LIBBY AMPHIBOLE (LA) SAMPLE RESULTS OF WOOD WASTE MATERIALS

LINCOLN COUNTY LANDFILLS TROY AND LIBBY, MONTANA

Prepared for:

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and

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ACRONYMS AND ABBREVIATIONS

CCA	Chromated copper arsenate
cm^2	Square centimeters
COC	Chain-of-custody
DEQ	Montana Department of Environmental Quality
Doug-fir	Douglas-fir (*Pseudotsuga menziesii*)
EPA	U.S. Environmental Protection Agency
ESAT	Environmental Services Assistance Team
FSDS	Field Sample Data Sheet
GPS	Global Positioning System
LA	Libby amphibole
ND	Non-detect
P-pine	Ponderosa pine (*Pinus ponderosa*)
PPE	Personal protective equipment
QC	Quality control
SAP	Sampling and analysis plan
SOP	Standard operating procedure
s/cm^2	Structures per square centimeter
s/g dry wt of duff	Structures per gram of dry weight of duff
TEM	Transmission electron microscopy
Tetra Tech	Tetra Tech EM Inc.

1.0 PROJECT OVERVIEW AND PURPOSE OF THE INVESTIGATION

Tetra Tech EM Inc. (Tetra Tech) completed a screening-level investigation of large wood waste piles at the Lincoln County landfills in Libby and Troy, Montana to determine the potential presence or absence of Libby Amphibole (LA) asbestos in the wood waste materials. This project was completed under Contract No. 407026, Task Order 97, with the Montana Department of Environmental Quality (DEQ). Tetra Tech completed the final Sampling and Analysis Plan (SAP) on May 25, 2012 (Tetra Tech 2012) and completed the sampling of the wood wastes on May 30 and 31, 2012. Twenty-five samples of bark, brush, and manufactured wood materials were collected and submitted to an analytical laboratory for determination of LA asbestos concentrations using approved sample preparation and analytical techniques. Sampling and analytical procedures were described in detail in the final SAP (Tetra Tech 2012). This Data Report contains a summary of the main tasks completed and the verified and validated analytical results.

The overall investigation purpose was to characterize the wood waste material stockpiles in two Lincoln County landfills for LA asbestos prior to processing and disposal. The specific investigation objectives were to:

- Provide a standardized method for collecting wood waste samples in both landfills.
- Submit samples to an analytical laboratory for determination of LA asbestos concentrations using approved sample preparation and analytical techniques.
- Complete quality control (QC) and cursory data validation to ensure the quality of analytical results.
- Provide LA detection results to allow Lincoln County to make decisions for handling the wood wastes (off-site disposal, chipping and grinding).

2.0 SITE BACKGROUND

The Lincoln County Environmental Health Department manages the Troy and Libby landfills and has requested that residents bring their wood wastes to the landfills rather than disposing of the materials on their properties. The wood waste piles at the landfills have been accumulating waste materials for approximately 2 years; there is currently little space remaining for additional wood wastes at either landfill, so wood waste materials at the Troy and Libby landfill sites are slated for chipping, grinding and removal, or some other appropriate disposal method. Recent analysis of bark and wood-chip samples from various operable units in the Libby Asbestos Superfund Site yielded detectable levels of LA

asbestos. In response to these findings, prior to selecting the method of wood waste processing and disposal at the landfills, Lincoln County requested Tetra Tech to sample and analyze the wood waste pile materials to determine the presence or absence of LA asbestos.

Tetra Tech collected the wood waste material samples using standard operating procedures (SOP) very similar to methods developed to collect bark and duff at Operable Unit 3 (Mine Site) and used previously for timbered lands owned by the Montana Department of Natural Resources and Conservation (Tetra Tech 2011). The laboratory analytical procedures to pre-treat and analyze the wood wastes for asbestos and LA were also very similar to the previously published SOPs. The two main SOPs used to guide the landfill wood waste sampling project were:

- EPA-LIBBY-2012-11 – Sampling and Analysis of Duff for Asbestos (U.S. Environmental Protection Agency [EPA] 2012b)
- EPA-LIBBY-2012-12 – Sampling and Analysis of Tree Bark for Asbestos (EPA 2012a)

Tetra Tech prepared a project-specific Health and Safety Plan that included general site information, site-specific waste characteristics, hazard evaluation, summary of field tasks, site safety work plan (including personnel training), and emergency information including contact phone numbers and a map identifying the route to the local hospital.

3.0 COMPLETED FIELD WORK

At the Libby and Troy landfill sites, samples were collected from three wood waste pile components: (1) brush materials (branches averaging ¼ -inch to 4 inches in diameter and foliage and other organic debris from various species (predominantly conifers), (2) tree bark (bark only from tree stumps and branches or trees larger than 4 inches in diameter), and (3) manufactured wood product debris. Each wood waste sample was a composite of 20 small wood aliquots collected to represent the types of wood wastes for that material type. The geographic coordinates for each sample location were recorded using a Garmin hand-held geographical positioning system (GPS) device.

The photographs in Attachment A show the great variation of wood wastes in the landfill piles and in the aliquots contained in each composite sample. Attachment A photographs 1 through 6 show the general sample areas and examples of the 20 aliquots for the brush, bark, and manufactured wood waste samples from the Libby landfill. Attachment A photographs 7 through 12 show similar general sample areas and examples of the 20 aliquots for the brush, bark, and manufactured wood waste samples from the Troy landfill.

Samples were collected from representative perimeter locations around the wood waste piles. Figures 3-1 and 3-2 show the approximate sample locations at the Troy and Libby landfills. The 20-aliquot composite samples were placed into clear 1-gallon plastic recloseable bag, labeled appropriately, and submitted to the Environmental Services Assistance Team (ESAT) facility in Troy, MT under chain-of-custody (COC). All samples were prepared for analysis using a process involving drying, ashing, acid treatment, and filtration followed by analysis using transmission electron microscopy (TEM).

3.1 Completed Sampling Activities

On May 31, 2012, Tetra Tech collected four samples of brush materials (plus one duplicate sample), two samples of tree bark, and two samples of manufactured wood waste materials from the perimeter of the Troy wood waste piles. The Troy landfill wood pile was approximately 90 by 141 feet and about 12 feet high and contained approximately 5,640 cubic yards of wood waste. A smaller pile of tree stumps and larger tree trunks (about 25 by 25 feet) was south of the main wood waste pile. Figure 1-1 shows the approximate locations of all samples collected at the Troy landfill by wood material type.

On May 30, 2012, Tetra Tech collected eight samples of brush materials (plus one duplicate sample), four samples of tree bark, and three samples of manufactured wood waste materials from the perimeter of the Libby wood waste piles. The wood pile at the Libby landfill was approximately 261 by 231 feet and about 14 feet high which correlates to approximately 31,262 cubic yards of wood waste. The stumps and larger tree trunks were in a separate 25- by 100-foot pile southwest of the main wood waste pile. Figure 1-2 shows the approximate locations of all samples collected at the Libby landfill by wood material type.

The brush and manufactured wood waste aliquots (wood portions) were primarily collected using an electric reciprocal saw powered by a portable generator. Some brush sample aliquots were collected as grab samples of the various types of leaves, needles, and other organic debris in that region of the wood waste pile. Representative pictures of the types of wood wastes and variation in aliquots in the composite brush and manufactured wood waste samples are shown in Attachment A.

The tree bark sample aliquots were collected using an electric drill powered by a portable generator. A 1-inch outside diameter (7/8-inch inside diameter) hole-saw bit was used to collect representative tree bark aliquots. A picture of the 20 representative aliquots for one bark sample is in Attachment A. The field notes were recorded for each sample on separate field sample data sheets (FSDS) with other notes recorded in a logbook. The FSDS and logbook pages are in Attachment B.

Tetra Tech did observe treated wood products (chromated copper arsenate [CCA]) in the Libby landfill pile and documented the materials in the field logbook and by photograph. Tetra Tech did not include and treated wood waste in the manufactured wood waste samples.

3.2 Laboratory Determinations for LA Asbestos

The bark, brush, and manufactured wood samples were prepared and analyzed for LA asbestos in accordance with the *Libby Asbestos Superfund Site Standard Operating Procedure, Sampling and Analysis of Tree Bark for Asbestos*, Revision 3 (EPA 2012a) and *Libby Asbestos Superfund Site Standard Operating Procedure, Sampling and Analysis of Duff for Asbestos*, Revision 2 (EPA 2012b). These SOPs were provided in Appendix F of the SAP (Tetra Tech 2012).

Samples were labeled with unique sample identification numbers beginning with WW-00100 and increasing consecutively to WW-00124. The "WW" indicated a wood waste sample. COC procedures were followed and all samples were kept in Tetra Tech's possession until transferred to the ESAT laboratory.

3.3 Decontamination and PPE

Tetra Tech field staff completed decontamination of the hole saws, reciprocal saw blades, pruning shears, and other sampling equipment between each wood waste sample. Heavy debris was brushed off and the equipment parts decontaminated using a spray bottle with Troy tap water, followed by drying with paper towels. The water was allowed to fall on the ground in the sampling area and the paper towels were placed in a labeled asbestos waste bag.

Personal protective equipment (PPE) was worn throughout the wood waste sampling and included disposable gloves, hard hats, protective eye wear, work boots, and disposable boot covers. All equipment was thoroughly decontaminated before leaving the landfill sites.

4.0 DATA VERIFICATION AND VALIDATION

Tetra Tech completed verification of the field and laboratory data. Verification of the field-generated data is needed to ensure accuracy of the results. Verification of the laboratory data is essential to ensuring the data is defensible and of acceptable quality. Tetra Tech conducted data review and data entry verification of 100 percent of the laboratory data packages and electronic data deliverables for the analytical results of wood waste material samples and found the data to be correct and of acceptable quality. The field and analytical data will be uploaded to the Scribe database and published to the EPA

Region 8 Scribe website. After it has been uploaded, Tetra Tech will verify 100 percent of the uploaded data.

5.0 DATA RESULTS AND DISCUSSION

Tetra Tech compiled the data from twenty-five wood waste samples analyzed by Hygeia Analytical Laboratory. The results of the wood waste sampling for the Lincoln County landfills are in **Table 1**. Two tree bark samples (WW-00110 and WW-00112) from the Libby tree trunks and stump pile contained detectable LA fibers (Figure 1-2). One brush sample (WW-00119) and two tree bark samples (WW-00121 and WW-00122) from the Troy landfill wood wastes and stump piles contained detectable LA fibers (Figure 1-1). The detectable fiber counts, corresponding LA concentrations, and sample compositional details for the five samples with detectable LA and the other 20 samples are discussed below.

Sample WW-00110: Four LA fibers were detected in tree bark sample WW-00110 from the Libby landfill, which corresponded to a concentration of approximately 379,821 structures per square centimeter (s/cm^2). In addition, one LA fiber was detected in the sample using phase contrast microscopy equivalent (PCME) analysis, which equates to a concentration of 94,955 s/cm^2. The twenty tree bark aliquots are shown in Photo 4 in Attachment A and the general type of tree bark materials that were sampled is shown in Photo 3. Sample WW-00110 was a composite sample from Douglas-fir (Doug-fir), Ponderosa pine (P-pine), cottonwood, and birch trees and was representative of the variety of stumps and trunks in the Libby tree trunks and stump pile. The total surface area of bark in the sample was determined by using a standard 1-inch outside diameter (7/8-inch inside diameter) key-hole drill bit. The surface area of each aliquot was 3.879 square centimeters (cm^2) that equated to a total surface area of bark in WW-00122 of 77.59 cm^2.

Sample WW-00112: One LA fiber was detected in tree bark sample WW-00112 from the Libby landfill. The one fiber corresponds to a concentration of approximately 95,297 s/cm^2. Photo 3 (Attachment A) shows the various cottonwood and oak tree bark materials that were included in this sample. The sample was a composite sample of 20 bark aliquots collected from 18 cottonwood tree trunks and 2 oak tree trunks. This composition was representative of the types of tree trunks in the Libby tree trunks and stump pile. The total surface area of bark in the sample was 77.59 cm^2.

Sample WW-00119: One LA fiber was detected in brush sample WW-00119. That corresponded to a concentration of approximately 8,269,005 structures per gram of dry weight (s/g dry wt). Sample WW-00119 was a field duplicate of sample WW-00118. The general sample location for these two samples is

shown in Photo 7 (Attachment A), and the variation and types of brush materials in the aliquots of the field duplicate samples is shown in Photo 8. Sample WW-00119 was a composite sample from 20 brush aliquots collected from Douglas-fir (Doug-fir), Ponderosa pine (P-pine), and cottonwood trees. The various aliquots represented the variety of brush materials in the Troy landfill wood pile. The sample paired with WW-00119 (WW-00118) did not contain any detectable LA fibers.

Sample WW-00121: Bark sample WW-00121 was collected from the stump pile at the Troy landfill and had two detectable LA fibers. The two fibers correspond to a concentration of approximately 190,594 s/cm^2. Photo 9 (Attachment A) shows the general types of tree trunks in the Troy pile near this sample location and also shows that other objects like rocks and soil were also present in the pile. WW-00121 was a composite bark sample containing 20 total aliquots from Doug-fir, P-pine, and cottonwood trees. Sixteen aliquots (80 percent of the sample) were collected from tree stumps and four aliquots (20 percent of the sample) were collected from tree trunks in the pile. The total surface area of bark in the sample was 77.59 cm^2.

Sample WW-00122: Bark sample WW-00122 was collected from the stump pile at the Troy landfill and had one detectable LA fiber. This one fiber corresponds to a concentration of approximately 285,891 s/cm2. A picture of the general tree bark materials collected in this sample is in Photo 10 (Attachment A). WW-00122 was a composite bark sample containing 20 total aliquots from Doug-fir, P-pine, and cottonwood trees with 16 aliquots (80 percent of the sample) from tree stumps and four aliquots (20 percent of the sample) from tree trunks in the pile. The surface area of bark in the sample was 77.59 cm^2.

All Other Wood Waste Samples: The 20 other brush, tree bark, and manufactured wood waste samples from the Troy and Libby landfills had no detections for LA fibers. As specified in the SAP (Tetra Tech 2012), Tetra Tech did observe, record, and photograph CCA-treated wood in the Libby landfill in the general area of samples WW-00113 and WW-00115. An approximate percentage of CCA-treated wood waste in those general sample areas was recorded, but no suspected CCA-treated manufactured wood products were included in the wood waste samples.

The Lincoln County landfills wood waste sampling is considered a screening-level investigation because only wood waste materials from the piles' perimeters were safe to sample during this task project. Based on the types and varieties of materials included as aliquots in each composite sample, the perimeter sampling is considered to be representative of the various types and varieties of wood wastes in the large landfill piles.

Table 1: Lincoln County Landfills – Libby Amphibole Asbestos Concentrations in Wood Wastes

Landfill Location	Sample No.	Sample Date	Sample Type	LA Fiber Count	LA CONC. (s/cm2 or s/g dry wt)	Field notes
Libby	WW-00100	5/30/12	Brush	ND	< DL	Brush Limbs (50%), little foliage (40%), hay bale (10%)
Libby	WW-00101	5/30/12	Brush	ND	< DL	Brush-limbs (60%), twigs (30%) of various species, little foliage (10%)
Libby	WW-00102	5/30/12	Brush	ND	< DL	Brush (60%), Clippings (10%), needles (30%)
Libby	WW-00103	5/30/12	Brush	ND	< DL	Large limbs (10%), twigs (60%), small foliage (20%), clippings (10%)
Libby	WW-00104	5/30/12	Brush	ND	< DL	Large limbs (15%), grass clippings (15%), twigs (50%), small foliage (20%)
Libby	WW-00105 (FD of WW-00104)	5/30/12	Brush	ND	< DL	Large limbs (15%), grass clippings (15%), twigs (50%), small foliage (20%)
Libby	WW-00106	5/30/12	Brush	ND	< DL	Large limbs (10%), twigs (50%), foliage (20%), roots (10%), clippings (10%)
Libby	WW-00107	5/30/12	Brush	ND	< DL	Large limbs (20%), twigs & smalls (60%), foliage (10%), clippings (10%)
Libby	WW-00108	5/30/12	Brush	ND	< DL	Large limbs (30%), twigs & smalls (40%), clippings (20%), foliage (10%)
Libby	WW-00109	5/30/12	Tree Bark	ND	< DL	Various stumps (60%), various trunks (40%)
Libby	WW-00110	5/30/12	Tree Bark	4	379,821 s/cm2	Various stumps (60%), various trunks (40%)
Libby	WW-00111	5/30/12	Tree Bark	ND	< DL	Various stumps (30%), various trunks (70%)
Libby	WW-00112	5/30/12	Tree Bark	1	95,297 s/cm2	Trunks (100%), oak 2 trunks
Libby	WW-00113	5/30/12	Manufactured Wood	ND	< DL	Pallets (50%), burnt Dim-L (10%), Dim-L (30%), plywood (5%), (CCA 5%)
Libby	WW-00114	5/30/12	Manufactured Wood	ND	< DL	Pallets (50%), Dim-L (40%), plywood (10%)
Libby	WW-00115	5/30/12	Manufactured Wood	ND	< DL	Plywood (40%), Dim-L (40%), pallets (20%), CCA (1 board noted)
Troy	WW-00116	5/31/12	Brush	ND	< DL	Large branches (20%), small & twig (80%)
Troy	WW-00117	5/31/12	Brush	ND	< DL	Large limbs (20%), smalls & twigs (60%), foliage (20%)
Troy	WW-00118	5/31/12	Brush	ND	< DL	Large limbs (20%), smalls & twigs (70%), foliage (5%), straw (5%)
Troy	WW-00119 (FD of WW-00118)	5/31/12	Brush	1	8,269,005 s/g dry wt. of duff	Large limbs (20%), small twigs (70%), foliage (5%), straw (5%)
Troy	WW-00120	5/31/12	Brush	ND	< DL	Large branches (20%), small twigs (60%), dry foliage (20%)
Troy	WW-00121	5/31/12	Tree Bark	2	190,594 s/cm2	Stumps (80%), trunks (20%)
Troy	WW-00122	5/31/12	Tree Bark	1	285,891 s/cm2	Stumps (80%), trunks (20%)
Troy	WW-00123	5/31/12	Manufactured Wood	ND	< DL	Pallets (10%), Dim-L (60%), plywood (30%)
Troy	WW-00124	5/31/12	Manufactured Wood	ND	< DL	Pallets (30%), Dim-L (60%), plywood (10%)

Notes:

FD Field duplicate

Dim-L Dimensional lumber

CCA Chromated copper arsenate (treated lumber) – observed but not sampled

s/cm2 Structures per square centimeter

s/g dry wt. of duff Structures per gram of dry weight of brush and manufactured wood

ND Non-detect

<DL Less than the detection limit

Brush Tree branches between ¼-inch to 4 inches in diameter and foliage and other organic debris.

Manufactured Wood Manufactured wood product materials, dimensional lumber, and plywood debris.

Tree Bark Bark from tree stumps and tree trunks larger than 4 inches in diameter.

REFERENCES

Tetra Tech EM Inc. (Tetra Tech). 2011. Final Asbestos in Tree Bark and Duff Sampling and Analysis Plan. Prepared for the Montana Department of Environmental Quality and Montana Department of Natural Resources and Conservation. October.

Tetra Tech 2012. Final Sampling and Analysis Plan, Libby Amphibole Screening Investigation, Wood Waste Piles at the Lincoln County Landfills, Troy and Libby, Montana. Prepared for the Montana Department of Environmental Quality. May 25.

U.S. Environmental Protection Agency (EPA). 2012a. Libby Asbestos Superfund Site Standard Operation Procedure, Sampling and Analysis of Tree Bark for Asbestos (SOP No. EPA-LIBBY-2012-12). Revision 3. April.

EPA. 2012b. Libby Asbestos Superfund Site Standard Operation Procedure, Sampling and Analysis of Duff for Asbestos (SOP No. EPA-LIBBY-2012-11). Revision 2. April.

LEGEND

CURRENT EXTENT OF WOOD WASTE AND STUMP PILES

WOOD WASTE SAMPLE POINTS

- BARK SAMPLE
- BRUSH SAMPLE
- MANUFACTURED WOOD SAMPLE

0 40 Feet

N

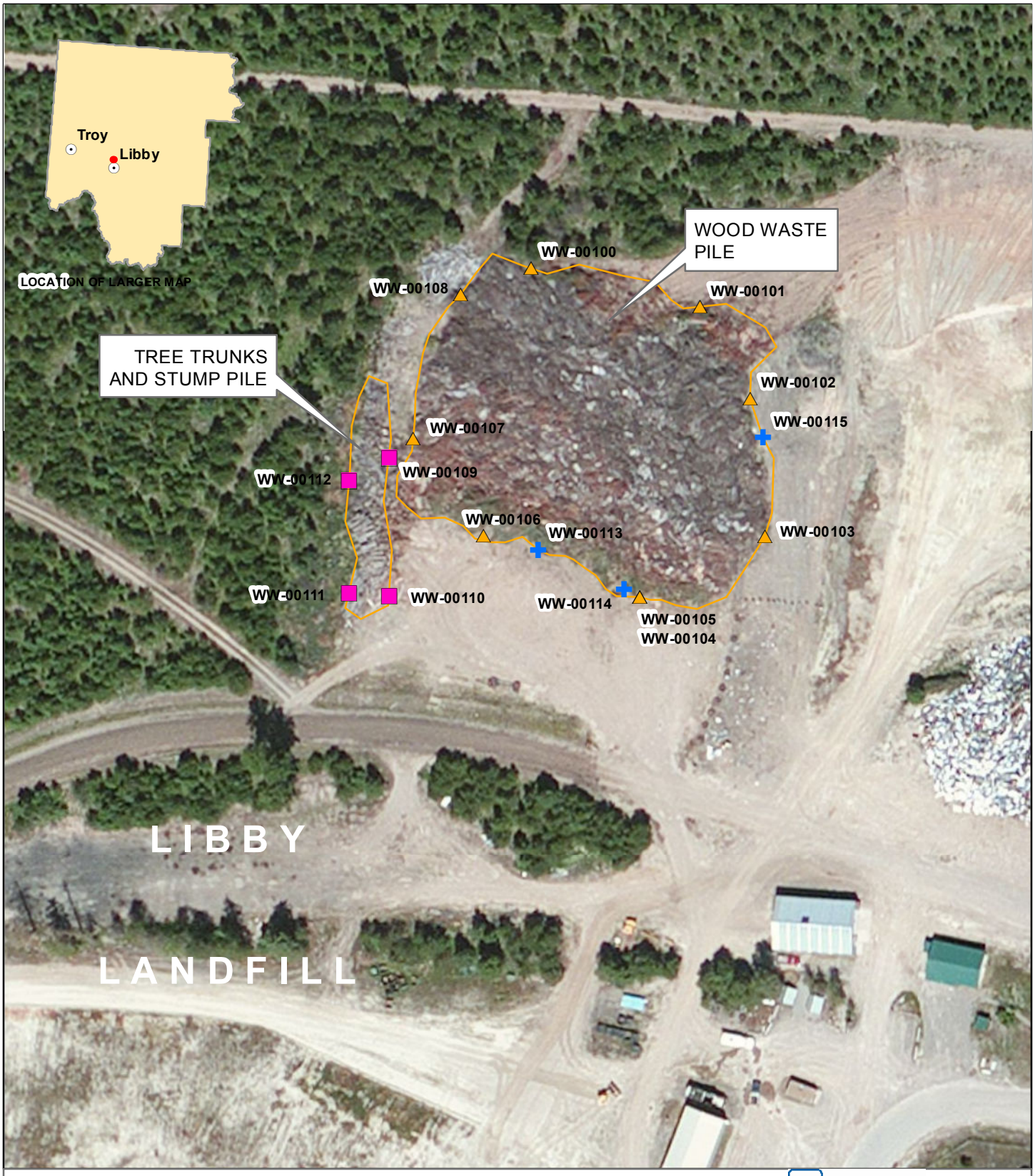
2011 BING AERIAL PHOTO

TETRA TECH EM INC.

LIBBY ASBESTOS SUPERFUND SITE

FIGURE 1-1
TROY LANDFILL
WOOD WASTE PILES

GIS map by Ed Madej TTEMI-HE
FIG1-1_TROY_LANDFILL_071812.mxd



LEGEND

- CURRENT EXTENT OF WOOD WASTE AND STUMP PILES

WOOD WASTE SAMPLE POINTS

- BARK SAMPLE
- BRUSH SAMPLE
- MANUFACTURED WOOD SAMPLE

0 80 Feet

N

2011 BING AERIAL PHOTO

TETRA TECH EM INC.

LIBBY ASBESTOS SUPERFUND SITE

FIGURE 1-2
LIBBY LANDFILL
WOOD WASTE PILES

GIS map by Ed Madej TTEMI-HE
FIG1-2_LIBBY_LANDFILL2_071812.mxd

ATTACHMENT A

PHOTOGRAPH LOG

Photo 1: Sample WW-00100 (Libby) – Typical brush limbs and twigs to be sampled (facing south)

Photo 2: Sample WW-00103 (Libby) – Aliquots of brush sample; mostly Ponderosa pine, Doug fir, cottonwood, apple tree, and leaves and grass clippings

Photo 3: Sample WW-00112 (Libby) – Cottonwood and oak tree bark to be sampled (facing east)

Photo 4: Sample WW-00110 (Libby) – Tree bark aliquots using 1-inch diameter hole saw

Photo 5: Sample WW-00113 (Libby) – Pallets in Libby landfill to be sampled for manufactured wood waste (facing north)

Photo 6: Sample WW-00115 (Libby) – Aliquots of manufactured wood waste sample

Photo 7: Samples WW-00118 and WW-00119 (Troy) – Duplicate brush samples; tree branches, needles, and dry foliage (facing north)

Photo 8: Samples WW-00118 and WW-00119 (Troy) – Brush sample aliquots from the duplicate samples

Photo 9: Sample WW-00121 (Troy) – Bark sample; Ponderosa pine, Douglas fir, and cottonwood (facing south)

Photo 10: Sample WW-00122 (Troy) – Bark sample; Ponderosa pine, Douglas fir, and cottonwood (facing west)

Photo 11: Sample WW-00124 (Troy) – Manufactured wood wastes, dimensional lumber, plywood facing west)

Photo 12: Sample WW-00124 (Troy) – Aliquots of manufactured wood waste sample

ATTACHMENT B

FIELD SAMPLE DATA SHEETS (FSDS)