk of exposure to contaminants as free product, in the groundwater and soil, and in the vapor phase during PCS excavation, and potential installation and operation of an of SVE system or other vapor control measures. Implementation of appropriate safety measures and institutional controls will minimize the risk to human health and the environment. The selected alternative will improve the overall environmental quality of the Site by reducing contaminant concentrations in the groundwater, soil gas, and removing SPH from the subsurface.

8.4.2 Permanence – WAC 173-340-360 (3)(f)(ii)

The selected cleanup alternative of the Amended CAP will serve to permanently remove contaminants from the subsurface, and to reduce the volume and mobility of any contaminants remaining in the subsurface. The cleanup alternatives will be effective in destroying the hazardous substances at the Site by removal from the subsurface and processing in the treatment facility. PCS removal, possible SVE operation or other vapor control measures, potential hydrogen peroxide injections and/or ORC use and/or other Ecology-approved in-situ treatment amendments, and possible MNA will serve to further reduce contaminant concentrations in the subsurface.

8.4.3 Cost – WAC 173-340-360 (3)(f)(iii)

The cleanup action selected is not considered to be substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action. Because Ecology and Yakima have agreed to the remedial actions, no disproportionate cost analysis is required.

8.4.4 Effectiveness over the long-term – WAC 173-340-360(3)(f)(iv)

The following types of cleanup action components may be used as a guide, in descending order, when assessing the relative degree of long-term effectiveness:

- Reuse or recycling;
- Destruction or detoxification;
- Immobilization or solidification;
- On-site or off-site disposal in an engineered, lined, and monitored facility;
- On-site isolation or containment with attendant engineering controls;
- Institutional monitoring.

8.4.5 Management of short-term risks – WAC 173-340-360(3)(f)(v)

Steps will be taken to minimize exposure to contaminated soil and groundwater during the PCS removal and possible installation and operation of an SVE system or other vapor control measures is conducted. A Safety and Health Plan will be followed at the Site. Institutional controls will be in place to prevent tampering with existing wells and the treatment system, and a restrictive covenant will be recorded to prevent use of groundwater prior to achievement of the cleanup levels and to restrict access to contaminated soil.

8.4.6 Technical and administrative implementability – WAC 173-340-360(3)(f)(vi)

The proposed cleanup alternatives of the Amended CAP are technically possible to implement at the Site.

8.4.7 Consideration of public concerns – WAC 173-340-360(3)(f)(vii)

Ample opportunity will be given to the community to comment on the CAP.

9.0 Additional Requirements

9.1 Compliance Monitoring

Requirements of Compliance Monitoring as stated in WAC 173-340-410 include:

a) Protection monitoring. Confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of an interim action or cleanup action as described in the safety and health plan;
b) Performance monitoring. Confirm that the interim action or cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards such as construction quality control measurements or monitoring necessary to demonstrate compliance with a permit or, where a permit exemption applies, the substantive requirements of other laws;
c) Confirmational monitoring. Confirm the long-term effectiveness of the interim action or cleanup action once cleanup standards and, if appropriate, other performance standards have been attained.

According to WAC 173-340-410 (3), a Compliance Monitoring Plan shall be prepared for all cleanup actions and shall include:

a) A sampling and analysis plan meeting the requirements of WAC 173-340-820 which shall explain in the statement of objectives how the purposes of WAC 173-340-410(1) are met;
b) Data analysis and evaluation procedures used, to demonstrate and confirm compliance and justification for these procedures, including:
    i) A description of any statistical method to be employed; or
    ii) If sufficient data is not available prior to writing the plan to propose a reliable statistical method to demonstrate and confirm compliance, a contingency plan proposing one or

more reliable statistical methods to demonstrate and confirm compliance, and the conditions under which the methods would be used at the facility; and

c) Other information as required by the department.

9.2 Sampling and Analysis Plan

The Sampling and Analysis Plan shall specify procedures that ensure that sample collection, handling, and analysis will result in data of sufficient quality to plan and evaluate remedial actions at the Site and confirm when conditions at the site meet cleanup standards. The Sampling and Analysis Plan shall be prepared by the implementers of this CAP. As defined in WAC 173-340-820, the Sampling and Analysis Plan shall include the following:

a) A statement on the purpose and objectives of the data collection, including quality assurance and quality control requirements;
b) Organization and responsibilities for the sampling and analysis activities;
c) Requirements for sampling activities including:
   i) Project schedule;
   ii) Identification and justification of location and frequency of sampling;
   iii) Identification and justification of parameters to be sampled and analyzed;
   iv) Procedures for installation of sampling devices;
   v) Procedures for sample collection and handling, including procedures for personnel and equipment decontamination;
   vi) Procedures for the management of waste materials generated by sampling activities; including installation of monitoring devices, in a manner that is protective of human health and the environment;
   vii) Description and number of quality assurance and quality control samples, including blanks and spikes;
   viii) Protocols for sample labeling and chain of custody; and
   ix) Provisions for splitting samples where appropriate.
d) Procedures for analysis of samples and reporting of results, including:
   i) Detection or quantification limits;
   ii) Analytical techniques and procedures;
   ii) Quality assurance and quality control procedures; and
   iii) Data reporting procedures, and where appropriate, validation procedures.

9.2.1 Tasks To Be Completed During Each Sampling Event

1) Obtaining water level measurements in each well accurate to one one-hundredth of a foot (.01 foot).
2) Obtaining the following field parameters: pH, dissolved oxygen, temperature, oxidation reduction potential (ORP), and conductivity.
3) Evaluating each well to determine the integrity of the well seal and cap to ensure no contamination will enter the well from the surface.
4) Utilizing an oil water interface meter or patch to determine if free petroleum products are present in the well.

5) Testing for TPH-G as gasoline using method NWTPH-Gx, and BTEX compounds. Reporting limits will be the analytical method detection limits. Laboratory MDLs must be below Ecology's cleanup levels.
6) If TPH-D is determined to be a chemical of concern for the Site, based on soil samples obtained during UST removal, testing for TPH-D in groundwater will occur. The reporting limit will be the analytical method detection limit.
7) Table 830-1, WAC 173-340-900 lists the minimum testing requirements for petroleum contaminated sites and will provide guidance as to what additional compounds must be tested for at the site. The reporting limit for any additional compound will be the analytical method detection limit.
8) Reporting analytical results in micrograms per liter (μg/L) in tables and in graphical form with concentration over time.
9) Preparing and submitting groundwater elevations and flow directions after each sampling event, with data presented in table and map form.
10) Preparing and submitting contaminant contour maps with benzene and TPH-G concentrations.

9.2.2 Wells To Be Sampled/Frequency of Sampling

Sample all wells during each sampling event.

If measurable SPH is present, the free product thickness will be determined, and the SPH shall be bailed and discharged in a legally appropriate manner. If measurable SPH is not detected in these wells, groundwater in the wells will be sampled and analyzed for the chemical constituents listed in Section 9.2.1.

Yakima may request in writing at anytime that the wells to be sampled and the frequency of sampling be modified by Ecology.

Monitoring under this section shall begin after all active remedial measures have been implemented, except for the possible PCS removal underneath the Tiger Mart building as discussed in section 3.2.2.

9.3 Reporting Requirements

All analytical results shall be reported in the following manner:
a) All data shall be submitted in compliance with reporting requirements found in WAC 173-340-840.
b) Copies of all data sheets received from the laboratory shall be submitted to Ecology on paper and in electronic digital format, preferable in EXCEL spreadsheets. This includes all chromatographs, and data showing any QA/QC analysis run by the laboratory, and chain of custody forms.
c) All data will be presented in tables and graphically showing concentration over time.
d) The most recent sampling and analysis results shall be presented as received from the lab as stand-alone documents in the report appendix.

e) All sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section XI (Progress Reports), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal
f) A report explaining the procedures used, anything unusual noted during sampling, the condition of each well, and discussion of the data will be submitted within 45 days of each sampling event.

9.4 Worker Safety Plan

Section 810(2) of WAC 173-340 outlines the requirements for a Safety and Health Plan. A Safety and Health Plan shall be prepared by Yakima and submitted to the Ecology Cleanup Project Manager for review and comment. The plan must include all Applicable and Relevant or Appropriate Requirements (ARARs) and comply with the requirements of the Washington State Department of Labor and Industry.

9.5 Public Participation Plan

Section 600(9) of WAC 173-340 outlines the requirements for the Public Participation Plan. A Public Participation Plan shall be prepared by Yakima or Ecology and submitted to the Ecology Site Manager for review and approval.

9.6 Work Plan

WAC 173-340-400(6) outlines the requirements for plans describing the cleanup action, which will be referred to as the "Work Plan." Work Plans for all proposed remedial actions shall be reviewed by Ecology and may not be implemented until approved by Ecology. The Work Plan(s) shall include an Engineering Design Report, per WAC 173-340-400(4)(a), Construction Plans and Specifications per WAC 173-340-400(4)(b), and an Operation and Maintenance Plan per WAC 173-340-400(4)(c).

9.7 Applicable, Relevant and Appropriate Requirements

WAC 173-340-700(4)(a) states, "In addition to establishing minimum requirements for cleanup standards, applicable state and federal laws may also impose certain technical and procedural requirements for performing cleanup actions." Yakima shall be responsible for determining and implementing ARARs (applicable, relevant and appropriate requirements) for the Site.

10.0 Schedule

10.1 Removal of PCS on the Tiger Oil property and possible: Vapor Intrusion Investigation; Use of Hydrogen Peroxide and/or ORC and/or other Ecology-approved in-situ treatment amendments; and Installation and Operation of a SVE system or other vapor control measures.

Schedules shall be completed and approved by Ecology for all work plans prepared under this Amended CAP.