Interim Action
Soil Removal Work Plan
Cameron-Yakima, Inc.

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Prepared by the

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1. Introduction

The Washington State Department of Ecology has prepared this Work Plan for removal and disposal of contaminated soils and a multiple hearth kiln, located at the Cameron-Yakima, Inc. (CYI) Facility. This soil removal is being performed as an interim action that will occur prior to the completion of the Remedial Investigation for the site. The removal and disposal of this soil is necessary to reduce/eliminate the ongoing threat to groundwater and public health at the site. Removal of this soil will reduce the quantity of material that is causing groundwater contamination at the site. This work plan details the excavation, sampling, construction of temporary storage area(s), and disposal procedures for the removal of these contaminated soils and the disposal of a multiple hearth kiln. Contaminant concentrations will be reduced to acceptable levels as defined under the Model Toxic Control Act (MTCA).

Procedures and cleanup criteria to be used to evaluate whether soil removal has achieved the project objectives are also presented. This Work Plan also describes groundwater monitoring, which will be conducted prior to soil excavation, to document groundwater indicator chemical concentrations prior to soil removal.

1.1. Site Conditions

The CYI facility is located at 1414 South First Street in Yakima, Washington (Figure 1). CYI operated as a carbon regeneration/reactivation facility since 1953. The property is approximately 1.84 acres in size and is situated in an industrial and light manufacturing area. It is bordered by Burlington Northern Santé Fe Railroad to the west, a former light manufacturing facility to the south, and commercial/retail properties to the east and north.

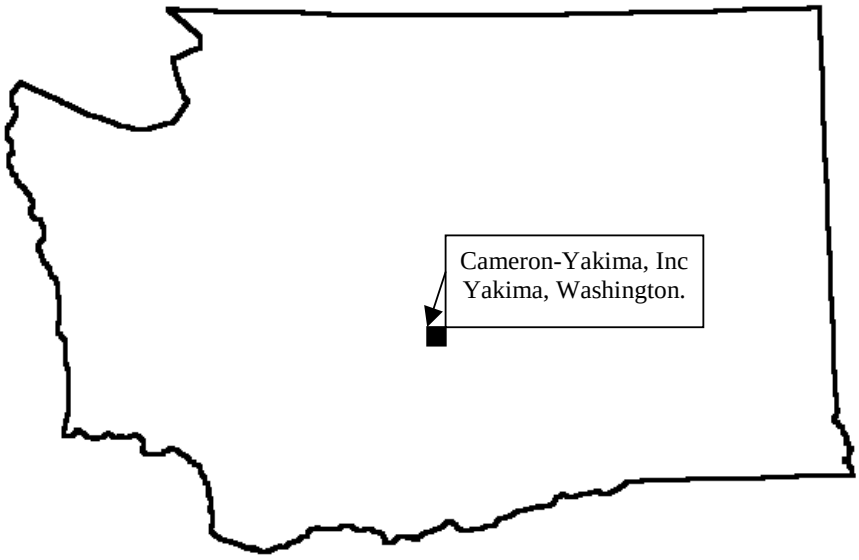
The site is flat and includes the foundations of the buildings, the secondary containment system from the carbon transfer tank, and one remaining kiln. All former structures, including the operational kilns, were removed by Ecology in the fall of 1998. One multiple hearth kiln, which to Ecology's knowledge never operated at the CYI facility, remains on site.

In March 1994, CYI, under Order from Ecology, began work on a Remedial Investigation/ Feasibility Study designed to determine the extent of soil contamination at the facility. The draft Remedial Investigation report, dated January 1996, identified the following primary soil contaminants:

- Perchloroethylene (PCE)
- Trichloroethylene(TCE)
- 1-2, Dichloroethylene (DCE)
- Vinyl Chloride

A variety of additional contaminants, including Arsenic, Lead, DDE, toxaphene, PAHs, and Dioxin, are also present above cleanup levels at some locations within the facility. Figure 2 shows the current site conditions and the approximate location(s) of contaminated soil to be removed.

FIGURE 1: SITE LOCATION



Location of Cameron Yakima, Inc Facility

Figure 2

Additional information regarding soil contamination at the site is available in the following documents.

- *Preliminary Assessment Report*; Ecology and Environment, Inc.; June 1988
- *Draft Field Investigation Report*; Black & Veatch Waste Management Inc.; October 25, 1988
- *Hydrogeologic Assessment*; Delta Environmental Consultants, Inc.; November 9, 1989
- *Preliminary Site Assessment Cameron Yakima, Inc.*; Hart Crowser; September 28, 1993
- *Final Draft Remedial Investigation/Feasibility Study Work Plan*; Hart Crowser; October 24, 1994
- *Draft Phase 1 Remedial Investigation Report*; Hart Crowser; January 18, 1996

1.2. Former Transfer Tank Interim Action

In late October 1996, CYI, under Order from Ecology, excavated approximately 250 cubic yards of material in the area known as the Former Transfer Tank. This included the former in-ground concrete transfer tank and sump, and the former process trench. As shown in Figure 3, this area was located in the south central portion of the property. After excavation the area was backfilled with clean material (gravel), a single PVC vapor extraction pipe was installed parallel to the former process trench, and the area was paved. Samples from the bottom of the excavation, at a depth of approximately 8 feet, showed Perchloroethylene (PCE) at up to 62 parts per million (ppm) remaining in soils. Further detail regarding contaminants present in excavated soils may be found in Appendix A: *Cameron-Yakima Interim Action Summary Report*, December 1996.

2. Soil Removal and On-Site Handling Plan

This section describes the sequence of the soil removal, on-site handling, temporary storage operations, and methods to be employed. This will include mobilization and site preparation, construction of temporary storage areas, soil excavation, soil screening of coarse materials to reduce volume, removal of underground utilities as encountered, soil sampling both during excavation and for confirmation, backfill of excavation, and demobilization. Groundwater sampling to be conducted both prior to and during this work is described in Section 3 of this Work Plan.

2.1. Applicable or Relevant and Appropriate Requirements

The applicable or relevant and appropriate requirements (ARARs) identified are presented in Table 1. These consist of a listing of state and federal laws which may impact this interim action soil removal. It is possible that subsequent ARARs will be identified during the implementation of this Work Plan.

Figure 3

Table 1
Applicable or Relevant and Appropriate Requirements
Cameron-Yakima, Inc. Facility
Yakima, Washington

State	Washington Water Pollution Control Laws: RCW 90-48, 52, 59
	Washington Water Pollution Control Regulations: WAC 173-10, 216, 220, 221
	Washington Water Quality Standards: WAC 173-201
	Washington Dangerous Waste Regulations : WAC 173-303
	Washington State Solid Waste Regulations: WAC 173-304
	Washington State Solid Waste Management Law: RCW 70-95
	Washington Air Pollution Control Regulations: WAC 173 – 400.490
	Washington Clean Air Act: RCW 70-94
	Washington State Environmental Policy Act: RCW 43.21C
	Washington Industrial Safety and Health Act: WAC 296-155, RCW 49.17

Federal	Clean Air Act
	Clean Water Act
	Department of Transportation Rules for the Transportation of Hazardous Materials
	Occupational Safety and Health Act(ASHA)
	Resource Conservation and Recovery Act (RCRA)
	Safe Drinking Water Act
	Toxic Substances Control Act

2.2. Soil Removal Schedule

Soil removal activities are expected to be complete within twelve (12) weeks of the start of site activities. The tentative start date for site activities is June 1, 1999. The start date depends on the award of contracts and other unknowns. The schedule of activities (Figure 4) and a description of each soil removal task is provided in the following sections.

2.3. Mobilization and Site Preparation

As shown in Section 2.2, following selection of a contractor(s) to perform soil removal, mobilization and site preparation will begin. This task will include transport of materials, equipment, and personnel to the facility. It will include set up of support facilities for the soil removal work. These facilities will include a field office and decontamination area for personnel and equipment. The field office will be located in the former lab/staff support building on the east edge of the facility. Personnel and equipment decontamination areas will be set up just inside the east gate of the facility. The equipment decontamination area will consist of a thick rubber membrane and contain a lined sump to collect wash water. Personnel decontamination will be set up per the site safety plan to be prepared by the contractor. Decontamination wash water collected during soil removal activities will be containerized and characterized by the contractor prior to disposal.

Figure 4

2.3.1. Construct soil staging, storage, and screening area

Temporary soil storage area(s) will be constructed by the contractor to contain soil prior to transport to a disposal facility and to handle the coarse materials that may be screened out during excavation. It is anticipated that two soil staging areas will be utilized, one on the eastern half of the facility and one on the west. As discussed in the following section, it is anticipated that excavation of the west half of the facility will occur first, with these soils being stored, screened, and containerized for transport on the eastern part of the facility. After backfilling the west portion of the facility, soils excavated from the east portion of the facility will be managed on the west portion of the facility.

The east storage, staging, and containerization area will be designed by the contractor to handle approximately 17,000 cubic yards of contaminated soil from the west portion of the facility - assuming a 10 percent bulking of soils from excavation to placement in the storage area. Similarly, the west storage area will be constructed to handle approximately 10,000 cubic yards of soils to be excavated from the east portion of the facility. It is anticipated that the east storage and soil handling area will utilize the existing pavement and concrete. This area will be inspected for any cracks or holes, all of which will be filled with concrete, asphalt, or other suitable material. The area will then either be covered with a membrane or sprayed with a sealant to create a surface that can be easily cleaned after soil is removed from the area. The west storage area will be constructed after backfilling is complete. It will be constructed by placing a membrane over the backfill material in the designated area. In both areas, preparation will be made to cover any waste soils with a membrane to prevent wind and rain erosion. Additionally, any runoff from storm events will be captured by a berm system and containerized, characterized, and disposed of by the contractor.

Soils excavated may be screened to remove all materials over 2 inches. These screened materials will be stored in the coarse material storage area(s). This area will be constructed by placing a membrane over native materials in the designated area.

Details on the construction of these areas will be supplied by the contractor for approval by Ecology prior to construction. Should railroad transport of waste be chosen then the above work areas will be modified as needed.

2.4. Concrete/Asphalt Removal

Figure 5 depicts the areas of the facility that are paved, asphalt, or open soils. Cores were drilled and samples of the concrete and asphalt from the west portion of the facility were taken by Ecology in September 1998. Results of these tests indicate that the material does not designate as hazardous waste (see Appendix B). Prior to removal of the concrete and asphalt located on the east portion of the facility, cores and samples will be taken as described in Section 4.

The contractor shall be responsible for removal and disposal of all concrete and asphalt from the facility. Loose soils will be removed from the underside of the waste concrete and asphalt. The waste material shall be segregated into asphalt waste and concrete waste and transported to a recycling facility such as the local asphalt and concrete batch plants.

Figure 5

2.5. Soil Removal

It is anticipated that approximately 27,000 cubic yards of contaminated soils will be excavated during this project. This estimate is based on the removal, prior to screening, of contaminated soils to provide for protection of groundwater. The soil cleanup level is described in Section 4 of this Work Plan.

West Area: The west area will be excavated first, with activity starting in the area of highest known contamination and moving outward along the contours depicted in Figure 6. Ongoing soil sampling during excavation will guide the final depths and lateral extent of the excavation. Prior to the actual excavation of soils, all pavement and concrete within the west area will be excavated and disposed of as described in the previous section. Once the west area has been completely excavated and backfilled, the east area will be completed in the same manner.

After an area has been excavated, "preliminary" samples will be collected by contractor personnel per Ecology direction. These preliminary samples will be analyzed for VOCs (PCE and breakdown products) in an on-site laboratory (see Section 5.1). These compounds were selected because they generally drive the risk associated with the impacted soil, are prevalent, and appear to correlate with the location of other contaminants present at the site. If the preliminary samples indicate that the concentration of PCE, TCE, DCE and vinyl chloride exceeds the levels specified in Section 4.1.1, additional soil will be removed by the contractor. When preliminary sampling indicates that the materials that exceed the cleanup levels for the aforementioned chemicals have been removed, the contractor will conduct verification sampling analysis. Verification samples will be analyzed for all contaminants of concern (COCs) as defined in Section 5.3.2.

Receipt of either verification sample analytical results indicating that the COCs are less than the cleanup levels, or if the bottom of the excavation is at the groundwater surface, will signify the completion of the excavation for a particular area. Verification sampling and groundwater elevation measurement are described in Section 4 of this Work Plan.

Upon excavation all soil will be transported to the temporary soil storage and screening area. The contractor may then screen all soil to remove rocks greater than 2 inches in size. Based on past grain size analyses of similar materials in the Yakima Railroad Area it is expected that up 60 percent by weight will be removed from the contaminated material (see Appendix C). Excavated soils which contain foreign material (sticks, garbage, etc.) may not be screened. Sampling of the coarse material will occur as defined in Section 5.3.3. Assuming that a 60 percent reduction is achieved, approximately 11,500 cubic yards of material will need to be transported off site for disposal.

Coarse material which is "clean" (meets the standards defined in Section 5.3.3) will be moved to the coarse material stockpile area. Coarse material which fails will need to be washed and re-sampled prior to transport to the coarse material stockpile area or simply disposed of with the remainder of the contaminated soils. Wash water from this process will be collected by the contractor, containerized, characterized, and disposed of per Section 5.3.4.

Figure 6

Figure 7

The contractor will need to employ procedures adequate to minimize airborne transport of dust and contaminants from the excavation, the transport vehicles and other equipment on site, the screening process, and the temporary soil and coarse material stockpiles. Work is expected to be completed using conventional earthmoving equipment. The contractor will present to Ecology for review and approval, a detailed plan regarding coarse material screening and washing and the control of airborne dusts.

The contractor will locate all underground utilities and "Shano Ditch", a small creek/irrigation return flow canal that transects the facility (see Figure 2). All underground utilities encountered, such as sewer, water, electric, and gas, will be removed and secured in accordance with the requirements of the local utilities and authorities. Provisions will be made by the contractor to ensure the integrity of Shano Ditch during excavation. In the event of contamination under Shano Ditch, temporary re-routing and subsequent replacement will need to occur to allow for removal of contamination. The contractor will present to Ecology for review and approval, a detailed plan to address this action should it be determined necessary. It will be the contractor's responsibility to make any necessary arrangements with the Ditch Company regarding temporary realignment.

Presently five (5) groundwater monitoring wells exist within the area anticipated to be excavated (Figure 8). The contractor will provide for the proper abandonment/decommissioning and removal of these wells per Washington Administrative Code (WAC) 173-160-560. All other wells at the facility will be protected from disturbance during soil removal activities.

2.6. Backfill

Following receipt of soil samples confirming that contaminated soil has been removed to the acceptable cleanup level(s), and approval from Ecology, the excavation(s) will be backfilled to a depth of two feet above the predicted seasonal groundwater high (expected to be about 14 feet below ground surface). This initial layer of backfill will consist of well-graded clean gravel or sand and gravel. The remaining "open" portion of the excavation(s) will then be backfilled with the coarse material and topped off with clean gravel, sand and gravel, or soil (see detailed material specifications). Once the excavation is brought to near grade it will be topped off with 2 inches crushed rock. As stated earlier, it is anticipated that excavation and backfilling will occur in stages, with the west area being completed first. The backfilled soils will require compaction based on a standard proctor test ASTM D-1557. Compaction confirmation will be based on proof-rolling the soil with the compactive equipment

The contractor shall determine the amount and method of compaction necessary to prevent subsequent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be considered a result of improper or insufficient compaction and shall be promptly repaired by the contractor at no cost to Ecology. The contractor shall be responsible for all costs for labor and materials resulting from improper compaction and recompaction.

Figure 8

Backfill Materials

Gravel Borrow

Aggregate for gravel borrow shall consist of granular material, either naturally occurring or processed, and shall meet the following requirements for grading and quality:

% Passing 4" square opening	100
% Passing U.S. No. 4 opening	50-90
% Passing U.S. No. 40 Sieve	30 max.
% Passing U.S. No. 200 Sieve	7.0 max.
Sand Equivalent	50 min.
Contaminants	0 %

All percentages are by weight.

Crushed Surfacing

Crushed rock shall be manufactured from ledge rock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material.

Crushed rock shall meet the following requirements for grading and quality:

	5/8" minus
% Passing 5/8" square sieve	100
% Passing 1/4" square sieve	55 to 75
% Passing U.S. No. 40 sieve	8 to 24
% Passing U.S. No. 200 sieve	10.0 max.
Sand equivalent	40 min.
Contaminants	0 %

All percentages are by weight.

The fracture requirements shall be at least one fractured face and will apply to material retained on each specification sieve size U.S. No. 10 and above if that sieve retains more than 5 percent of the total sample.

The portion of crushed rock retained on a 1/4" square sieve shall not contain more than 0.15% wood waste.

2.7. Demobilization

Following completion of backfill activities the contractor will perform demobilization activities. The contractor will clean up all work areas including performing any decontamination. All equipment, liners, waste, or other items on site will be removed and properly disposed of. The site will then be secured by ensuring the integrity of the existing fence. This will include rebuilding/replacing any portion of the fence removed during the excavation process. All excavations shall be completely resurfaced and brought to the original grade. Roadways used by the contractor for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadways is damaged or otherwise affected due to the contractor's operations.

2.8. Contractor Qualification

The removal contractor will meet all local, state, and federal requirements and certifications necessary to conduct the activities described in this Work Plan. In addition, the contractor will be responsible for developing a project Health and Safety Plan that provides specific guidance and protocols in conformance with Occupational Safety and Health Administration (OSHA) regulations and the Washington Industrial Safety and Health Act (Chapter 49.17 Revised Code of Washington) for all the soil removal activities to be conducted. The contractor will also be responsible for developing and implementing the protocol for air monitoring and fugitive dust control to assure the protection of public health and the environment (see Appendix D: Yakima Regional Clean Air Authority Project Dust Control Plan). Both the Project Health and Safety Plan and the Project Dust Control Plan must be submitted to and approved by Ecology prior to commencement of site activities.

3. Groundwater Sampling and Analysis

The objective of groundwater sampling is to document concentrations of indicator chemicals present in the groundwater prior to, during, and after soil removal.

A complete round of groundwater sampling will be collected from the twenty (20) wells at the facility prior to the commencement of soil removal activities and again at the completion of excavation work. Fifteen (15) monitoring wells will remain after the excavation is complete. The number of samples, their locations, and the parameters to be analyzed are listed in Table 2. The method of groundwater sampling will be as follows:

Depth to Water Measurements: Prior to well purging, water depths will be measured to the nearest 100th of a foot (.01) using a decontaminated electric water level sounder. Measurement will be based on the preexisting control points on each monitoring well.

Purging: After initial measurements have been recorded, monitoring wells will be purged. During purging temperature, pH, and electrical conductivity will be monitored and recorded. Indicator parameters will be considered stabilized when three successive measurements, in 5-gallon increments, vary less then 10 percent. A minimum of three (3) casing volumes will be removed during purging.

Sample Collection: Groundwater samples will be collected using a disposable bailer suspended by a nylon cord. The bailer will be lowered slowly into the water, retrieved, and emptied slowly to avoid degassing the sample. The sample will them be handled according to the Quality Assurance Project Plan in Section 5.

Quality Assurance/Quality Control (QA/QC) samples of groundwater will include one duplicate, one field blank, and one trip blank per sampling event. Samples will be sent to an offsite lab with turn-around times not to exceed 24 hours unless otherwise approved by Ecology.

Table 2
Groundwater Sampling Locations
Cameron-Yakima, Inc. Facility
Yakima, Washington

Sample Location/Well Number	Type of Analytical Test
CYI-MW-1	VOC
CYI-MW-101D	VOC
CYI-MW-2 (to be abandon during excavation)	VOC
CYI-MW-102S	VOC, Metals
CYI-MW-3(to be abandon during excavation)	VOC, Metals
CYI-MW-103S	VOC, Metals, Oppest
CYI-MW-103D	VOC, Metals, Oppest
CYI-MW-4 (to be abandon during excavation)	VOC
CYI-MW-104S(to be abandon during excavation)	VOC
CYI-MW-105S(to be abandon during excavation)	VOC
CYI-MW-106S	VOC
CYI-MW-107S	VOC
CYI-MW-108S	VOC
CYI-MW-109S	VOC
CYI-MW-110S	VOC
CYI-MW-111S	VOC
CYI-MW-112S	VOC
CYI-MW-113S	VOC
CYI-MW-113D	VOC
CYI-MW-114S	VOC

4. Soil Sampling and Analysis

This section describes the soil sampling objectives; location, frequency, and types of samples to be collected; methods for sample collection and handling; and methods for evaluating compliance. The contractor, under Ecology's guidance, will be responsible for soil sampling, groundwater elevation measurement, and the evaluation of whether cleanup criteria have been achieved.

This field sampling plan is intended to satisfy the requirements of the Model Toxic Control Act, Chapter 173-340 WAC. The principal guidance document is *the Statistical Guidance for Ecology Site Managers* (WDOE 1992).

This interim action soil removal is intended to remove the major ongoing threat facility soils are having on groundwater, and to mitigate any threats to human health associated with direct contact with impacted soils at the facility.

4.1. Sampling Objectives

The primary objectives of soil sampling and analysis are to direct soil excavation activities and to verify the attainment of soil cleanup standards. These two objectives are inter-linked and require joint discussion.

4.1.1. Sampling and Analytical Strategy

The Cameron-Yakima, Inc. facility has had soil sampling conducted during the Preliminary Site Assessment (September 1993), the field work associated with the draft Remedial Investigation report (January 1996), and the interim action in the vicinity of the transfer tank (December 1996). This work provides a basis of knowledge to understand which contaminants are present and to identify major areas of concern. The contaminant Tetrachloroethylene (PCE) and its breakdown products (TCE, DCE, vinyl chloride) are located throughout the facility and appear to present the greatest risk to groundwater at the facility. These constituents will be used as indicator chemicals during this soil removal. Data from a variety of sites within the Yakima Railroad Area has shown that the removal of all soil contaminated with PCE above approximately 20 ug/kg (parts per billion or ppb) adequately provides for the protection of groundwater. Additionally, based on available data for the facility, it is anticipated that the removal of soils based on the PCE cleanup level will effectively remove the soil that exceeds the cleanup levels for the other contaminants at the site. Therefore, contour maps of soil exceeding the cleanup levels for PCE and its breakdown products will be used to guide this soil removal (Figures 6 and 7).

In general, an area will first be excavated according to the contaminant contour maps. After an area has been excavated to these contours, preliminary soil sampling and analysis will be performed. These samples will be analyzed in an on-site lab, to be provided by the contractor. Sample turn around will be no longer than 24 hours. If the samples indicate that concentrations of PCE, TCE, DCE, or vinyl chloride are greater than the cleanup objectives as shown in Table 3, additional soil will be removed. After sampling and analysis indicates that the soils exceeding the PCE, TCE, DCE and vinyl chloride cleanup levels have been removed, verification sampling and analysis will be performed.

Table 3
Cleanup Levels
Cameron-Yakima, Inc. Facility
Yakima, Washington

Contaminant:	Perchloroethylene	cis 1-2 Dichloroethylene	Trichloroethylene	Vinyl Chloride
Cleanup Level ug/kg:	19	29	11	2

All verification samples will be analyzed as described in Section 5.3.2. Analytical results for these samples will be compared to the chemical-specific cleanup levels. The statistical approach to verification sampling and statistical method for evaluating compliance with cleanup levels discussed in the following sections will be used to make this comparison.

East Area Concrete/Asphalt Sampling

Prior to excavation in the east portion of the facility, cores of the concrete and asphalt will be drilled and sampled to determine waste disposal options. The east portion of the facility will be divided into a 50-foot grid. Cores will be taken from a random location within each grid and analyzed as was done in the previous sampling of the west excavation area (see Appendix B).

4.1.2. Statistical Approach to Verification Sampling

The goal of this remedial action is to remove soil that contains contaminants that are impacting groundwater. This section discusses the statistical approach for evaluating the success of the effort. The basis of this statistical approach includes the requirements of WAC 173-340-740 in MTCA. This section of MTCA includes statistical methods and criteria for evaluating compliance with cleanup levels.

The statistical approach to verification sampling used in this Work Plan consists of three major components:

- sampling areas
- evaluation of verification samples
- quantity and spatial distribution of verification samples

4.1.2.1. Sampling Areas

The CYI facility will be excavated in two phases: west area and east area. Within each of these respective areas verification samples will be collected and lab results will be used to evaluate the success of cleanup in that area. Each of these areas will be evaluated individually against the cleanup levels using the contaminants of concern (COC).

4.1.2.2. Evaluation of Verification Sample Results

Once laboratory results are available for the verification samples, the concentration of each COC will be statistically compared to their cleanup levels for each area. As required by MTCA and

discussed in Ecology guidance documents (*Guidance on Sampling and Data Analysis Methods*, January 1995, Ecology Publication 94-49), the COCs are to be statistically evaluated using the following three criteria:

1) Perform a one-tailed test of the null hypothesis that the true soil concentration of a hazardous substance exceeds the soil cleanup level. To satisfy the requirements of this test, the upper confidence limit of a 95-percent one-sided confidence interval for the mean soil concentration shall be less than the cleanup level.
2) No single sample concentration shall be greater than two times the soil cleanup level.
3) Less than 10 percent of the sample concentrations shall exceed the soil cleanup level.

If all three of the criteria are satisfied for the COCs then an area is considered clean.

4.1.2.3. Quantity and Spatial Distribution of Verification Samples

Criterion 1 of the previous section describes the need to perform a one-tailed test of the null hypothesis that the true mean concentration exceeds the cleanup level. Table 7.1 of the USEPA guidance document (USEPA 1989) presents a method to determine the number of samples needed for a hypothesis test on the mean. Based on this guidance, 46 verification samples will be taken in both the west and the east areas at the facility.

A systematic random sampling plan will be used to collect verification samples. This type of sampling plan consists of random sampling within a square grid or other systematic method, if appropriate. The benefit of this is that samples collected on such a grid will provide better direction toward identifying the extent of residual contamination if any is found.

4.2. Sample Location, Frequency, and Procedures

This section presents the rationale that was used for selecting removal areas and procedures for evaluating analytical results against cleanup levels.

Within the west and east areas, specific sub-areas of high contamination exist and will be identified as removal locations (see Figures 6 and 7). Each of these removal locations has common characteristics and will be treated as homogeneous areas. Each removal location will undergo the same sampling and analysis and remedial action procedures. It is expected that when analytical results indicate the need for additional excavation, approximately six (6) inches to a one (1) foot depth of additional soil will be removed, over an area to be determined in the field, surrounding the sample location. The actual amount of additional soil removal may vary depending on the contaminant concentrations in the sample that exceed the cleanup level.

For each of the removal locations the following procedures will be performed:

Step 1) Excavate contaminated soil from each removal location indicated in Figures 6 and 7.
Step 2) Several of the removal locations are bordered by other areas that are considered to be below cleanup levels or have not been investigated. Previous sampling and analysis

has not precisely located the boundaries nor fully characterized these areas. The approach to the cleanup and verification of these border areas will be the following:

a) Perform preliminary sampling to evaluate the condition of the area in question.
b) If the sample is above the cleanup level, increase the boundary of the removal area or create a new removal area. Perform preliminary sampling and analysis to evaluate the condition of the increased area (for newly added areas only).
c) Continue this routine until an area is found to contain less than the cleanup levels.

Step 3) Identify verification sample locations as defined earlier. Collect verification samples and analyze.

Step 4) Compare the results to their respective cleanup level. If a sample is greater than two times its cleanup level or more than 10 percent of the samples in a removal location are greater than the cleanup level, remove more soil from the contaminated area. If the criteria have been met, removal is complete.

These four steps will be performed for each of the removal areas.

Site Acceptance Criteria

The concentration of contaminants will be subject to the statistical criteria of Section 4.1.2.2 independently for each of the removal areas. If the data from each of the removal areas satisfy these criteria the site will be considered clean.

4.3. Sample Designation

Setting up in the field an individual systematic method for each removal area and then collecting samples at these designated locations will designate the locations for soil sampling.

4.4. Sample Equipment and Procedures

This section describes the sampling equipment and procedures to be used during soil removal. All samples must meet the grain size requirements of WAC 173-340-740(7)(a).

4.4.1. Sampling Equipment

The following equipment is needed to collect soil samples:

- Pre-cleaned stainless steel spoons/scoops;
- labeled sample containers to be provided by lab; and
- cooler with ice or other cooling medium capable of achieving a temperature of four (4) degrees Celsius (C°).

4.4.2. Sample Collection Procedures

The following procedure will be used when collecting soil samples:

a) If present, debris (twigs, rocks, litter, etc.) will be carefully removed and discarded.

b) Soil samples will be taken from approximately three (3) inches below the disturbed surface of the soil.
c) Samples will be collected using pre-cleaned stainless steel spoons or scoops and transferred directly into sample bottle.
d) The cap will be checked to ensure cleanliness and that it is secured.
e) The sample bottle will be carefully labeled with the appropriate sample tag addressing all parameters.
f) Sample will be transferred to the cooler and preserved at 4 °C.
g) All pertinent information will be recorded in the field logbook.
h) All equipment will be decontaminated before use and between sample locations.

4.5. Sample Handling and Analysis

The analytical laboratory will provide appropriate sample containers. Each sample will be placed in the appropriate pre-cleaned container and sealed with custody tape. Sampling will be conducted under safety levels determined by the Site Safety Officer in accordance with the Facility Health and Safety Plan. Disposable latex gloves will be worn during the sampling process. Gloves will be changed between sample areas or if the gloves have been damaged in any manner. Sample documentation will be completed immediately following sample collection. The chain-of-custody forms will be filled out in ink and placed in a plastic bag to avoid damage. Duplicates will be maintained in the site files at Ecology. The original will be sent to the analytical lab. The forms will include the date, site designation, sample designation, analysis required, turnaround, preservation, and authorized signatures as specified in the Quality Assurance Project Plan (QAPP) presented in Section 5 of this Work Plan.

5. Quality Assurance Project Plan

5.1. Data Quality Objectives

The overall data quality objectives are to develop and implement QA/QC procedures for field sampling, chain of custody, laboratory analysis, and reporting as described in this Work Plan; and to provide results that are technically sound and properly documented and that can be confidently used to support decisions regarding the soil removal and disposal. An environmental lab with the ability to provide on-site analysis will be used for the verification soil sample analytical testing. The methods of analysis will be as follows:

- Volatile Organic Analysis: 8010, 8260, 8240, or 8021B
- Metals: 6000-7000 series
- Semi-VOA: 8270
- Pesticides
  - Organophosphorous Pesticides: 8140
  - Organochlorine Pesticides: 8080
- Dioxins/furans: 8280

At a minimum, the following samples will be collected for QA/QC purposes:

- One trip blank for every 20 volatile organic analysis samples;
- One equipment blank for every 20 samples; and
- One duplicate for every 20 samples.

5.2. Sample Custody Procedure

This QAPP requires documentation concerning the collection of samples, field QA/QC, and custody. Procedures for this documentation follows.

5.2.1. Identification of Samples for Chemical Analysis

Each sample location will have a specific sample number based on the sampling point location designation. The specific designation for the soil samples will be based on the removal area and sample location. All sample containers will be affixed with a label to prevent misidentification of samples. The label will include, at a minimum the following:

- Initials of the collector;
- Date and time of collection;
- Location; and
- Sample number.

5.2.2. Field Documentation

Information pertinent to the work performed will be recorded in logbooks and on field documentation forms for sampling events and daily activities. Documentation will be stored in the project files of Ecology's Central Regional Office in Yakima, Washington. Field documentation forms anticipated to be used are included in Appendix E and are listed below.

- Sample Control Log
- Soil/sediment sampling
- Test Pit Log
- Water Sampling Data
- Water Level Data
- Daily Activities Log
- Site Visitor Log Sheet
- Photo Log
- Chemical Analysis Request Form
- Site Supervisor's Daily Log

All information pertinent to the soil removal and/or sampling will be recorded in a field logbook or books during this project. These will become part of the project file. Entries into these books will contain three basic types of information: site activities, photographs, and sampling data including locations of samples taken. Site activities will be recorded daily. Photograph and sampling entries will be done on an "as-performed" basis.

5.2.3. Chain-of-Custody Record

To establish the documentation necessary to trace sample possession from the time of collection through analysis, a serial number-based chain-of-custody record will be filled out to accompany each sample. A copy of the record is included in Appendix F. All pertinent fields shown on the form will be filled in prior to sample shipment.

5.2.4. Custody Seals

Custody seals will be used to seal each sample container prior to packaging in ice chests. Sample transport ice chests will also be sealed after packing prior to shipment. Sampling personnel will place a signed and dated custody seal across the opening points of the containers.

5.2.5. Sample Delivery to the Laboratory

Samples that need to go to an off-site lab will be transported by a next-day delivery service to the lab for chemical analysis. The chain-of-custody record will accompany the samples. All samples will then be delivered directly to the lab. Samples to be analyzed in the on-site lab will be directly transferred, with the chain-of-custody record, to the on-site lab by the sampler.

Packaging and shipping of samples to the off-site lab will be per the following protocol.

- Sample container lids will be secured with custody tape and packing tape as necessary
- About 2 inches of cushioning material will be placed in the bottom of the cooler
- Sample containers will be placed in the cooler in a manner to prevent breakage
- VOC vials will be placed in zip-loc bags and centered in the cooler to help prevent breakage
- Samples will be packed in ice enclosed in plastic bags or freeze packs
- Blank samples will be packaged with the samples that they control
- Cooler will be filled with cushioning material
- Chain-of-custody paperwork will be placed in plastic bags and placed inside the cooler
- Cooler will be wrapped with strapping tape to seal it closed
- Appropriate address will be affixed to the top of the cooler

When a sample set is picked up by the delivery service, the shipper will receive a copy of the shipping documentation. This documentation will be placed in the project file with the chain-of-custody paperwork.

5.2.6. Laboratory Quality Control

Upon receipt of the shipping container, the lab will inspect the custody seal for its integrity. The chest will be opened and the shipment checked versus the chain-of-custody record. Any inconsistencies or problems with a sample shipment will be noted and resolved. Once at the laboratory the samples will be tracker through the lab by internal custody procedures. QA/QC procedures to be followed by the lab will be per the laboratory QA manual.

5.3. Analytical Procedures

The analytical methods chosen for this project will follow those presented in "Test Method for Evaluating Solid Waste (SW-846)", September 1986, as described below.

5.3.1. Preliminary Soil Sample Analysis

Preliminary soil sample analysis for PCE and its breakdown products will be performed on site utilizing method 8260, 8240, 8021B or 8010. No other contaminants will be analyzed during the preliminary soil sample analysis. All method and QC criteria will be as specified in the method and under the contract laboratory QA/QC program.

5.3.2. Verification Soil Sample Analysis

Verification analysis will be performed using SW-846 methodologies and will include:

- Method 8021B, 8010, 8240 or 8260 for Volatile Organic Compounds
- Semi-Volatile Organic Compounds Method 8270
- Dioxins/Dibenzofurans by Method 8280
- Chlorinated pesticides/PCPs Method 8080
- Metals by Method 6000/7000 series

As identified in Section 4, the specific combination of verification sample analyses to be run on a group of samples will vary for each particular sub-area at the facility. All method and QC criteria will be as specified in the method and under the contract laboratory QA/QC program.

5.3.3. Coarse Material Sample Analysis

As described in Section 2, coarse materials may be removed and stored for eventual replacement as fill material into the excavation areas. To ensure that this material is clean enough to allow for reuse, this material will be subject to sampling. Specific analyses to be run on these samples will be determined based on the removal area the material originated from. Actual analytical methods will be the same as those identified for verification samples in the preceding section.

5.3.4. Waste Sample Analysis

This project will generate wastes, both soil and water, that will need characterization prior to disposal. It is the contractor's responsibility to follow the waste designation requirements of WAC 173-303.

5.3.4.1. Soil

During excavation and screening of soils, VOC analysis will be occurring to guide the extent of the excavation. Based on the results of these samples, additional soil samples will be taken from the waste soils and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals. These samples will be taken from locations within the soil piles where VOC results were the

highest. The number of samples will be as illustrated in Table 4. These samples will provide the basis for waste designation. Other analyses may occur as required by the facility receiving the waste soil.

Table 4
Number of Samples for Excavated Soil
Cameron-Yakima, Inc. Facility
Yakima, Washington

Cubic Yards of Soil	Minimum Number of Samples
0-100	3
101-500	5
501-1000	7
1001-2000	10
>2000	10 + 1 for each additional 500 cubic yards

5.3.4.2. Water

Wastewater will be generated on site from the process of decontaminating personnel and equipment and possibly from soil washing if needed. All water generated will be collected and stored on site in portable tanks. The water will be run through an activated carbon filter then sampled prior to disposal at the local wastewater treatment plant. Samples will include VOCs, TCLP metals, and other analyses as required by the PTOW.

5.4. Data Reduction, Validation, and Reporting

The contract laboratory QA/QC program will address data reduction, validation, and reporting. It will be the contractor's responsibility to provide Quality Assurance documentation addressing this.

6. Waste Designation, Disposal, and/or Treatment

Based on Ecology's current understanding of the contaminated soils present at the CYI facility, listed or characteristic soils are not expected to be generated during this soil removal action (Appendix H: Memo from Brian Dick, HWTR). Limited amounts of State Only Wastes as defined in WAC 173-303-100 (i.e. Halogenated Organic Compounds above 100mg/kg (.01%)) may be encountered and should be identified from the sampling described in earlier sections.

The contractor shall be responsible for all waste designation and locating appropriate disposal facilities for soils, wastewater, and other debris generated from this project. For waste soils over

cleanup levels but not designated as hazardous waste, disposal shall be to an Ecology approved treatment facility, or a lined, Sub-title D facility. For hazardous waste soils, disposal shall be to an Ecology approved treatment facility or to a Sub-title C landfill.

Multiple Hearth Kiln Disposal

Located at the facility is a 60,000+ pound multiple hearth kiln. TCLP Metal and pH tests of refractory from each of the hearths in the kiln are presented in Table 5.

Table 5
Multiple Hearth Kiln Sample Results
Cameron-Yakima, Inc. Facility
Yakima, Washington

		SAMPLE #						
		1	2	3	4	5	6	7
	pH	1.25	4.17	3.98	3.39	5.34	5.25	7.22
TCLP Metals (mg/L)	Arsenic	ND	ND	0.47	ND	ND	ND	ND
	Barium	0.14	0.033	0.061	0.083	0.024	0.068	0.068
	Cadmium	0.14	ND	ND	ND	ND	ND	ND
	Chromium	1.5	0.053	0.026	0.094	0.013	0.015	ND
	Lead	ND	0.21	0.33	0.42	0.32	0.34	0.47
	Mercury	630	3	510	12	10	6.8	0.73
	Selenium	1.7	ND	ND	ND	ND	ND	ND
	Silver	ND	ND	ND	ND	ND	ND	ND

The contractor will be responsible for disposal of this kiln unit. A treatment/disposal memo describing the proposed disposal method for this kiln will need be prepared and submitted to Ecology for approval as part of the bid.

7. Project Reporting

Upon completion of the soil removal activities a project completion report shall be prepared. This report will include a listing of quantities and types of materials removed, a listing of the ultimate destination of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all available relevant documentation generated during this project.

CYI Interim Action Soil Removal
Bid items:

#1:	Mobilization/demobilization	LS	$_____
#2:	Construct Soil Staging/Storage/Handling Area	LS	$_____
#3:	Concrete/Asphalt removal	_____CY	$_____
	West Area	_____CY	$_____
	East Area	_____CY	$_____
#4:	Soil Removal		
	West Area	_____CY	$_____
	East Area	_____CY	$_____
#5:	Backfill	_____CY	$_____
#6:	Demobilization	LS	$_____
#7:	Health and Safety Plan	LS	$_____
#8:	Dust Control Plan	LS	$_____
#9:	Ground Water Sampling	cost of all wells per event	$_____
#10:	Monitoring Well Abandonment	per well	$_____
#11:	Sampling (including labor)		
	Preliminary Soil Sampling	per sample	$_____
	Verification Soil Sampling	per sample	$_____
	East Area Concrete/Asphalt	per sample	$_____
	Coarse Material Sample Analysis	per sample	$_____
	Waste Sample Analysis	per sample	$_____
#12:	Soil Disposal $/ton for:		
	Non-Haz waste	_____CY	$_____
	Hazardous Waste	_____CY	$_____
	Multiple Hearth Kiln	LS	
#13:	Shano Ditch Temporary Relocation:	LS	$_____
#14:	Coarse Material Soil Washing	_____CY	$_____
#15:	Proposed Alternative Treatment Technology		
	Soil Treatment $ per ton for:		
	Non-Haz	_____CY	$_____
	Haz	_____CY	$_____
	Multiple Hearth Kiln	LS	$_____