ENTRIX

ENVIRONMENTAL CONSULTANTS

FINAL
INTERIM REMEDIAL ACTION PLAN
UNDER AGREED ORDER NO. 1315
BRIGGS NURSERY, INC.
OLYMPIA, WASHINGTON

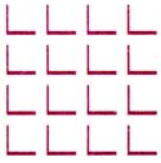
Prepared for Submittal to:
Washington State Department of Ecology
Southwest Region Toxics Cleanup Program

Prepared by:
ENTRIX, INC.
2701 First Avenue, Suite 500
Seattle, Washington 98121

On behalf of:

BRIGGS NURSERY, INC.
4407 Henderson Boulevard
Olympia, Washington 98501-6001

April 4, 2005



FINAL INTERIM REMEDIAL ACTION WORK PLAN BRIGGS NURSERY, INC. OLYMPIA, WASHINGTON

1.0 INTRODUCTION

Based on the results of systematic grid sampling across the upland portions of Areas 1 and 2 at the Briggs Nursery site (Site), as defined in Agreed Order No. 1315 between Briggs Nursery and the Washington State Department of Ecology (Ecology), an Interim Remedial Action is proposed to address areas of low-level dieldrin and two areas of localized PCB contamination. This Interim Remedial Action Plan (IRAP), developed in consultation with Ecology, provides the work plan to accomplish the excavation and disposal of contaminated soils consistent with the Model Toxics Control Act (MTCA) and other relevant state and federal regulations.

2.0 DELINEATION OF CONTAMINATED UPLAND SOIL

2.1 INITIAL SOIL SAMPLING ANALYTICAL RESULTS

Surficial soil samples were initially collected on a 200-foot grid for most of the uplands within Areas 1 and 2 and a smaller-scale grid, on 100-foot centers, near the Fertilizer Injection Shed in Area 2. All of these soil samples were analyzed for pesticides using EPA Method 8081A. Select soil samples collected in the Fertilizer Injection Shed area were also analyzed for metals using EPA Method 200.8. Results of the grid sample analyses indicate that soil collected from 12 grid nodes in Work Areas 1 and 2 have concentrations of dieldrin that exceed the MTCA cleanup standard for unrestricted land use. These 12 grid nodes define seven proposed excavation areas as shown on Figures 1a and 1b (attached). Concentrations of metals and pesticides other than dieldrin either were below the MTCA cleanup levels or were not detected in the remaining soil samples.

2.2 FURTHER DELINEATION METHODS

A detailed description of the original grid set-up and initial sampling approach are provided in the RI/FS Workplan (ENTRIX 2004). To further delineate the extent of dieldrin contamination, additional soil samples were collected in the vicinity of the 12 grid node samples whose dieldrin concentrations exceeded the MTCA cleanup standard.

2.2.1 Horizontal Delineation

To the extent feasible, additional soil samples were collected at 25 feet, 50 feet, 75 feet, 100 feet, and 150 feet in the four cardinal directions (based on grid north) from the grid nodes where soil exceeded MTCA standards. Soil samples were also collected at approximately 142 feet and 213 feet in the appropriate diagonal directions (NE, SE, SW, and NW) from the grid nodes in exceedance of the dieldrin unrestricted land use standard. On the diagonals between two nodes on the 200-foot grid, 142 feet and 213 feet from a given node equal ½ and ¾ of the distance to the next grid node, respectively. These sampling regimes were modified at B-9, located near the western portion of Briggs Nursery site, to account for property boundaries and impenetrable vegetation.

Sampling was conducted according to the protocols described in Sections 3.1, 3.5, 3.6, and 3.8 of the RI/FS Work Plan (ENTRIX 2005). Each sample was labeled with a unique sample number that facilitates tracking and cross-referencing of sample information, as outlined below:

S-MMDDYY-XX+NI

Where:

S = soil sample media

MMDDYY = collection date (month/day/year)

XX = alphanumeric grid location

N = distance from the grid node (feet)

I = cardinal/diagonal direction from the grid node based the cant of the grid (N, S, E, W, NE, SE, SW, NW)

2.2.2 Vertical Delineation

To assess the depth of soil that exceeds MTCA cleanup levels, subsurface samples were collected at two grid nodes with dieldrin concentrations above MTCA standards for soil. These northern and southern grid nodes – J-11 and H-7 – were selected to provide a screen of the potential vertical distribution of dieldrin throughout the property.

At each grid node, a pit 24 inches in diameter and 30 inches deep was dug. Soil samples were collected at five depths from within each pit at 6-inch intervals from zero to 30 inches below ground surface. Equal amounts of soil were scraped from four sides of each pit to form a homogenized composite sample. Collection, handling, and decontamination methods were consistent with those described in Sections 3.1, 3.5, 3.6, and 3.8 of the RI/FS Work Plan.

Each sample was labeled with a unique sample number using the sample labeling system described below:

S-MMDDYY-XX-pit-D"

Where:

S = soil sample media

MMDDYY = collection date (month/day/year)

XX = alphanumeric grid location

D = depth interval (0-6, 6-12, 12-18, 18-24, or 24-36 inches).

2.3 SAMPLING RESULTS

2.3.1 Horizontal Grid Soil Samples

Soil samples collected 25 feet from the grid node were analyzed first. Where a 25-foot sample exceeded dieldrin MTCA cleanup standards, the sample collected 50 feet from the grid node along the same transect was analyzed. If the 50-foot sample exceeded MTCA cleanup standards, the 100-foot sample along the same transect was analyzed. Finally, where the 100-foot sample exceeded dieldrin standards, the 150-foot sample was analyzed.

Similarly, the 142-foot diagonal samples were analyzed for dieldrin where 100-foot samples were analyzed. Where a 142-foot sample exceeded MTCA cleanup standards, the 213-foot sample along the same diagonal transect (NE, SE, SW, or NW) was analyzed. Samples not immediately queued for analysis were stored in frozen archive at a temperature of -20 degrees C.

The grid sample and subsequent delineation sample results are provided in Table 1, above. The sample points are provided in Figures 1a and 1b with categories designating the levels of dieldrin exceedance.

Table 1. Exceedances of MTCA Unrestricted Use Cleanup Standard for Dieldrin in Surficial Soil Samples.

Grid Location	Sample ID	Sample Date	Dieldrin Conc. (mg/kg)
Excavation Area 1			
B8+50NW	S101404-B8+50NW	10/14/2004	0.160
B8+90N	S101404-B8+90N	10/14/2004	0.120
B8+90NA	S101404-B8+90N-A	10/14/2004	0.100
B8+90N	S101404-B8+90N	10/14/2004	0.110
B9	S-081604-B-9	8/16/2004	0.071
B9a	S-081604-B-9-a	8/16/2004	0.024
B9	S-081604-B-9	8/16/2004	0.048
B9-70S	S-090804-B9-70S	9/8/2004	0.120
Excavation Area 2			
G8	S-081604-G-8	8/16/2004	0.140
G8+100N	S-101204-G8+100N	10/12/2004	0.360
G8+100S	S-101204-G8+100S	10/12/2004	0.089
G8+100W	S-101204-G8+100W	10/12/2004	0.430
G8+142NE	S-101204-G8+142NE	10/12/2004	0.640
G8+142SE	S-101204-G8+142SE	10/12/2004	0.330
G8+142SW	S-101204-G8+142SW	10/12/2004	0.210
G8+25E	S-092204-G8+25E	9/22/2004	0.180
G8+25EA	S-092204-G8+25E-A	9/22/2004	0.220
G8+25E	S-092204-G8+25E	9/22/2004	0.200
G8+25N	S-092204-G8+25N	9/22/2004	0.200
G8+25S	S-092204-G8+25S	9/22/2004	0.200
G8+25W	S-092204-G8+25W	9/22/2004	0.600
H7	S-081604-H-7	8/16/2004	0.180
H7+100W	S-101304-H7+100W	10/13/2004	0.130
H7+142SW	S-101304-H7+142SW	10/13/2004	0.230
H7+142SWA	S-101304-H7+142SW-A	10/13/2004	0.220
H7+142SW	S-101304-H7+142SW	10/13/2004	0.225
H7+25E	S-092104-H7+25E	9/21/2004	0.096
H7+25N	S-092104-H7+25N	9/21/2004	0.280
H7+25S	S-092104-H7+25S	9/21/2004	0.310
H7+25W	S-092104-H7+25W	9/21/2004	0.370
H8	S-081604-H-8	8/16/2004	0.250
H8+100E	S-101204-H8+100E	10/12/2004	0.290
H8+100N	S-101204-H8+100N	10/12/2004	0.096
H8+25E	S-092104-H8+25E	9/21/2004	0.360
H8+25N	S-092104-H8+25N	9/21/2004	0.072
H8+25S	S-092104-H8+25S	9/21/2004	0.330
H8+25W	S-092104-H8+25W	9/21/2004	0.930
H8+50E	S-092104-H8+50E	9/21/2004	0.200

Table 1. Exceedances of MTCA Unrestricted Use Cleanup Standard for Dieldrin in Surficial Soil Samples. (Continued)

Grid Location	Sample ID	Sample Date	Dieldrin Conc. (mg/kg)
Excavation Area 3			
J7	S-090904-J7	9/9/2004	0.250
J7+100W	S-101304-J7+100W	10/13/2004	0.065
J7+142NW	S-101304-J7+142NW	10/13/2004	0.400
J7+142SE	S-101304-J7+142SE	10/13/2004	0.120
J7+142SW	S-101304-J7+142SW	10/13/2004	0.130
J7+142SWA	S-101304-J7+142SW-A	10/13/2004	0.092
J7+142SW	S-101304-J7+142SW	10/13/2004	0.111
J7+50E	S-101304-J7+50E	10/13/2004	0.660
J7+50N	S-101304-J7+50N	10/13/2004	0.190
J7+50S	S-101304-J7+50S	10/13/2004	0.350
K7	S-090904-K7	9/9/2004	0.210
Excavation Area 4			
J8	S-081704-J-8	8/17/2004	0.290
J8+25E	S-092104-J8+25E	9/21/2004	0.120
J8+25N	S-092104-J8+25N	9/21/2004	0.100
J8+25NA	S0-92104-J8+25N-A	9/21/2004	0.120
J8+25N	S-092104-J8+25N	9/21/2004	0.110
J8+25W	S-092104-J8+25W	9/21/2004	0.073
J8+25WA	S-092104-J8+25W-A	9/21/2004	0.050
J8+25W	S-092104-J8+25W	9/21/2004	0.062
J8+50N	S-092104-J8+50N	9/21/2004	0.270
Excavation Area 5			
I8+100E+100N	S-081704-I8+100E+100N	8/17/2004	0.088
I8+100E+100N+25N	S-092104-I8+100E+100N+25N	9/21/2004	0.110
I8+100E+100N+25NA	S-092104-I8+100E+100N+25N-A	9/21/2004	0.110
I8+100E+100N+25N	S-092104-I8+100E+100N+25N	9/21/2004	0.110
I8+100E+100N+25S	S-092104-I8+100E+100N+25S	9/21/2004	0.070
I8+100E+100N+25W	S-092104-I8+100E+100N+25W	9/21/2004	0.180
I8+100E+100N+50N	S-092104-I8+100E+100N+50N	9/21/2004	0.280
I8+100E+100N+50S	S-092104-I8+100E+100N+50S	9/21/2004	0.140
I8+100E+100N+50W	S-092104-I8+100E+100N+50W	9/21/2004	0.230
Excavation Area 6			
K9+100E+100N	S-081704-K9+100E+100N	8/17/2004	0.200
K9+100E+100N+25E	S-092004-K9+100E+100N+25E	9/20/2004	0.170

Table 1. Exceedances of MTCA Unrestricted Use Cleanup Standard for Dieldrin in Surficial Soil Samples. (Continued)

Grid Location	Sample ID	Sample Date	Dieldrin Conc. (mg/kg)
Excavation Area 7			
J11	S-081704-J-11	8/17/2004	0.130
J11+100E	S-101304-J11+100E	10/13/2004	0.130
J11+25E	S-092004-J11+25E	9/20/2004	0.210
J11+25EA	S-092004-J11+25E-A	9/20/2004	0.220
J11+25E	S-092004-J11+25E	9/20/2004	0.215
J11+25N	S-092004-J11+25N	9/20/2004	0.150
J11+25S	S-092004-J11+25S	9/20/2004	0.120
J11+25W	S-092004-J11+25W	9/20/2004	0.180
J11+50E	S-092004-J11+50E	9/20/2004	0.510
J11+50W	S-092004-J11+50W	9/20/2004	0.086
J12	S-081704-J-12	8/17/2004	0.092
J12+100E	S-101304-J12+100E	10/13/2004	0.470
J12+100S	S-101304-J12+100S	10/13/2004	0.140
J12+100W	S-101304-J12+100W	10/13/2004	0.500
J12+142SE	S-101304-J12+142SE	10/13/2004	0.140
J12+142SW	S-101304-J12+142SW	10/13/2004	0.120
J12+25E	S-092004-J12+25E	9/20/2004	0.067
J12+25EA	S-092004-J12+25E-A	9/20/2004	0.069
J12+25E	S-092004-J12+25E	9/20/2004	0.068
J12+25N	S-092004-J12+25N	9/20/2004	0.200
J12+25S	S-092004-J12+25S	9/20/2004	0.140
J12+25W	S-092004-J12+25W	9/20/2004	0.130
J12+50E	S-092004-J12+50E	9/20/2004	0.120
J12+50N	S-092004-J12+50N	9/20/2004	0.160
J12+50S	S-092004-J12+50S	9/20/2004	0.130
J12+50W	S-092004-J12+50W	9/20/2004	0.100
K11	S-081704-K-11	8/17/2004	0.200
K11+100N	S-101304-K11+100N	10/13/2004	0.130
K11+150N	S-101304-K11+150N	10/13/2004	0.089
K11+25E	S-092004-K11+25E	9/20/2004	0.160
K11+25EA	S-092004-K11+25E-A	9/20/2004	0.170
K11+25E	S-092004-K11+25E	9/20/2004	0.165
K11+25N	S-092004-K11+25N	9/20/2004	0.180
K11+25W	S-092004-K11+25W	9/20/2004	0.093
K11+50E	S-092004-K11+50E	9/20/2004	0.110
K11+50N	S-092004-K11+50N	9/20/2004	0.150

NOTES: Field Duplicate samples were averaged
MS and MSD Samples were removed. Results under 0.0625 were removed
In the case of dilution samples, the lower dilution sample was used. Higher dilution samples were removed.

2.3.2 Vertical Soil Samples

Dieldrin concentrations in the pit samples indicate that dieldrin at concentrations in exceedance of MTCA unrestricted land use standards is restricted to the upper 12 inches of the soil column (Table 2). This finding is consistent with known fate and transport properties of dieldrin. Dieldrin is essentially insoluble in water, and tends to bind with organic materials in the soil. Applied to plants at the nursery, overspray and runoff would be captured by organic materials in the silty sand that is present at ground surface across the site (and observed to over 40 feet below ground surface during the installation of the monitoring wells). With the dieldrin thus "locked up" at ground surface, its potential for vertical transport is minimal. As noted in the chemical database developed by the *International Programme on Chemical Safety* (IPCS 2004):

> "As would be expected from their very low water solubility, hydrophobic character, and strong adsorption by soil, aldrin and dieldrin are very resistant to downward leaching through the soil profile."

This determination is supported by the pit samples collected for the purpose of vertical delineation. Concentrations drop to less than 0.024 mg/kg in the 12-18 inch samples in both samples. Excavation to a depth of 12 inches below ground surface (bgs) should therefore be conservative, and any residual dieldrin at deeper depths should be at concentrations below the MTCA unrestricted land use standard.

Table 2. Vertical Delineation Results

Sample ID	Sample Depth (bgs)	Dieldrin Conc. (mg/kg)	Qualifier
Pit at Grid Point H7			
S-092104-H7-pit-0-6	0 to 6"	0.33	
S-092104-H7-pit-6-12	6" to 12"	0.016	Y
S-092104-H7-pit-12-18	12" to 18"	0.0125	J
S-092104-H7-pit-18-24	18" to 24"	0.014	U
S-092104-H7-pit-24-30	24" to 30"	0.014	U
Pit at Grid Point J11			
S-092204-J11-PIT-0-6"	0 to 6"	0.15	
S-092204-J11-PIT-6-12"	6" to 12"	0.22	
S-092204-J11-PIT-12-18"	12" to 18"	0.024	
S-092204-J11-PIT-18-24"	18" to 24"	0.013	U
S-092204-J11-PIT-24-30"	24" to 30"	0.013	U

Qualifiers:

J - Estimated concentration when the value is less than established reporting limits

U - Indicates that the target analyte was not detected at the reported concentration

Y - The analyte reporting limit is raised due to a positive chromatographic interference. The compound is not detected at or above the raised limit but may be present below the limit

2.4 DETECTION OF PCBS IN GRID SAMPLES

Due to a single polychlorinated biphenyls (PCBs) detection within the southeast kettle during a previous study at the Briggs Nursery, care was taken during quality assurance of laboratory analyses to review interferences that could indicate PCB at elevated levels in upland soils.

Briggs Nursery soil samples have been analyzed by U.S. EPA Method 8081A, which is used to analyze for chlorinated pesticides using an electron capture detector (ECD). The output of the ECD is a series of peaks on a chromatogram. Each of these peaks is associated with an individual pesticide, except for pesticides that occur as mixtures of compounds, such as chlordane and mirex.

The ECD is also sensitive to other chlorinated compounds such as PCBs, which are simultaneously detected when analyzing for chlorinated pesticides. PCBs occur as multi-component mixtures of compounds that produce patterns on the chromatogram potentially interfering with, or at least complicating, the detection of pesticides. Therefore, the potential co-occurrence of PCBs and pesticides needs to be taken into account whether the analyzing solely for pesticides, solely for PCB, or for both compound classes.

In order to provide certified results for both pesticides and PCBs, however, the instrument must be specifically calibrated using laboratory standards for both compound classes in a series of tests that are only conducted when both kinds of analyses have been ordered. For Briggs Nursery soil samples, the laboratory instrument has been calibrated for the detection and quantification of chlorinated pesticide compounds. Most recently, the calibration has focused solely on the reporting of dieldrin. Nevertheless, the potential for interfering compounds (such as PCBs) to be present must still be assessed in order to report reliable dieldrin concentrations and detection limits.

A pattern similar to that of PCBs (i.e., Aroclor 1254) has produced interferences in the pesticide chromatogram for a few of the Briggs Nursery soil samples. In two samples, the intensity of the response in this pattern suggested that PCBs were present at concentrations higher than MTCA limits for unrestricted land use. These two samples were subsequently tested specifically to obtain a calibrated (certified) PCB concentration. The concentrations in these two samples are 2.8 and 4.4 mg/kg. A review of pesticide chromatograms at nearby locations showed no discernable PCB pattern, except one. At this one location, there was a discernable PCB pattern but at a probable concentration substantially below the MTCA Method A cleanup standard (J-11+50S). Therefore, the two locations where the PCB cleanup standard was exceeded are isolated and are in areas that will be excavated because of their dieldrin concentrations.

During the reporting of calibrated dieldrin results, the laboratory alerted ENTRIX to samples that had discernable and elevated (in relation the MTCA standard) PCB concentrations. In addition, ENTRIX examined the pesticide chromatograms submitted in the final data packages for indications of PCBs as part of the independent data validation process. Although not a specific test for PCBs, this qualitative review indicates that notable PCB detections were rare. Only two samples warranted PCB-specific analysis based on this review, resulting in only two confirmation above MTCA Method A cleanup standards.

2.5 DELINEATION OF PCB CONTAMINATION

Because the effects of the PCB interference were not observed in the dieldrin analyses for any samples other than those noted in the previous section, if PCBs are present in any other samples, the concentrations are well below the 1 mg/kg requirement under MTCA Method A unrestricted use standards. The delineation method for excavation of the PCB-contaminated soils can therefore be based on the results from samples for the delineation of the dieldrin-contaminated soils.

There are no known historical electrical transformer installations on the Site west of Henderson Boulevard, nor any other known sources of PCBs on the Site. Therefore, the PCB excavation will be conducted in the same manner and to the same depth as the pesticide excavation. Confirmatory samples will be collected from the PCB excavation area to ensure the extent of the PCB contamination has been reached.

3.0 EXCAVATION AND DISPOSAL OF CONTAMINATED SOIL

3.1 SOIL EXCAVATION

Areas identified for excavation have been determined based on analytical results from the initial sampling activities described in the RI/FS Work Plan and results from the subsequent sampling effort outlined above. The methods for excavation and removal of the contaminated soils are presented in this section.

3.1.1 Determination of Excavated Area

The excavation area is based on the delineation of dieldrin and PCB contamination as described previously in Section 2.0. The sample results are provided in Tables 1 and 3 and the proposed excavation boundaries are provided in Figures 1a and 1b. The excavation boundaries were determined by selecting a point half the distance from the sample location with the exceedance to the nearest outer non-exceedance sample location. The excavation boundary is identified on Figures 1a and 1b by connecting these halfway points.

On the site, halfway points will be measured from the surveyed sample points and marked with survey stakes or distinctive spray paint markings. From these halfway points, the boundary of the excavation will be marked on the ground with spray paint.

All excavation areas identified on Figures 1a and 1b will be excavated to approximately one foot in depth in accordance with the findings in the vertical delineation described in Section 2.1.2.

3.1.2 Excavation Procedure

A combination of a scraper, bulldozer, and a trackhoe will be used to remove the top 12 inches from the designated areas. A trackhoe may also be used to excavate the small PCB contaminated areas. Care will be taken to minimize the equipment traffic through the excavation area. Truck traffic will be limited to rock roads adjacent to excavation areas and truck loading will occur at the edge of excavation or stockpiling areas, in order to prevent the movement of excavation soils onto clean areas of the Site or public roads. Excavated soil will be screened prior to trucking to remove large rocks using a grizzly-type sorter. The soil collected from the separation will be treated as excavated soil. Watering equipment will be available if dust control or gravel washing is necessary in the gravel separating operation. The excavated soil will then be transported off-site to the appropriate disposal facility as described in Section 3.2. The trucks will be tarped prior to leaving the Site to prevent wind dispersion.

The PCB-contaminated areas will be specifically designated prior to excavation. The excavation of these areas will be conducted prior to the excavation of the dieldrin-contaminated soils, and the PCB-contaminated soils will be segregated for separate disposal as discussed in Section 3.2.

During excavation, standard practices to prevent dispersion of excavated soil will be employed. These will include the following:

- Trucks will access the excavation by large rock roads;
- Excavation and loading dust will be controlled using water spray;

- Truckloads will be tarped; and
- Erosion control measures will be employed where surface water runoff can erode excavations.

3.2 DISPOSAL REQUIREMENTS

This section discusses the applicable regulatory requirements for determining the disposal location of the excavated soils.

The excavated soil will be disposed of at one of two facilities. The dieldrin contaminated soil will be excavated and transported to the Briggs Farm Property (Farm Site) in Porter, Washington, where it will be re-used as a soil amendment. The Farm Site is a working farm with silty, clay-rich soils and poor drainage. The sandy soils excavated from the Nursery Site will be tilled into the Farm Site soil to improve drainage and increase agricultural productivity. The soil amendment will cover an area of about 10-15 acres and the area will be re-graded to avoid stormwater runoff. The excavated soil used at the Farm Site will meet all MTCA industrial use standards.

The PCB-contaminated soils will be segregated from the dieldrin-contaminated soils, tarped, and ultimately transported to the Waste Management facility in Seattle, Washington. This facility is licensed to receive W001 wastes as listed in WAC 173-303 (see section 3.2.1 below).

3.2.1 Washington Dangerous Waste Regulations

The State of Washington Dangerous Waste Regulations do not identify a criterion specific to dieldrin under WAC 173-303-090. However, dieldrin is a halogenated organic compound (HOC) that must meet the "Dangerous Waste Criteria Level" under WAC 173-303-100. This criterion requires that the sum of all HOC concentrations is less than 1% (or 10,000 mg/kg). With dieldrin being the only HOC of concern at the site, the sum is substantially below 1% and therefore below the Dangerous Waste standards.

In addition, WAC 173-303-100 also provides a formula to ensure that the Equivalent Concentration does not exceed the "Toxic Dangerous Waste". The sum of the pesticide concentrations (on a percentage basis) is divided by 10. That value is then summed with other chemical classes to see if the total is less than 0.001% (or 10 mg/kg). Again, dieldrin concentrations are well below this criterion. The soil is therefore below the standards for Toxic Dangerous Waste. The dieldrin-contaminated soils are designated as non-hazardous waste under the Washington Dangerous Waste regulations.

The MTCA Method A unrestricted land use standard for total PCBs is 1 mg/kg. The soils associated with the PCB-contaminated areas do not meet the requirements to be listed as a dangerous waste under Chapter 173-303 WAC. These soils are not associated with any of the waste types covered under the listing for W001 (including, *e.g.*, transformers, capacitors, bushings, and associated wastes). To be conservative, the excavated soils from the PCB-contaminated areas will be segregated and disposed of at the Waste Management Facility in Seattle, Washington. This facility is licensed to handle soils contaminated with PCBs at concentrations up to 50 mg/kg.

3.2.2 MTCA

Unrestricted land use criteria under MTCA have driven the need to remove soils from the Briggs Nursery site. The most stringent unrestricted land use cleanup standard for dieldrin is 0.0625 mg/kg based on dermal contact and inhalation exposure pathway. The highest level of contamination in site soils that will be excavated under this IRAP based on the recent sampling and analysis program is 0.930 mg/kg. This level is almost an order of magnitude lower than the MTCA standard for industrial land use based on dermal contact and inhalation exposure pathway of 8.2 mg/kg dieldrin. Therefore, based on this pathway, the soils are suitable for use at an industrial site after removal from the Site.

Under WAC 173-340-747, an empirical demonstration may be used to show that measured soil concentrations will not cause an exceedance of the applicable groundwater cleanup levels established under WAC 173-340-720. Consistent with this provision of the WAC, the data collected at the Site empirically demonstrate that the excavated soils do not represented a threat to groundwater at the Site. Additionally, the data collected empirically demonstrate that these soils will not pose a threat to the groundwater underlying the Farm Site, the proposed receiving site for the excavated soils. The elements of this empirical demonstration are as follows:

- Six groundwater monitoring wells have been installed at the Briggs Nursery site during the RI, and dieldrin has not been detected in any of these monitoring wells.

- Vertical sampling during the RI indicate dieldrin contamination in soils above the most stringent unrestricted land use criterion (0.0625 mg/kg) occur only within the upper 12 inches of the soil profile.

- Dieldrin use, for everything except termite control, was banned by the EPA in 1974. It is therefore reasonable to assume that dieldrin use at the Briggs Nursery site did not occur after 1974. The preponderance of the dieldrin is confined to the upper foot of soil even after a residence period of at least 30 years. Therefore, dieldrin is clearly not migrating and is tightly bound to the site soils slated for excavation.

- As reported in the database developed by the International Program on Chemical Safety, dieldrin is very resistant to downward leaching through the soil profile.

- The soils slated for excavation comprise an organic-rich sandy loam that have strongly and preferentially adsorbed the dieldrin.

- The soils at the Farm Site are silty clay-rich soils and not ideal for agriculture. The proposed soil amendment with the excavated sandy soils will improve the drainage and productivity of the farm. Mixing the excavated soils with the clean soils at the Farm Site will likely result in pesticide levels even below the strict MTCA residential standards

PCB-contaminated soils will be excavated and handled separately. These soils will be transported by Envirocon to the Waste Management, Inc. facility described in Section 3.2. This facility is approved to handle PCB wastes under 50 mg/kg. The highest level of PCB contamination identified in site soils is 4.4 mg/kg.

3.2.3 MTCA Disposal Characterization

Exceedances of the MTCA unrestricted residential standard for dieldrin were found in 12 of the initial 105 grid samples collected. Additional samples were collected in the vicinities of these exceedances to further delineate their extent, resulting in a total of 194 dieldrin sample analyses. The maximum observed dieldrin concentration was 0.930 mg/kg. The area-weighted average concentration within the areas designated for excavation is estimated to be 0.24 mg/kg. Given that the concentration estimated to represent excavated soils is based on a large number of observations (n=82) and is so far below the standard (the maximum is approximately one-tenth of the standard; the mean is one-fourth of the maximum), the stockpiles do not require additional sampling for their characterization prior to their delivery to an industrial site.

The area-weighted average concentration of dieldrin in the top six inches (where the soil samples were collected) within the areas designated for excavation is estimated to be 0.24 mg/kg. However, concentrations should be substantially lower in the deeper portions (6 to 12 inches deep) of the excavations. Also, excavation will extend beyond all known locations of exceedance of the MTCA standard. We think that as a result of these factors, the average dieldrin concentration in the excavated soils will be substantially less than 0.25 mg/kg.

As a result of the inevitable mixing that will occur as the amending soil is tilled into the ground at the Farm Site, we predict that both any localized maximum and area-wide average dieldrin concentrations will decrease even further. It is not unlikely that the average concentration after tilling will be near the residential standard, or about one-tenth of the industrial standard. The literature also indicates that dieldrin degrades in the soil. Its half-life may be on the order of 2.5 years, and that it loses 75 to 100% of its biological activity in three years.

3.3 DISPOSAL OF EXCAVATED SOIL

The excavation is expected to take 14 working days once the process has begun. An estimated 13,000 cubic yards of material will be removed. The trucks will be securely covered with tarps during transportation to prevent potential wind dispersion.

The delineation analyses indicate the excavated dieldrin-contaminated soils are below the Dangerous Waste and MTCA Method C industrial land use requirements; therefore, the soil will be loaded into dump trucks and transported off-site to the Farm Site for use as a soil amendment.

The excavated soils from the Site will be unloaded at the Farm Site by dumping the trucks onto the field designated for soil amendment. The soil will then be spread out over the field. The equipment used to spread the dumped soil will remain in the receiving field. The trucks will, by necessity, drive over some part of the area covered by previous truckloads from the Site, in order to dump their loads. Therefore, a wheel-wash station will be present at the Farm Site to clean the trucks prior to their departure from the Farm Site.

The PCB-contaminated soil will be transported to a landfill that meets the requirements of WAC 173-351 or a Subtitle D landfill. The Waste Management facility in Seattle, Washington has been selected for this disposal.

4.0 CONFIRMATIONAL SAMPLING

At the conclusion of soil excavation, samples will be collected for analysis within the excavated area to confirm that soil with dieldrin and PCBs at concentrations above MTCA cleanup standards has been removed. The procedures are described below.

4.1 SAMPLE COLLECTION, HANDLING, AND ANALYSIS

The sample locations were selected in consultation with Ecology. Ecology staff will be provided splits of confirmation samples upon request, or they may collect separate samples; the choice is at their discretion. These independent confirmation samples will be analyzed at Ecology's Manchester laboratory.

Soil samples will be collected and handled and sampling equipment will be decontaminated according to the protocols described in Sections 3.1, 3.5, 3.6, and 3.8 of the RI/FS Work Plan. Each confirmation sample will be labeled with a unique sample identification number that facilitates tracking and cross-referencing of sample information. Confirmation sampling locations are shown in Figure 1, along with the choice of analyte – dieldrin or PCBs – for each sample.

In the Phillips 1998 *Limited Phase I Site Assessment*, the Chemical Mixing Shed area was identified as the location of a wood preservative spill. This area has been identified for excavation based on dieldrin. At the request of Ecology staff, two confirmation samples will be collected from the vicinity of the Chemical Mixing Shed, after excavation, and analyzed for copper and chromium; their locations are also identified on Figure 1.

At each confirmation sampling point, a discrete soil sample will be collected from 0-6 inch depth. The samples will be collected from the side-wall or bottom of an excavated area, as indicated on Figure 1.

4.2 CRITERION FOR CONFIRMATION SAMPLING ANALYSIS

Dieldrin concentrations in confirmation samples will be compared to the MTCA criterion of 0.0625 mg/kg. Ecology guidance provides a procedure for comparison of confirmation samples to a cleanup standard. The procedure compares the cleanup standard to two statistical estimates, such that:

- The upper confidence limit of the mean cannot exceed the cleanup standard; and
- The upper tolerance limit on the 90^{th} percentile;

And two additional criteria:

- No sample value may exceed two times the cleanup standard; and
- No more than 10% of the sample values may exceed the cleanup standard.

Ecology's guidance recognizes that small sample sizes (less than 20 observations) may require special treatment. Each excavation area will be tested separately for compliance, and therefore the number of samples in each area will be substantially less than 20. With small sample size, statistical estimates of confidence about distributional parameters or quantiles become unreliably high. For this reason, each individual sample concentration in a given excavation area will be compared to the cleanup standard. If no sample exceeds the criterion of 0.0625 mg/kg dieldrin, that excavation area will be considered clean.

In the second step of the statistical methodology, the guidance allows for the occasional, relatively small exceedance of the cleanup standard (i.e., no more than 10% in exceedance, none greater than two times the standard). For this interim action, only one excavation area (surrounding grid node G8) has enough samples to allow a single observation to be in exceedance, and still meet the "no more than 10%" rule.

4.2.1 Course of Action If Analytical Results Indicate Soil Exceeds MTCA Standards

If soil contaminated above appropriate MTCA levels is encountered, the affected soil will be removed and transported off-site, consistent with the disposal procedures outlined in Section 3.2. An additional round of confirmation samples will be collected and submitted to the laboratory for analysis. The excavated areas will remain open until samples have been analyzed and it is determined that the soil contaminate levels do not exceed applicable MTCA cleanup standards.

4.2.2 Course of Action When Analytical Results Indicate Soil Does Not Exceed MTCA Standards

When analytical results indicate contaminant concentrations are below appropriate MTCA levels the excavated areas will be closed in place or be graded until acceptable slopes are met, if necessary.

5.0 REFERENCES

CFR 40. Code of Federal Regulations; Title 40 Protection of Environment Section 268 Land Disposal Restrictions. http://www.ecfr.gpoaccess.gov/cgi/text/. Viewed on October 20, 2004. Data current as of October 18, 2004.

Ecology, 1991. Guidance for Site Checks and Site Assessments for Underground Storage Tanks. Washington Department of Ecology Publication # 90-52. February 1991, revised April 2003.

Ecology, 1997. Discussion Paper – Polychlorinated Biphenyl (PCB) Dangerous Waste W001. Ecology Publication # 97-415. Revised May 1997.

ENTRIX, Inc., 2005. Revised Draft Remedial Investigation Feasibility Study Work Plan Briggs Nursery, July 29, 2004 revised March 15, 2005.

EPA, 1992. Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies. July 1992 EPA/600/R-92/128.

EPA, 1997. Best Management Practices (BMPs) for Soils Treatment Technologies – Suggested Operational Guidelines to Prevent Cross-Media Transfer of Contaminants During Cleanup Activities. Environmental Protection Agency Publication No. EPA530-R-97-007, May 1997.

EPA , 1998. Management of Remediation Waste Under RCRA. EPA Publication EPA530-F-98-026. October, 1998.

EPA, 2002. Final Guidance on Demonstrating Compliance with the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standards. EPA Publication EPA530-R-02-003, July, 2002.

Farallon, 2000. Letter Report: Environmental Media Management Plan (Revised Final) for Able Pest Control Site. Farallon Consulting LLC. April 6, 2000.

Farallon, 2004. Draft Amended Cleanup Action Plan Able Pest Control Site. Farallon Consulting LLC. March 23, 2004.

IPCS 2004. International Programme on Chemical Safety 2004. Website: http://www.inchem.org/documents/ehc/ehc/ehc91.htm#SectionNumber:2.2 Viewed on October 25, 2004.

Phillips Services Corporation, 1998. Limited Phase I Site Assessments, Briggs Nursery Olympia Facility, Briggs Nursery, Porter Facility.

Toxicological Profile for Aldrin/Dieldrin. 2002. U.S. Department of Health and Human Services. Public Health Services. Agency for Toxic Substances and Disease Registry. Website: http://www.atsdr.cdc.gov/toxprofiles/tp1.pdf Viewed on January 4, 2005.

WAC Chapter 173-303, Dangerous Waste Regulations. Revised April 2003.

WAC Chapter 173-340, Model Toxics Control Act. Revised February 2001.

Figure 1a. Excavation Area 1

Figure 1b. Excavation Areas 2 through 7