Final
First Quarter Memorandum
Outdoor Ambient Air Study

Operable Unit Number 7 of the
Libby Asbestos Superfund Site

Prepared for:
Montana Department of Environmental Quality
Helena Montana

Prepared by:
Tetra Tech
Helena, Montana

February 2010

FINAL
FIRST QUARTER MEMORANDUM
OUTDOOR AMBIENT AIR STUDY

Operable Unit Number 7
of the Libby Asbestos Superfund Site

February 17, 2010

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation Division
P.O. Box 200901
Helena, Montana 59620

Contract Number 407026
Contract Task Order Number 47

Prepared by:

TETRA TECH EM INC.
Power Block Building, Suite 612
7 West 6th Avenue
Helena, Montana 59601
(406) 442-5588

CONTENTS

Section **Page**

1.0 INTRODUCTION 1

2.0 AIR MONITORING PLAN IMPLEMENTATION 1

2.1 ESTABLISH AIR MONITORING STATION LOCATIONS 1
2.2 EQUIPMENT SELECTION AND SETUP 4
2.3 OUTDOOR AMBIENT AIR MONITORING 5
2.4 OUTDOOR AMBIENT AIR MONITORING, ISSUES AND RESOLUTIONS 7

3.0 OUTDOOR AMBIENT AIR MONITORING RESULTS 8

4.0 REFERENCES 11

Appendices
(Provided on attached CD)

A FIRST QUARTER OUTDOOR AMBIENT AIR SAMPLING FSDS SHEETS OCTOBER 30, 2009 THROUGH JANUARY 22, 2010
B AIR MONITORING STATION PHOTOGRAPHS
C FIRST QUARTER OUTDOOR AMBIENT AIR SAMPLING ANALYTICAL RESULTS FOR SAMPLE PERIODS 1 AND 5

TABLES

Table **Page**

2-1 Outdoor Ambient Air Sampling Locations 3
2-2 OU7 Outdoor Ambient Air Sampling 1st Quarter Sample Period Dates 5
3-1 Outdoor Ambient Air Analytical Results 9

FIGURE

Figure **Page**

2-1 OU7 Air Sampling Station Locations 2

1.0 INTRODUCTION

As part of the overall remedial investigation activities conducted within Operable Unit (OU) Number 7 (OU7) of the Libby Asbestos Superfund Site, Tetra Tech EM Inc. (Tetra Tech) conducted ambient air monitoring for the Montana Department of Environmental Quality (DEQ) to evaluate the presence of Libby Amphibole (LA) asbestos in outdoor ambient air throughout the operable unit.

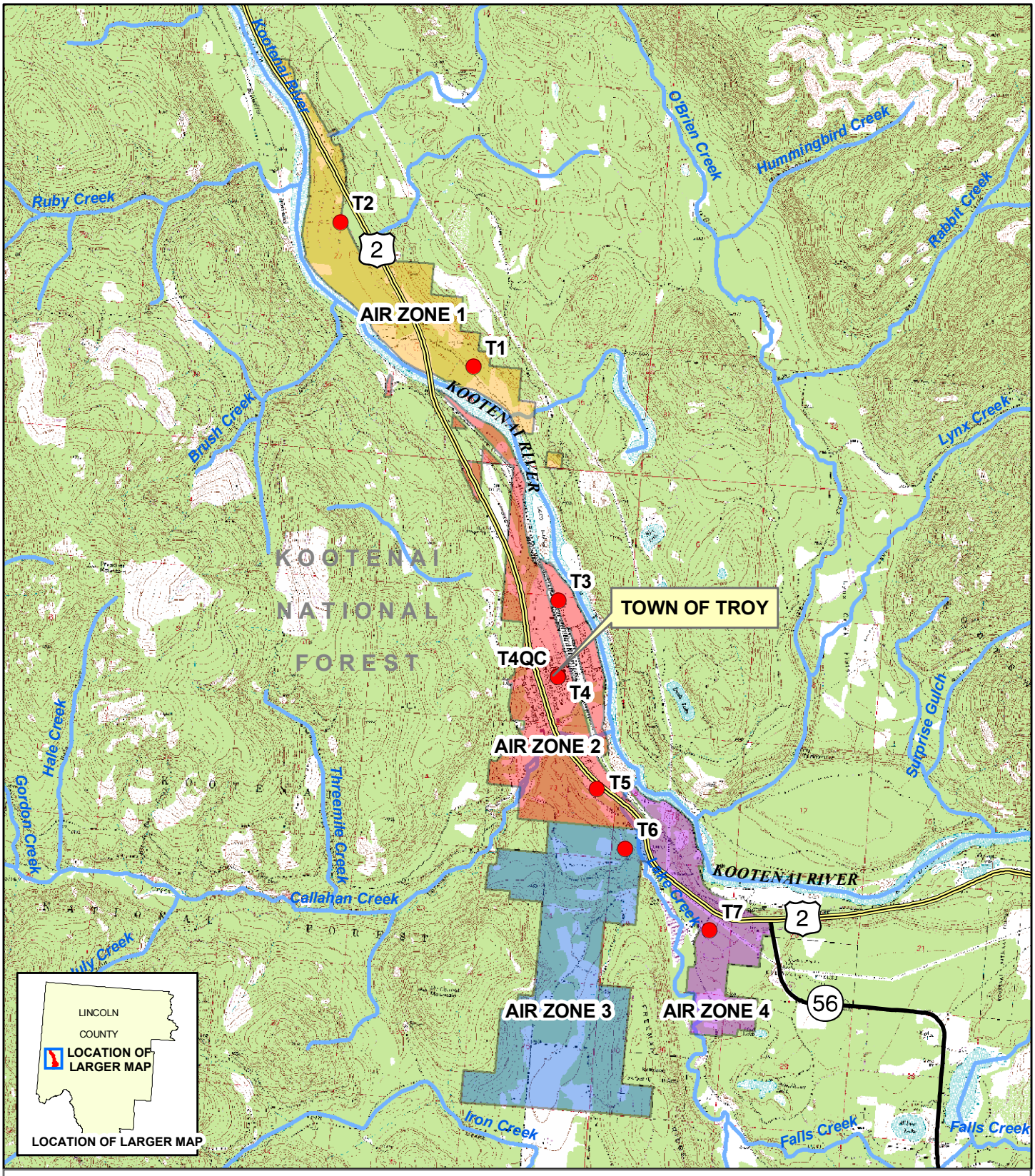
The outdoor ambient air monitoring program implemented by Tetra Tech is based on the Remedial Investigation Work Plan, Outdoor Ambient Air Study (Tetra Tech 2009a) and the associated health and safety plan (Tetra Tech 2009b) and includes monitoring of ambient air in four distinct "air zones" across OU7. Tetra Tech established seven monitoring station locations within the four air zones to evaluate upwind, downwind and residential exposure scenarios. Personnel and work zone monitoring was also conducted to ensure worker safety and to evaluate real-time airborne levels of asbestos in ambient air. This quarterly report summarizes activities related to monitoring station site selection and setup, outdoor ambient air monitoring activities conducted, and available analytical results from the first quarter (October 30, 2009 through January 22, 2010) of the year-long outdoor ambient air monitoring program.

2.0 AIR MONITORING PLAN IMPLEMENTATION

Implementation of the OU7 air monitoring program was initiated in October 2009. Initial field activities included the selection of site monitoring stations, assembly and installation of monitoring equipment, and initiation of outdoor ambient air sample collection. The following sections provide a brief summary of activities conducted to accomplish the goals of the Outdoor Ambient Air Study Work Plan (Tetra Tech 2009a).

2.1 ESTABLISH AIR MONITORING STATION LOCATIONS

Seven ambient air sampling station locations were selected within four distinct outdoor ambient air sampling zones of OU7 **(Figure 2-1)**. The four air sampling zones were defined based on geographic location and land use coverage. Final locations for the seven air sampling stations were determined during the first week of October and were based upon site access, landowner approval, site security, and adequate special coverage of the study area. **Table 2-1** provides the general and detailed locations and rationale for selecting the seven stations. Photographs of the 7 air sampling stations are provided in **Appendix A**.



TETRA TECH EM, INC.

LEGEND

- OU 7 AMBIENT AIR SAMPLE STATION

AMBIENT AIR ZONES

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4

0 1 Miles N

LIBBY ASBESTOS SUPERFUND SITE

FIGURE 2-1
OPERABLE UNIT 7
AMBIENT AIR MONITORING
STATION LOCATIONS

GIS map by Ed Madej TTEMI-HE
TROY_AMBIENT_AIR3_021510.mxd

TABLE 2-1

OUTDOOR AMBIENT AIR SAMPLING LOCATIONS

Station Number	General Location*	Detailed Location	Purpose
T1	Community exposure site and upper-middle bounds of OU7, located at the small community area NE of the Kootenai River	Residential Property at North River Road ***Long -115.9109194*** ***Lat 48.49736625***	This site is used to evaluate LA concentrations at the small community and the upper-middle bounds of OU7
T2	Upwind/downwind site near the NW border of OU7	Fire Station at Forest Drive at Vacation Rd in Kootenai Vista ***Long -115.9355267*** ***Lat 48.5124475***	This site is used to evaluate LA concentrations at the northern boundary of OU7
T3	City of Troy northern site	Water Treatment Station at North end of Roosevelt Park ***Long -115.893191033333*** ***Lat 48.47169145***	This site is used to evaluate LA concentrations north of the Troy community
T4	City of Troy population exposure site	DEQ Troy Info. Center at 303 Third Street ***Long -115.89226045*** ***Lat 48.4631302166667***	This site is used to evaluate LA concentrations in the Troy community (specifically in the population center).
T4QC	City of Troy population exposure site	DEQ Troy Info. Center at 303 Third Street ***Long -115.89226045*** ***Lat 48.4631302166667***	Co-located sample station of T4
T5	City of Troy southern site	County Shops at Hwy. 2 at Sunset Rd. ***Long -115.88398595*** ***Lat 48.4507425666667***	This site is used to evaluate LA concentration south of the Troy community
T6	Upwind/downwind site near the SW boarder of OU7	Water Tower at Iron Creek Rd. ¾ mile south of Hwy 2 ***Long -115.878429133333*** ***Lat 48.4441892166667***	This site is used to evaluate LA concentrations at the southwestern boundary of the OU and confirm if any LA is entering or leaving OU7
T7	Upwind/downwind site near the SE boarder of OU7	Residential Property at Hummingbird Way at Bighorn Way in Wilderness Plateau ***Long -115.862912383333*** ***Lat 48.4357253333333***	This site is used to evaluate LA concentrations at the southeastern boundary of OU7

Notes:

LA	Libby Amphibole	SE	Southeast	Lat	Latitude
NE	Northeast	SW	Southwest	Long	Longitude
NW	Northwest	OU7	Troy Operable Unit		

* Predominant winds in the area blow from the southeast and northwest. Stations on the southeast and northwest bounds of OU7 will act as upwind and downwind receptors depending on wind direction.

The predominant winds in Troy tend to flow in southeast and northwest directions, following the river corridor in which Troy is located; therefore, two sampling stations (one each) were placed in close proximity to the northwest and southeast boundaries of OU7. This will ensure that there are upwind and downwind sample collection stations for both wind directions. Two stations (one each) were also located on the northwest and southeast borders of downtown Troy in order to have upwind and downwind sample stations in the area with the highest population density. One sample station was also placed at the DEQ Troy Information Center in downtown Troy to measure the presence of LA in Troy. One station was placed in the Kootenai Vista area in the northern portion of OU7 and the last station was placed along Iron Creek Road in the southwestern portion of OU7. One additional station was placed in tandem with the station at the DEQ Information Center to serve as the location for collection of co-located quality control samples.

2.2 EQUIPMENT SELECTION AND SETUP

With assistance from Mr. Damon Repine, a CDM field supervisor, Tetra Tech obtained the ambient air sampling station boxes from a Libby storage facility on October 7, 2009. Eight station boxes were obtained with the following serial numbers: 3794-1, 3794-3, 3794-7, 3794-9, 3794-11, 3794-12, 3794-13, and 3794-14. Using Hudson sprayers and disposable towels, Tetra Tech decontaminated the boxes prior to transporting them to the Troy field office. Tetra Tech purchased materials and supplies to set up the sampling station boxes during the weeks of October 12 and 19, 2009.

Exterior view of ambient air sampling station.

Tetra Tech obtained access agreements from property representatives before the sampling station boxes were installed on October 20 and 21, 2009. Contact dates and names of those individuals granting access to each site were recorded on Field Sampling Data Sheets (FSDS) along with all field data collected. The basic design for the FSDS sheets was created before field-testing began and was modified during the first two sampling periods. FSDS sheets for the first quarter sampling periods are provided in **Appendix A**.

Once the sampling stations were placed at each location, the global positioning system coordinates of each station were recorded and site photographs were taken **(Appendix B).** The coordinates provided in

Table 2-1 will be used for spatial pattern analysis and in the preparation of maps that summarize findings. **Figure 2-1** provides sampling station locations.

AirChek 2000 Pump

Sampling station equipment was designed to use battery-operated air sampling and heating equipment in order to work independent of onsite electrical sources. In order to sample continuously for 5 consecutive days with data recording capabilities, the battery operating criteria required Tetra Tech to purchase air sampling equipment that could use 12-volt deep cycle batteries. Tetra Tech purchased air sampling pumps that met these criteria. The selected pumps were SKC AirChek2000 which are equipped with battery eliminator attachments that can be connected directly to the 12-volt batteries. Although the air pump set-up met the manufacturer's specifications, Tetra Tech could not be sure that the apparatus would work successfully for the OU7 ambient air project requirements without first completing a test run. Separate short-term test runs of the sampling equipment and power supply system were completed in the days prior to actual sampling startup. Results of short-term testing indicated that the equipment was functioning properly and was ready for full-length sampling periods.

2.3 OUTDOOR AMBIENT AIR MONITORING

First quarter ambient air sampling consisted of nine 5-day sampling periods separated by five off days between each period. First quarter sampling began with Period 1 on October 30, 2009 and ended with Period 9 that ended on January 22, 2010. **Table 2-2** provides a summary of sampling dates for periods 1 through 9.

TABLE 2-2
OU7 OUTDOOR AMBIENT AIR SAMPLING
1ST QUARTER SAMPLE PERIOD DATES

Sample Period 1	October 30, 2009 to November 3, 2009
Sample Period 2	November 9, 2009 to November 13, 2009
Sample Period 3	November 19,2009 to November 23, 2009
Sample Period 4	November 29, 2009 to December 3, 2009
Sample Period 5	December 9, 2009 to December, 13, 2009
Sample Period 6	December 19, 2009 to December 23, 2009
Sample Period 7	December 29, 2009 to January 2, 2010
Sample Period 8	January 8, 2010 to January 12, 2010
Sample Period 9	January 18, 2010 to January 22, 2010

Tetra Tech scheduled the first sampling period, October 30, 2009 to November 3, 2009, to be a full-length test run. If the pumps ran successfully during this first week the data would be considered valid and subsequent sampling periods would use similar methods. The pumps were set to run at 3 liters per minute for the entire 5-day period, collecting a total of 21,600 liters of air. Tetra Tech monitored the 12-volt batteries daily and recorded minimal voltage loss during this first week. Only one sample, TA-0006 collected at station T-2 (the Kootenai fire station), failed to obtain the air volume goal. This error was due to a programming malfunction and not battery failure, therefore, the test run was deemed successful and samples were collected for analysis. Sampling data and observations were recorded daily on FSDS sheet **(Appendix A)**. The FSDS sheets were modified to add an expanded section for comments and to record the pump set up and retrieval dates on the front page. A total of 5 daily pump inspection checks were placed on the second page of each FSDS.

Interior view of ambient air sampling station showing sampling equipment, batteries, and heater.

Although Tetra Tech was able to test the battery operated air pump mechanisms during the first sampling period, questions still remained on how the pumps would perform during winter temperature drops. The AirChek2000 sampling pump specifications identify an operating temperature range of 32 to 100 degrees Fahrenheit. To maintain temperatures above the base level, Tetra Tech purchased several 12-volt deep cycle batteries to operate miniature heaters inside the sample station boxes.

Tetra Tech tested two heating devices: miniature terrarium heaters with flexible plate designs and 12-volt light bulb appliances. The heating devices were tested during the 2nd and 3rd sampling periods. Tetra Tech collected and recorded data daily to monitor the temperatures of the sampling pumps and the temperatures within the sample station boxes. Tetra Tech also monitored and compared the battery voltage loss for the two heating options. Data were summarized and reviewed after each of the two sampling periods and Tetra Tech concluded that both heating options worked adequately. Although the light bulb appliances provided more heat in extreme cold temperatures, the terrarium heaters were shown to be more efficient for battery usage. The Tetra Tech field team decided to use the terrarium heaters unless extreme cold temperatures are encountered.

The air sampling pumps were programmed to record atmospheric pressure in the "INS mode" (inches of Hg) since Sample Period 1; however, the FSDS sheets for sample periods 1 through 7 had incorrectly referenced the "mm/Hg" (millimeters of Hg) mode. The FSDS sheets were changed to correctly list "INS" beginning in period 8.

2.4 OUTDOOR AMBIENT AIR MONITORING, ISSUES AND RESOLUTIONS

This report addresses the first quarter of the OU7 outdoor ambient air monitoring project. The issues and resolutions addressed during project start up through the first 9 sampling periods are summarized below.

The OU7 Outdoor Ambient Air Study work plan establishes a goal of 21,600 liters of air to be collected per sampling period at each sampling location. This goal was established in order to ensure that target analytical sensitivities could be achieved during the project. However, the air volume requirement presented a potential concern for sample filter overloading. The target air volume of 21,600 liters exceeds the volume of air collected in the OU4 (Libby) ambient air study which averaged about 15,000 liters per sample.

Tetra Tech requested that analytical results for the first sampling period be obtained as soon as possible to determine if the specified pump flow rate of 3.0 liters per minute was excessive and filter overloading would result. Since the ESAT analytical laboratory was not set up to analyze the OU7 outdoor ambient air study samples, Period 1 filter cassettes were sent to Reservoirs Laboratory for analysis. Prior to analyzing the samples, Reservoirs informed Tetra Tech that three samples from Period 1 yielded overloaded cassettes while the remaining five cassettes were not overloaded. Overloaded cassette filters were noted to have a black "soot-like" substance on the filter. The three overloaded cassettes were collected at stations T-4, T-4QC and T-5 (the DEQ Office, DEQ Office QC station, and the County Shops station). Tetra Tech consulted with the DEQ and resolved that the sample stations with the overloaded filter cassettes were likely located in dusty areas and near high traveled roads. Tetra Tech recommended relocating the sampling boxes at these locations to positions farther away from the main roads. Tetra Tech also recommended reducing the sample flow rates from 3.0 to 2.0 liters per minute. These changes were made prior to starting sample Period 4.

Overloaded cassettes were discussed during a telephone conference call on December 2, 2009 with Reservoirs Laboratory, DEQ and Tetra Tech. Reservoir Laboratories stated that although the three cassettes were overloaded, they would be able to analyze them using a secondary dilution process. Additional grid openings would need to be counted in order to achieve the analytical sensitivity and would result in increased analytical time and costs. The number of grid openings to be counted would

increase from 45 to either 73 or 146 to reach required sensitivity levels. Reservoirs Laboratory was directed to analyze the overloaded samples.

The analytical results for Sample Period 1 were received on December 8, 2009, just prior to the start of Sample Period 5. Since all the Period 1 sample results yielded legitimate data despite the three overloaded cassette filters, Period 5 flow rates were returned to 3.0 liters per minute.

The DEQ recommended that rush analysis be completed for the Period 5 samples to help evaluate if relocating the sample boxes at T-4, T-4QC, and T-5 helped avoid filter overloading at these locations. No overloaded cassette filters were identified for any of the Period 5 samples. As a result, relocation of the boxes was enough to eliminate filter cassette overloading and the 3.0 liters per minute flow rate was established for subsequent sampling periods.

Infrequent sample pump failure was another issue noted during first quarter sampling. Tetra Tech experienced pump failures approximately 4 to 5 times during this period. Failures were generally attributed to pump faults and not battery failures or hardware malfunctions. When failures were identified, Tetra Tech was able to minimize data loss for these 4 or 5 occurrences by either repairing or reprogramming the air sampling pump, re-sampling with a new cassette and sample number, or exchanging the pump for a working backup pump using a new cassette and sample number. The FSDS sheets were used to record the replacement samples and revised sample periods.

3.0 OUTDOOR AMBIENT AIR MONITORING RESULTS

Only samples from sample periods 1 and 5 were submitted for transmission electron microscopy (TEM) analyses during first quarter sampling activities. Samples collected during the remaining sample periods (2, 3, 4, 6, 7, 8, and 9) are currently stored at the ESAT laboratory awaiting future analysis. All sample filter cassettes were shipped to ESAT Laboratory in Golden, Colorado under chain-of-custody protocol where they were dried in a dessicator to prevent the growth of mold. **Table 3-1** presents a summary of sample analytical results for periods 1 and 5.

LA fibers were found in sample TA-0003 (County Shops T-5 sample station), and sample TA-004 (DEQ Office T-4 sample station) during Period 1. The laboratory noted other amphibole and chrysotile asbestos fibers in sample TA-001 (DEQ office T-4QC sample station). All three samples were overloaded and underwent an indirect preparation method. The remaining samples collected during Periods 1 and 5 had no detectable asbestos fibers.

TABLE 3-1

OUTDOOR AMBIENT AIR ANALYTICAL RESULTS

Sample Number	Station Location	Sample Station Number	Fiber Size	LA	OA	C	Total Fibers
Sample Period 1 (10/30/09 to 11/3/09)							
TA-0001	DEQ Office	T-4QC	< 5 um	0	2	1	3
	Filter Overload		>= 5 um	0	1	0	1
TA-0002	Water Tower	T-6	> 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0003	County Shops	T-5	< 5 um	**3**	0	0	**3**
	Filter Overload		>= 5 um	**2**	0	0	**2**
TA-0004	DEQ Office	T-4	< 5 um	**4**	0	0	**4**
	Filter Overload		>= 5 um	0	0	0	0
TA-0005	Wilderness Plateau Residence	T-7	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0006	Fire Station	T-2	< 5 um	0	0	0	0
	Limited air volume collected due to programming error		>= 5 um	0	0	0	0
TA-0007	River Rd. Residence	T-1	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0008	Water Treatment	T-3	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0009	Blank	Blank	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
Sample Period 5 (12/9/09 to 12/13/09)							
TA-0041	DEQ Office	T-4QC	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0043	Water Tower	T-6	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0042	County Shops	T-5	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0040	DEQ Office	T-4	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0044	Wilderness Plateau Residence	T-7	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0038	Fire Station	T-2	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0
TA-0037	River Rd. Residence	T-1	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0

Notes:
LA Libby Amphibole
OA Other Amphibole
C Chrysotile Asbestos

TABLE 3-1 (Cont.)

OUTDOOR AMBIENT AIR ANALYTICAL RESULTS

Sample Period 1 (10/30/09 to 11/3/09)							
Sample Number	**Station Location**	**Sample Station Number**	**Fiber Size**	**LA**	**OA**	**C**	**Total Fibers**
TA-0047	Water Treatment	T-3	< 5 um	0	0	0	0
	TA-0039 and TA-0046 were voided due to pump failure at this station		>= 5 um	0	0	0	0
TA-0045	Blank	Blank	< 5 um	0	0	0	0
			>= 5 um	0	0	0	0

Notes:
LA Libby Amphibole
OA Other Amphibole
C Chrysotile Asbestos

4.0 REFERENCES

Tetra Tech EM Inc. 2009a. Remedial Investigation Work Plan, Outdoor Ambient Air Study, Operable Unit 7 of the Libby Asbestos Superfund Site. October.

Tetra Tech EM Inc. 2009b. Operable Unit 7 Ambient Air Study Health and Safety Plan. October.

APPENDICES

(Appendices are provided on the attached disk)

APPENDIX A
FIRST QUARTER OUTDOOR AMBIENT AIR SAMPLING FSDS SHEETS
OCTOBER 30, 2009 THROUGH JANUARY 22, 2010

APPENDIX B
AIR MONITORING STATION PHOTOGRAPHS

APPENDIX C
FIRST QUARTER OUTDOOR AMBIENT AIR SAMPLING ANALYTICAL RESULTS FOR SAMPLE PERIODS 1 AND 5