TETRA TECH EM INC.

February 3, 2012

John Podolinsky
Montana Department of Environmental Quality
Remediation Division
P.O. Box 200901
Helena, MT 59620-0901

Subject: **Final Data Report for DNRC Tree Bark and Duff Sampling for the Upper Flower Creek Timber Sale, Task Order No. 93, DEQ Contract 407026**

Dear John:

One hard copy of the Final Data Report for the Department of Natural Resources and Conservation (DNRC) Tree Bark and Duff Sampling for the Upper Flower Creek Timber Sale Site near Libby, Montana is attached. An electronic copy of the entire report and appendices is also provided in a companion CD. As stipulated under the Task Order, Tetra Tech is providing one hard copy plus companion CD to Mark Peck (DNRC) and also to Christina Progess (EPA).

Tetra Tech appreciates the opportunity to work with you and the DEQ Remediation Division on this important project. If you have any questions, please call me at 441-3269.

Sincerely,

J. Edward Surbrugg, Ph.D.
Project Manager

cc: Tetra Tech file
Mark Peck, DNRC
Christina Progess, EPA

Attachment: Final Data Report
Electronic Copy

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FINAL

LIBBY AMPHIBOLE (LA) ASBESTOS IN TREE BARK AND DUFF IN THE UPPER FLOWER CREEK TIMBER SALE SITE
Libby, Montana

Prepared for:

Montana Department of Environmental Quality
Remediation Division
P.O. Box 200901
Helena, MT 59620

and

Montana Department of Natural Resources and Conservation
1625 Eleventh Avenue
Helena, Montana 59620

Contract Number 407026
Task Order Number 93

February 2012

Prepared By:

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ACRONYMS AND ABBREVIATIONS

DBH	Diameter at breast height
DEQ	Montana Department of Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
Doug Fir	Douglas fir (*Pseudotsuga menziesii*)
EMSL	EMSL Analytical, Inc.
EPA	Environmental Protection Agency
FSDS	Field Sample Data Sheet
HASP	Health and safety plan
ISO	International Organization for Standardization
LA	Libby amphibole
ND	Non-detect
P. Pine	Ponderosa pine (*Pinus ponderosa*)
QA	Quality assurance
QC	Quality control
SAP	Sampling and analysis plan
SOP	Standard operating procedure
SRC	Scientific Research Corporation
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.
W. Larch	Western larch (*Larix occidentalis*)

1.0 PROJECT OVERVIEW AND PURPOSE OF THE INVESTIGATION

Tetra Tech EM Inc. (Tetra Tech) entered into a contract with the Montana Department of Environmental Quality (DEQ) pursuant to DEQ contract No. 407026, Task Order 93, to sample tree bark and duff in the Upper Flower Creek timber sale area south of Libby, Montana (Upper Flower Creek site). Tetra Tech completed the sampling on November 3, 2011 and submitted 10 bark and 10 duff samples to the EMSL Analytical Inc. (EMSL) laboratory for determination of Libby amphibole (LA) asbestos concentrations using approved sample preparation and analytical techniques. Sampling and analytical procedures were described in the approved Sampling and Analysis Plan (SAP) (Tetra Tech 2011). This Data Report contains a summary of the main tasks completed and the validated analytical data.

The purpose of the investigation was to:

- Use a standardized method for collection of tree bark and duff to be analyzed for LA asbestos.
- Submit samples to an analytical laboratory for determination of LA asbestos concentrations using approved sample preparation and analytical techniques.
- Complete a cursory data validation, and
- Provide the results in a brief data report.

2.0 SITE BACKGROUND

The Upper Flower Creek timber sale site is located south of Libby, Montana. The site is owned by the State of Montana and managed by the Department of Natural Resources and Conservation (DNRC). Tetra Tech was tasked to complete this project for DNRC under Tetra Tech's DEQ contract No. 407026. Mr. John Podolinsky, the DEQ Project Officer, provided direction and oversight to Tetra Tech. Mr. Mark Peck, the primary DNRC Project Contact, provided site access to Tetra Tech for the field sampling. Mr. Podolinsky and Mr. Peck reviewed and provided comments on the SAP.

Tetra Tech completed the Draft SAP on October 28, 2011 and the Final SAP on November 2, 2011. Tetra Tech provided the field personnel and collected 10 bark samples and 10 duff samples on November 3, 2011 and shipped the samples to EMSL for analysis on November 4, 2011. Tetra Tech received the analytical data from EMSL on November 23, 2011. Tetra Tech completed cursory data validation during December 2011 and prepared this Data Report to describe the work completed and data results obtained.

J. Edward Surbrugg, Ph.D. was Tetra Tech's project manager and Mr. Mark Stockwell was the field sampling team leader. Mr. Stockwell and Mr. Jay Jordan collected the bark and duff samples and completed the sample shipment. Tetra Tech prepared a project Health and Safety Plan (HASP) that was

available during the sampling. The HASP included general site information, site-specific waste characteristics, hazard evaluation, summary of the field tasks, the site safety work plan (including personnel training), and emergency information including contact phone numbers and a map identifying the route to the local hospital. Mr. Stockwell and Mr. Jordan are current for the Occupational Safety and Health Administration 40-hour hazardous materials handling course training and are certified as asbestos inspectors and contractor/supervisors through the Environmental Protection Agency (EPA) Asbestos Hazard and Emergency Response Act training program.

3.0 COMPLETED SAMPLING AND ANALYSIS

One tree bark sample was collected from each of nine individual trees located across the Upper Flower Creek site (Figure 1). One collocated duplicate bark sample was collected from the tree at Location No. 1. One duff sample was collected near the base of each of the nine trees. One collocated duplicate duff sample was collected at Location No. 4. The collection and analysis of the bark and duff samples for LA concentrations followed the Standard Operating Procedures (SOP) described in (1) Sampling and Analysis of Tree Bark for Asbestos and (2) Sampling and Analysis of Duff for Asbestos (Scientific Research Corporation [SRC] 2007 and 2008).

Two main areas in the upper Flower Creek site were designated for bark and duff sampling. The first area consisted of approximately 450 acres in Section 20, Township 30N, Range 31 W. The second area consisted of approximately 50 acres in a portion of Section 16, Township 30 N, Range 31 W. Six locations were sampled in Section 20 and three in Section 16. Sample locations were selected by dividing the two main areas into polygons and using a Geographic Information System tool to select random locations within each polygon. Representative trees were selected at each of the nine locations from species of Douglas fir, Ponderosa pine, and Western larch with minimum diameters at breast height (DBH) of 16 inches. Five fir trees, three pine trees, and one larch tree were sampled.

Tetra Tech used a tacky hairspray to thoroughly coat the area of bark to be sampled. Bark samples were collected from the northeast side of the tree which generally faces the vermiculite mine. After the hairspray dried, a 2-inch hole saw was used to cut a ring in the bark. The circular piece of bark was removed from the tree using a sharp chisel and a hammer. The detached bark sample was placed in a labeled gallon-size plastic recloseable bag.

Tetra Tech collected the duff samples from the base area near the selected trees. Duff samples were collected using a disposable-gloved hand to place all twigs, leaves, pine needles, and partially decayed organic debris from an approximately six- by six-inch area into a labeled gallon-size reclosable plastic

bag. All samples were shipped to EMSL under chain-of-custody protocols as described in the SAP (Tetra Tech 2011).

Samples were prepared and analyzed by transmission electron microscopy (TEM) by EMSL as described in Section 6 of the SOPs. The laboratory prepared three grids for TEM analysis as detailed in International Organization for Standardization (ISO) TEM method 10312, also known as ISO 10312:1995(E). The laboratory utilized two grids for analysis, and archived one grid. A detailed description of the TEM examination and counting rules was provided in the SAP and in the SOPs. Field and laboratory quality assurance (QA) and quality control (QC) methods are also provided in the SAP and SOPs.

Tetra Tech documented the bark and duff sampling activities on project-specific field sample data sheets (FSDS). Copies of the completed FSDSs are in **Attachment A**. Tetra Tech recorded field sampling notes in a bound field logbook. Photographs were taken to document the field-sampling. Representative photographs of the main field tasks are in **Attachment B**.

4.0 DATA VERIFICATION AND VALIDATION

Tetra Tech completed verification of the field data and validation of the laboratory data. Verification of the data generated during field activities is needed to ensure accuracy of the results. Validation of the laboratory data is essential to ensuring the data is defensible and of acceptable quality. Tetra Tech completed a 100 percent cursory validation on the summary data packages for the analytical results of bark and duff 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.

5.0 DATA RESULTS AND DISCUSSION

Tetra Tech compiled the data from EMSL for the Upper Flower Creek Timber Sale tree bark and duff sampling in **Table 1**. Tree bark samples were collected from five Douglas fir, three Ponderosa pine, and one Western larch. Eight of the nine sample locations contained detectable LA fibers in the tree bark sample or the duff sample. Only Location No. 4 had no detectable LA concentrations in the bark and duff samples. Five of nine tree bark samples and 3 of the nine duff samples contained LA fibers.

LA fibers were detected in tree bark from Sample Locations 1, 5, 6, 7, and 8 with fiber counts from one to ten fibers. LA concentrations in the bark samples ranged from non-detect to 282,873 structures per square centimeter (s/cm^2). The three Upper Flower Creek duff samples with detectable LA fiber counts of 1 to 3 fibers were found at Sample Locations 2, 3, and 9. The LA fiber counts translated to LA concentrations of non-detected to 12,000,000 structures per gram dry weight of duff (s/g dry wt. of duff).

The duplicate tree bark samples were collected from a Douglas fir tree at Sample Location No. 1. The duplicate tree bark samples produced different LA results—the original sample contained 226,298 s/cm^2 and the duplicate sample had no-detectable concentration. The duplicate duff samples were collected at Sample Location No. 4 and both samples had no-detectable concentration of LA asbestos.

Table 1: Upper Flower Creek Timber Sale Bark and Duff Libby Amphibole Asbestos Concentrations

Location No.	Sample No.	Sample Date	Tree Type	LA Fiber Count	LA CONCENTRATIONS Bark = (s/cm2)
1	BT-00105	11/3/2011	Doug Fir	8	226,298
1	BT-00106 (FD of BT-00105)	11/3/2011	Doug Fir	ND	<DL
2	BT-00108	11/3/2011	P. Pine	ND	<DL
3	BT-00110	11/3/2011	P. Pine	ND	<DL
4	BT-00102	11/3/2011	Doug Fir	ND	<DL
5	BT-00112	11/3/2011	Doug Fir	3	84,862
6	BT-00100	11/3/2011	W. Larch	3	73,793
7	BT-00114	11/3/2011	Doug Fir	10	282,873
7	BT-00114 (RP)	11/3/2011	Doug Fir	5	141,436
8	BT-00116	11/3/2011	P. Pine	1	28,287
9	BT-00118	11/3/2011	Doug Fir	ND	<DL
Location No.	**Sample No.**	**Sample Date**	**Tree Type**	**LA Fiber Count**	**LA CONCENTRATIONS Duff = (s/g dry wt. of duff)**
1	BT-00107	11/3/2011	Doug Fir	ND	<DL
2	BT-00109	11/3/2011	P. Pine	2	5,700,000
3	BT-00111	11/3/2011	P. Pine	1	7,300,000
4	BT-00103	11/3/2011	Doug Fir	ND	<DL
4	BT-00104 (FD of BT-00103)	11/3/2011	Doug Fir	ND	<DL
5	BT-00113	11/3/2011	Doug Fir	ND	<DL
6	BT-00101	11/3/2011	W. Larch	ND	<DL
7	BT-00115	11/3/2011	Doug Fir	ND	<DL
8	BT-00117	11/3/2011	P. Pine	ND	<DL
9	BT-00119	11/3/2011	Doug Fir	3	12,000,000

Notes:

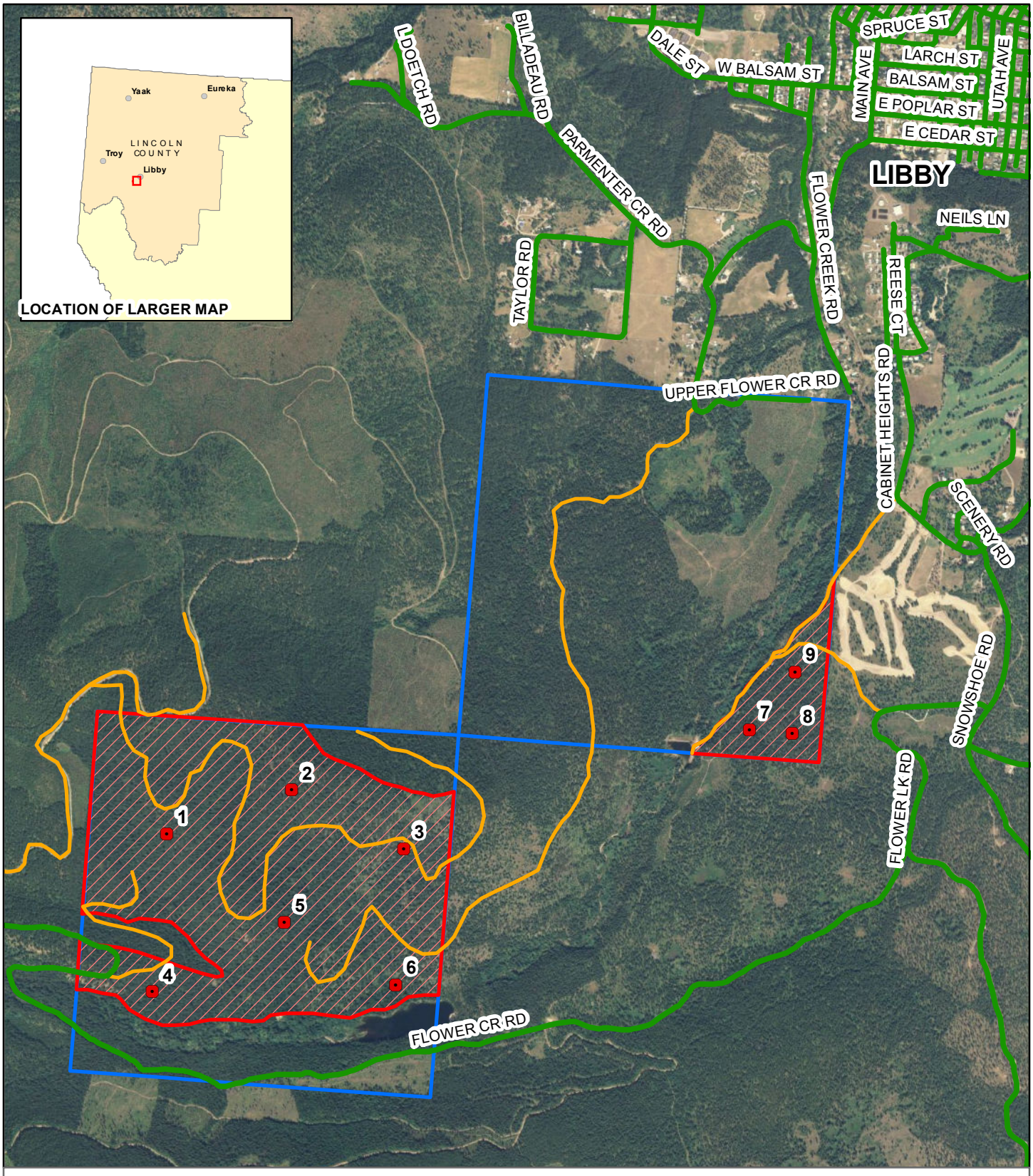
FD	Field duplicate	RP	Laboratory reprepared sample
s/cm2	Structures per square centimeter	s/g dry wt. of duff	Structures per gram of dry weight of duff
ND	Non-detect	Doug Fir	Douglas fir (*Pseudotsuga menziesii*)
P. Pine	Ponderosa pine (*Pinus ponderosa)*	W. Larch	Western larch (*Larix occidentalis*)
<DL	Less than the detection limit		

REFERENCES

Scientific Research Corporation (SRC). 2007. Libby Superfund Site Operable Unit 3 Standard Operating Procedure: Sampling and Analysis of Tree Bark for Asbestos. November 20.

SRC. 2008. Libby Superfund Site Operable Unit 3 Standard Operating Procedure: Sampling and Analysis of Duff for Asbestos. February 7.

Tetra Tech EM Inc. 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.



Legend

- BARK AND DUFF SAMPLE POINTS
- FOREST ROADS
- MAIN ROADS
- HARVEST UNTIS
- DNRC SECTIONS

0 0.4 Miles

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TETRA TECH EM INC.

DEQ BARK AND DUFF SAMPLING SAP

FIGURE 1
UPPER FLOWER CREEK TIMBER SALE
SITE MAP

GIS map by Ed Madej TTEMI-HE
FIG1_DNRC_TIMBER_SALE_SITE_MAP_102511.mxd

ATTACHMENT A

FIELD SAMPLE DATA SHEETS (FSDS)

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-0049 Page Number 24

Sample Location ID: 1 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 21' 03.9" Y Coordinate: W 115° 35' 53.8" Elevation: 3773

Sample Team: M. STOWELL, T. JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: FIR TREE LOCATED 28' SOUTHWEST OF WAY POINT 17" DIAMETER

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00105**	**BT-00106**	**BT-00107**
Sample Time (hh:mm)	1:56 PM	1:56 PM	1:56 PM
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 1	(Bark) Duff (Grab) Composite # of Composites: 1	Bark (Duff) Grab (Composite) # of Composites: 1
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) (FD (field duplicate)) For FD, Parent ID: BT-00105	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A
Field Comments:	BARK 2 1.5 INCHES THICK	BARK 2 1.5 INCHES THICK	DUFF 2 1 INCHES DEEP
Entered by (Provide initials): JJS	**Entered by (Provide initials):** MAS		

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-0049 Page Number 24 ~~25~~ MAS

Sample Location ID: 2 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 45° 21' 11.6" Y Coordinate: W 115° 35' 27.5" Elevation: 3772

Sample Team: M. STOKNES, J. JOHNSON Samplers' Initials: MAS, JJ

Sample Location Comments: PONDEROSA PINE 26" DIAMETER - LOCATED ± 62' EAST OF WAYPOINT (NEAREST LARGE ENOUGH TREE)

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00108**	**BT-00109**	
Sample Time (hh:mm)	2:40PM	2:45PM	
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 5	Bark (Duff) (Grab) Composite # of Composites: 1	Bark Duff Grab Composite # of Composites:
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) FD (field duplicate) For FD, Parent ID:
Field Comments:	BARK ± 2 INCHES THICK	BARK ± 3.5 INCHES THICK DEEP MAS	
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: M-0049 Page Number 25

Sample Location ID: 3 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 21' 04.4" Y Coordinate: W115° 35' 02.4" Elevation: 3768

Sample Team: M. STICKLEY, T. JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: PONDEROSA PINE 19" DIAMETER LOCATED ± 10' EAST OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00110**	**BT-00111**	
Sample Time (hh:mm)	3:10 PM	3:10 PM	
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 1	Bark (Duff) (Grab) Composite # of Composites: 1	Bark Duff Grab Composite # of Composites:
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) FD (field duplicate) For FD, Parent ID:
Field Comments:	BARK ≥ 2 INCHES THICK	DUFF ≥ 3 INCHES DEEP	
Entered by (Provide initials): MAS		**Entered by (Provide initials):** MAS	

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-00419 Page Number 23 & 24

Sample Location ID: 4 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 20' 41.0" Y Coordinate: W 115° 35' 54.3" Elevation: 3780

Sample Team: M. STOLLWERK, JAY JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: FIR TREE 17" DIAMETER LOCATED 3 20' SOUTHWEST OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00102**	**BT-00103**	**BT-00104**
Sample Time (hh:mm)	12:10 PM	12:10 PM	12:10 PM
Sample Type (circle one):	(Bark) Duff; (Grab) Composite; # of Composites: 1	Bark (Duff); (Grab) Composite; # of Composites: 1	Bark (Duff); Grab Composite; # of Composites: 1
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	FS (field sample) (FD (field duplicate)); For FD, Parent ID: BT-00103
Field Comments:	BARK 2 1 INCHES THICK	DUFF 2 1.5 INCHES DEEP	DUFF 2 1.5 INCHES DEEP
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-0049 Page Number 25

Sample Location ID: 5 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 20' 52.4" Y Coordinate: W 115° 35' 27.0" Elevation: 3771

Sample Team: M. STOCKWELL, J. JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: FIR TREE 16" DIAMETER LOCATED ≈ 14' SOUTHEAST OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00112**	**BT-00113**	
Sample Time (hh:mm)	3:34 PM	3:34 PM	
Sample Type (circle one):	(Bark) Duff; (Grab) Composite; # of Composites: 1	Bark (Duff); (Grab) Composite; # of Composites: 1	Bark Duff; Grab Composite; # of Composites:
Field QC Type (circle one)	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	FS (field sample) FD (field duplicate); For FD, Parent ID:
Field Comments.	BARK ≈ .5 INCHES THICK	DUFF ≈ 1.5 INCHES DEEP	
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR - 00149 Page Number 23

Sample Location ID: 6 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 20' 44.7" Y Coordinate: W 115° 35' 01.8" Elevation: 3776'

Sample Team: MAS, JJ Samplers' Initials: MAS, JJ

Sample Location Comments: EACH TREE 16" DIAMETER 56' SOUTH OF WAYPOINT. ONLY TREE OF CORRECT DIAMETER NEAR LOCATION

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00100**	**BT-00101**	
Sample Time (hh:mm)	11:25 am	11:30 am	
Sample Type (circle one):	(Bark) Duff; (Grab) Composite; # of Composites: 1	Bark (Duff); (Grab) Composite; # of Composites: 1	Bark Duff; Grab Composite; # of Composites: ____
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate); For FD, Parent ID: N/A	FS (field sample) FD (field duplicate); For FD, Parent ID ____
Field Comments:	BARK 2 1.5 INCHES THICK	DUFF 2 3 INCHES DEEP	
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-0049 Page Number 25 & 26

Sample Location ID: 7 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 21' 25.4" Y Coordinate: W115° 33' 49.7" Elevation: 3776

Sample Team: M. STOCKWELL, J. JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: FIR TREE 16.5" LOCATED ≈ 6' SOUTHEAST OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00114**	**BT-00115**	
Sample Time (hh:mm)	3:50 PM	3:50 PM	
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 1	Bark (Duff) (Grab) Composite # of Composites: 1	Bark Duff Grab Composite # of Composites:
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) FD (field duplicate) For FD, Parent ID
Field Comments:	BARK ≈ 1 INCHES THICK	DUFF ≈ 2 INCHES DEEP	
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-00419 Page Number 26

Sample Location ID: 8 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N48°21'25.3" Y Coordinate: W115°33'40.5" Elevation: 3774

Sample Team: M. STOCKWELL, J. JORDAN Samplers' Initials: MAS, JJ

Sample Location Comments: PONDEROSA PINE 17" DIAMETER, LOCATED 3' SOUTH OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00116**	**BT-00117**	
Sample Time (hh:mm)	4:00 PM	4:00PM	
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 1	Bark (Duff) (Grab) Composite # of Composites: 1	Bark Duff Grab Composite # of Composites:
Field QC Type (circle one).	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) FD (field duplicate) For FD, Parent ID:
Field Comments.	BARK = .5 INCHES THICK	DUFF = 4 INCHES DEEP	
Entered by (Provide initials): MAS		**Entered by (Provide initials):** MAS	

FIELD SAMPLE DATA SHEET (FSDS)

BARK and DUFF

Field Log Book Number: TR-0049 Page Number 26

Sample Location ID: 9 Sample Date: 11/3/11

GPS Coordinate System: N/A Elevation Coordinate System: N/A

X Coordinate: N 48° 21' 34.2" Y Coordinate: W 115° 33' 40.9" Elevation: 3776

Sample Team: M. STOCKWELL, J. JOHNSON Samplers' Initials: MAS, JJ

Sample Location Comments: FIR TREE 16" DIAMETER - LOCATED ≈ 16' NORTH OF WAYPOINT

Data Item	Sample 1	Sample 2	Sample 3
Index ID (place pre-printed label in field provided)	**BT-00118**	**BT-00119**	
Sample Time (hh:mm)	3:42 pm	3:42 pm	
Sample Type (circle one):	(Bark) Duff (Grab) Composite # of Composites: 1	Bark (Duff) (Grab) Composite # of Composites: 1	Bark Duff Grab Composite # of Composites:
Field QC Type (circle one):	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	(FS (field sample)) FD (field duplicate) For FD, Parent ID: N/A	FS (field sample) FD (field duplicate) For FD, Parent ID:
Field Comments:	BARK ≈ .5 INCHES THICK	DUFF ≈ 6 INCHES DEEP	
Entered by (Provide initials):	MAS	**Entered by (Provide initials):**	MAS

ATTACHMENT B

PHOTOGRAPH LOG

Photo 1: Sample Location No. 1 – Field duplicate bark sample from Douglas fir tree (facing southwest)

Photo 2: Sample Location No. 2 – Bark and Duff collected from Ponderosa pine tree and forest floor (facing southwest)

Photo 3: Sample Location No. 2 – Tetra Tech field member collecting duff sample (facing southwest)

Photo 4: Sample Location No. 3 – General view around sampling area (facing southeast)

Photo 5: Sample Location No. 3 – Ponderosa pine tree after sampling (facing southwest)

Photo 6: Sample Location No. 4 – Field equipment and sample team member (facing southwest)

Photo 7: Sample Location No. 4 – Douglas fir tree bark after sampling (facing southwest)

Photo 8: Sample Location No. 5 – Douglas fir tree to be sampled (facing east)

Photo 9: Sample Location No. 6 – Western larch tree after collecting bark sample (facing southwest)

Photo 10: Sample Location No. 7 – Douglas fir tree after collecting bark sample (facing southwest)

Photo 11: Sample Location No. 8 – Ponderosa pine tree and forest area (facing southwest)

Photo 12: Sample Location No. 9 – Douglas fir tree to be sampled (facing southwest)