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Dear reader of the Draft Internal USEPA Region 8 Working Document entitled "Summary of Asbestos Levels in Ambient Air in Libby, Montana" dated December 5, 2005.

The purpose of this letter is to clarify the draft status of the document entitled "Summary of Asbestos Levels in Ambient Air in Libby, Montana (December 5, 2005)," and highlight important limitations of the data and resultant conclusions. The reader is reminded that the document represents a draft internal working document intended for USEPA review only and should be considered preliminary in nature. Our goal is to perform further data collection and analysis to strengthen the report. Neither the data nor the conclusions presented within this draft document should be considered final.

Important limitations of the draft document are summarized below.

- Data presented in the draft document are incomplete because of lack of seasonal and geographic representation over time, and there are an insufficient number of data points at adequate sensitivity.
- The analysis presented in the draft document preliminarily assumes that "non-detect" values are equal to zero. USEPA Region 8 is currently reviewing this approach for analyzing "non-detect" results.
- The methodology for estimating risk ranges is preliminary and should be considered draft.
- Evaluation of risk in the draft document is limited to a single pathway and does not address cumulative exposure from multiple pathways at the Site.

The draft document highlights the need for further investigation of outdoor ambient air in Libby and its vicinity, specifically 1) collection of additional outdoor ambient air data, 2) refinement of the methodology for estimating risk ranges for the Libby population, and 3) consideration of cumulative exposures in evaluating risk.

For further information please contact Jim Luey at (303) 312-6791.

Sincerely,

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cc with Enclosure (1)

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DRAFT – FOR USEPA REVIEW ONLY

SUMMARY OF ASBESTOS LEVELS IN AMBIENT AIR IN LIBBY, MONTANA

December 5, 2005

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SUMMARY OF ASBESTOS LEVELS IN AMBIENT AIR IN LIBBY, MONTANA

1.0 INTRODUCTION

Site Description and History

Libby, Montana, is a community located near an open-pit vermiculite mine which began limited operation in the 1920's and was operated on a larger scale by the W.R. Grace Company from 1963 to 1990. Vermiculite from this mine contains varying amounts of amphibole asbestos (referred to in this report as Libby amphibole, or LA) which, when inhaled, may pose a threat to human health. In the past, mining, milling, processing, and shipping of vermiculite products at the Libby mine led to the release of LA fibers into air breathed by workers, and epidemiological studies of workers at the site indicate an increased incidence of asbestos-related cancer and non-cancer disease (Amandus and Wheeler 1987, Amandus et al. 1987, McDonald et al 1986a, McDonald et al. 1986b, McDonald et al. 2002, McDonald et al. 2004).

Residents in Libby may also have been exposed to asbestos from a number of non-occupational sources, including vermiculite used for indoor insulation in unenclosed locations, vermiculite or other mine wastes in piles located around town, vermiculite used as fill in yards or gardens, and soils contaminated by fallout of vermiculite and/or LA from airborne releases from mining, processing and shipping activities. Such non-occupational exposure pathways have also been associated with evidence of asbestos-related disease and mortality (Peipens et al. ATSDR 2002a,b)

In 1999, the U.S. Environmental Protection Agency (USEPA) began conducting investigations in Libby to identify the most important current sources of asbestos exposure in and about the community, and has been undertaking a range of clean-up activities at the site to remove these sources and reduce or eliminate exposure to materials that contain LA. Under current site conditions, the primary sources of concern are believed to be: a) unenclosed vermiculite in indoor spaces, 2) vermiculite and/or LA in outdoor soils, and 3) vermiculite and/or LA in indoor dusts. The exposure pathways of potential concern to residents include inhalation of asbestos particles in 1) ambient outdoor air, 2) outdoor air in the immediate vicinity of activities that disturb source materials, and 3) indoor air in homes or business where indoor dusts have become contaminated (USEPA 2003a).

Purposes of this Document

As noted above, one of the exposure pathways of potential concern to residents of Libby is inhalation of LA in ambient outdoor air. The purposes of this report are to:

1. Summarize data that have been collected on the level of LA in ambient air in Libby.

2. Investigate whether there are any detectable spatial or temporal trends in ambient air levels of LA.
3. Compare the levels observed in Libby to levels observed in other locations.
4. Provide an assessment of the level of health concern to residents of Libby associated with current levels of LA in ambient air.

2.0 SUMMARY OF AMBIENT AIR MONITORING IN LIBBY

Historic Data

Historic data on the occurrence of LA in ambient air in Libby are extremely limited. However, it is believed that historic levels (i.e., during the time that the mine was active and vermiculite milling, processing and transporting was occurring in and around the community) were almost certainly much higher than under present conditions. The few historic ambient air samples available (collected by phase contrast microscopy (PCM)) indicate that airborne fiber concentrations in the downtown area of Libby may have at least periodically, and perhaps more consistently, exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cc (MRI 1982, Eschenbach deposition).

Recent Data

Beginning around 2000, EPA began collecting ambient air samples at a number of locations around the community in order to gain an initial understanding of the levels of LA typically observed in outdoor air. Locations where samples were collected included:

- Fitness Center at the City Hall Building (952 East Spruce Street)
- McGrade Elementary School (899 Farm to Market Road)
- Plummer Elementary School (247 Indian Head Road)
- Rainy Creek Road
- Lincoln County Courthouse Annex (418 Mineral Avenue)
- Lincoln County Landfill
- Station FA-1 (on the northwestern boundary of the River Runs Through It subdivision)
- Stimson Lumber Property

In addition, samples of ambient air were collected at 27 properties in Libby where EPA clean-up activities were scheduled. These samples were collected before clean-up began, and the measurements were intended to help determine if the cleanup activities caused a measurable release to ambient air.

Figure 1 shows the location of all of these sampling stations, along with a brief description of each site and a summary of the number and dates of samples collected. For convenience, these samples are grouped according into several spatial zones, as follows:

- Zone 1: downtown, east of California Avenue
- Zone 2: downtown, west of California Avenue
- Zone 3: the area south of Stimson Lumber
- Zone 4: the vermiculite mine and Rainy Creek Road
- Zone 5: the screening plant and adjacent area known as the Flyway.

All samples were collected using stationary air monitors. This type of sampler draws a known volume of air (typically 1000-4000 L) through a mixed cellulose acetate filter, trapping asbestos particles on the filter surface. These filters were analyzed for LA primarily by transmission electron microscopy (TEM) using either ISO 10312 or AHERA counting rules. For the purposes of this report, results for these two counting rules are treated as being approximately equivalent, as detailed in USEPA (2005a).

Some samples, especially those collected in the very early phases of the site investigation, were also analyzed for asbestos by phase contrast microscopy (PCM). However, PCM does not distinguish LA from other forms of asbestos, nor does PCM distinguish asbestos from a variety of fibrous non-asbestos materials. In addition, TEM operates at a much higher magnification than PCM, and so it has a greater ability to recognize and include thin fibers. For these reasons, this report focuses only on the results of the TEM analyses.

3.0 SAMPLE IDENTIFICATION

For the purposes of this report, an ambient air sample is defined as any stationary outdoor air sample collected in or about the community under conditions where there were no known nearby activities or disturbances that might cause a temporary elevation of LA fibers in air.

Because TEM ambient air samples entered into the Libby2 database were not explicitly identified as such, it was necessary to use a multi-step process to separate out ambient air samples from other types of air samples that have been collected and analyzed at the site. Table 1 provides a list and brief description of the sequence of steps that were followed to identify the ambient air samples. Attachment 1 provides the Microsoft Access® query used to implement these selection steps in the Libby2 database. This selection procedure was applied to all air samples in the database that were collected from January 2000 through November 2004 (the date of the query). This date range represents the time when EPA initiated ambient air testing in Libby to the point when the database was queried in preparation for this report. Based on these criteria, a total of 404 ambient air samples were identified. These samples are detailed in Attachment 2. Subsequently, a set of 33 ambient air samples was selected for reanalysis from the original 404 TEM ambient air samples identified. These samples were selected for reanalysis in order to improve the sensitivity of the samples for comparison to available health-based criteria (see Section 5.0 below for details).

4.0 RESULTS

Figure 2 shows the measured concentration of LA in each of the 404 ambient air samples, stratified by zone and by collection date. The error bars indicate the statistical (Poisson) uncertainty around each measured value. Summary statistics for these samples are presented in Table 2.

While the database query looked for samples from January 2000 through November 2004, all of the ambient air samples identified in the Libby 2 database were collected between January 2000 and November 2002 (as seen in Figure 2). This is because a majority (85%) of all of the ambient air samples collected between 2000 and 2002 were non-detects (NDs) for LA. As a result, EPA risk managers determined near the end of 2002 that continued monitoring of ambient air beyond 2002 was not needed to support interim decision-making at the site.

As shown in Table 2, the two highest detection frequencies (17%-34%) and the two highest mean air concentrations of LA in detects (approximately 0.004 to 0.006 s/cc)were observed in Zone 4 (Rainy Creek Road and the mine area) and in Zone 5 (the screening plant area). In the main commercial and residential sections of Libby (Zones 1, 2 and 3), the detection frequency was lower [(12+2+2)/261 = 6%] that in Zones 4 and 5, and the concentration of LA in detects in Zones 1, 2 and 3 also tended to be a few-fold lower (approximately 0.001 to 0.003 s/cc) than the mean concentration of detects in Zone 4 or 5. Within the main commercial and residential sections of Libby (Zones 1, 2, and 3), Zone 1 exhibited a higher detection frequency (11%) compared to Zone 2 (2%) or Zone 3 (4%). Overall (all five zones combined), 60 of 404 ambient air samples (15%) were observed to contain one or more LA structures. For these 60 detects, the average TEM LA air concentration was 0.0044 s/cc, with a range from 0.0002 s/cc to 0.033 s/cc. For the non-detect samples (364 out of 404), sensitivity averaged about 0.003 s/cc. The best estimate of the average concentration[1] across all 404 samples is 0.00065 s/cc.

However, confidence in this estimate of the mean concentration of LA in ambient air in Libby is limited by the high frequency of non-detects, and by the relatively high sensitivity of most non-detect samples. To address this limitation, a sub-set of ambient air samples was selected for re-analysis by TEM in order to improve (decrease) the sensitivity and decrease the uncertainty in estimates of concentration, as described below.

5.0 RE-ANALYSIS OF SELECTED SAMPLES

Selection Procedure

A set of 33 ambient air samples were selected for re-analysis. These samples were selected from the set of 404 samples described above, using a stratified random approach

[1] As discussed in Libby Technical Memo 16 (USEPA 2005c), the best estimate of the average concentration was calculated by assigning a value of zero to all samples in which no LA structures were observed ("non-detects").

in which a number of samples were selected for each zone and each year, in order to ensure that the samples were both spatially and temporally representative. In selecting samples for re-analysis, greatest emphasis was placed on Zones 1, 2 and 3, since these zones represent the main residential and commercial areas of Libby (see Figure 1). Only one residential property is represented in the ambient air dataset within Zone 5 and no residential properties are represented in Zone 4. Therefore, no samples were selected for re-analysis from Zone 4 and one sample was selected from the single residential property was selected from Zone 5. The number of samples available and the number selected from each zone and each year are summarized below:

Zone	Year 2000		Year 2001		Year 2002		Total Selected
	Total	Selected	Total	Selected	Total	Selected	
1	33	3	30	3	45	5	11
2	30	4	33	5	37	4	13
3	27	3	10	2	16	3	8
4	119	0	0	0	0	0	0
5	3	0	0	0	21	1	1
Total	212	10	73	10	119	13	33

Target Sensitivity

The target sensitivity identified for the re-analysis of these samples was 0.0001 total TEM LA s/cc. This target sensitivity is based on the concentration that would correspond to a predicted lifetime excess cancer risk of about 1 person in 10,000 (1E-05) in an individual exposed 24 hours per day for a lifetime, using the IRIS risk model for calculation of cancer risk (USEPA 2005b). Details of the approach EPA uses to calculate risk from LA are presented in USEPA (2003a).

Results for the Re-analysis Samples

Attachment 3 provides the detailed analytical results for the 33 ambient air samples selected for re-analysis. The results are shown in Figure 3, stratified by zone and year. Note that the scale in Figure 3 is 10-fold smaller than in Figure 2, so direct comparisons should take this into account. Inspection of Figure 3 suggests there is no apparent difference in concentration values between Zones 1, 2, or 3. Consistent with the original analysis data in Table 2, the one value from Zone 5 is higher than for Zones 1-3, but it is difficult to judge from a single re-analysis sample whether this difference is meaningful or not.

Table 3 presents summary statistics for the original results for these 33 samples (Panel A), along with the results following re-analysis (Panel B). As seen, the re-analysis resulted in an average sensitivity that was about 30 times lower than the original sensitivity (decreasing from 0.0028 s/cc to 0.000096 s/cc), and the best estimate of the

mean[2] decreased from 0.00057 to 0.00026 s/cc. The uncertainty bounds around these means were estimated using Monte Carlo simulation, as described in Attachment 4. Comparison of the results for the original analyses (Panel A) with the results for the re-analysis (Panel B) reveals that the mean values for the re-analysis samples fall within the 90% confidence interval for each of the zones evaluated, alone and combined. However, the width of the uncertainty intervals are decreased substantially in the re-analysis samples compared to the original analyses.

A more detailed pair-wise comparison of the original and re-analysis results of the 33 selected samples is presented in Figure 4. The error bars in this figure represent the 90% statistical (Poisson) confidence bounds around each measured concentration. As shown, the primary effect of re-analysis is to substantially decrease the uncertainty bounds around each estimate, while simultaneously improving the best estimate of the mean ambient air concentration. Of the 26 samples that were non-detects in the original analysis, nine had one or more LA structures detected in the re-analysis, with an average concentration of 0.00037 s/cc. Of the 7 samples that were previously detects (mean = 0.0027 s/cc), all 7 remained detects in the re-analysis, with an average concentration of 0.00075 s/cc. This decrease in the average value of detects is expected, since the sensitivity of the original analysis (about 0.003 s/cc) was higher than the actual mean concentration (0.0003 s/cc), and the detection of even one structure in a sample will always result in a concentration value that is higher than the mean.

6.0 TIME TRENDS

Inspection of Figure 2 and Figure 3 reveal that there is little or no apparent time trend in ambient air samples over the period 2000-2002. However, this may be because the time interval over which samples were collected is too narrow to detect the beneficial effects of remedial activities in the community.

7.0 COMPARISON TO LEVELS OBSERVED ELSEWHERE

A number of reports have been published that include data on the level of asbestos in ambient air in a variety of other locations. These data have been summarized in USEPA (2004). Most of the data include few or no details on sampling locations and methods, or on analytical methods and counting rules. It is suspected that most of the data are for chrysotile rather than amphibole, but this is not certain. Nevertheless, it is of interest to compare the concentration values of LA observed in Libby to the data reported in the literature. This is shown in Figure 5. In this figure, each data point represents a reported ambient air level derived from the literature, and the horizontal bar represents the mean concentration of LA in ambient air in Libby (0.00026 s/cc). As seen, the average concentration of LA in ambient air in Libby overlaps the range of asbestos values reported in outside air at other locations, suggesting that asbestos levels in ambient air in Libby are similar to those observed at other locations.

[2] As discussed in Libby Technical Memo 16 (USEPA 2005c), the best estimate of the mean concentration was calculated by assigning a value of zero to all samples in which no LA structures were observed ("non-detects").

8.0 RISK CHARACTERIZATION

As discussed in USEPA (2003a), there are at present two alternative methods for estimating health risks to people who are exposed to asbestos in air. The first is the method described in USEPA (1986), and the second method is detailed in USEPA (2003b). USEPA (1986) evaluates risks from asbestos based on measured levels of PCM fibers in air, which treats amphibole and chrysotile fibers as being equally toxic. In contrast, USEPA (2003b) evaluates the risks from amphiboles and chrysotile separately, and assigns the greatest potency to fibers that are long (> 10 um) and thin (< 0.4 um). For convenience, these are referred to as protocol structures (PS). In both methods, the level of risk depends on the concentration of asbestos in air, the duration of exposure, and the age when exposure occurs. The details of how the risk computations are performed are presented in Appendix E of USEPA (2003b).

In both risk models, the concentration of asbestos must be expressed in terms of the type of particles evaluated by the model (PCME structures for USEPA 1986, protocol structures for USEPA 2003b). As discussed in USEPA (2003a), at this site the concentrations of PCME structures and protocol structures are estimated by multiplying the total LA concentration by a constant (referred to as the "risk fraction"), which is the fraction of all LA particles that meet the counting rules for each risk model. Based on the most recent download of the LA particle size data from the Libby database (performed On 9/12/2005), the risk fractions are 0.46 for PCME structures and 0.055 for protocol structures. Based on this, the average concentrations of PCME and protocol structures in ambient air are estimated as follows:

PCME: 0.00026 total LA s/cc * 0.46 = 0.00012 PCME s/cc
Protocol structures: 0.00026 total LA s/cc * 0.055 = 0.0000014 PS/cc

Based on these concentrations, the risks for a range of alternative exposures were evaluated. Risks from 9 years of exposure were evaluated because 9 years is the exposure duration used as a default value for assessing risks to residents with central tendency exposure (CTE). Risks from 30 years of exposure were evaluated because 30 years is the exposure duration used as a default for a resident with reasonable maximum exposure (RME). Risk from lifetime exposure was included to define the maximum risk that could occur. Results are shown below:

Estimated Risk of Cancer from Exposure to LA in Ambient Air

Exposure Duration	Age at Exposure (yrs)	Risk Method			
		USEPA 1986		USEPA 2003	
		Best Est.	90% CI	Best Est.	90% CI
9 years (CTE)	0-9	1.0E-05	8.6E-06 - 1.2E-05	3.2E-05	2.7E-05 - 3.9E-05
	21-30	4.6E-06	3.9E-06 - 5.5E-06	1.2E-05	1.0E-05 - 1.4E-05
	51-60	1.4E-06	1.2E-06 - 1.7E-06	1.5E-06	1.2E-06 - 1.7E-06
30 years (RME)	0-30	2.4E-05	2.0E-05 - 2.8E-05	7.1E-05	6.0E-05 - 8.5E-05
	21-50	1.0E-05	8.7E-06 - 1.2E-05	2.3E-05	1.9E-05 - 2.7E-05
Lifetime	Birth-Death	3.2E-05	2.7E-05 - 3.8E-05	8.5E-05	7.2E-05 - 1.0E-04

[NOTE TO EPA REVIEWERS...these risk estimates are tentative, and may change subject to review comments on the mortality and smoking data used to calculate asbestos risks]

As seen, risks to an RME resident (30 years of exposure, beginning at age zero) are about 2.4E-05 based on the USEPA (1986) risk model, and are about 7.1E-05 based on the USEPA (2003) risk model. Lifetime risks are slightly higher (3.2E-05 to 8.5E-05).

9.0 CONCLUSIONS

These results indicate that LA occurs in ambient air in Libby. The sources of these fibers are not known with certainty, but it seems likely that wind-borne transport of particles that are present in soils and dusts around the community is one important component. Concentration levels do not appear to be substantially different at different locations within the main residential-commercial section of Libby (Zones 1-3), but may be somewhat higher closer to the mine (Zones 4 and 5). The levels of LA found in ambient air around Libby are similar to levels of asbestos (unclear mineral types) that have been observed in outdoor air in other locations. Current data are too limited to determine if any time trend towards reduced levels in ambient air is occurring as a result of on-going EPA cleanup activities, but collection of additional current and future ambient air data will help answer this question.

If an individual were exposed to the observed concentrations of LA in ambient air for a lifetime, excess cancer risks based on both risk models (USEPA 1986 and USEPA 2003) would fall within the range that EPA usually considers acceptable (less than 1E-04). However, it should be remembered that people may be exposed to LA by other pathways in addition to ambient air, so cumulative risks will be higher than for ambient air alone. These risk estimates may be revisited and appropriately revised as new data or risk models, including models for non-cancer risks, become available.

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USEPA. 2005a. Technical Memorandum 11: Procedure for Combining TEM Results Across Different Counting Rules and Sample Preparation Methods. *PENDING.*

USEPA. 2005b. Supplemental Remedial Investigation Quality Assurance Project Plan For Libby, Montana (Revision 1). August 5, 2005.

USEPA. 2005c. Technical Memorandum 16: Approach For Computing Exposure Point Concentration Values For Asbestos. *PENDING.*

TABLE 1
PROCEDURE FOR IDENTIFYING AMBIENT AIR SAMPLES

Step	Description	Justification	Number of Analyses		
			Start	Excluded	Remaining
0	Select all air samples in Libby database meeting the query restrictions specified in Attachment 1. This query was performed on 1/11/05.	Starting data set.	11,194	–	–
1	Exclude results for samples that were damaged, overloaded, or not analyzed	No data associated with these records.	11,194	51	11,143
2	Exclude results for samples identified as "blank" in Sample Group	Only field samples are used in report; field blanks will be addressed in a separate quality assurance report.	11,143	5	11,138
3	Exclude samples designated as "clean room" in Sample Group	Samples are not representative of background conditions; "clean room" is used during cleanup activities.	11,138	21	11,117
4	Exclude samples designated as "auto" in Sample Group	Do not fit outdoor criteria; "auto" indicates samples were collected inside vehicles.	11,117	14	11,103
5	Exclude samples designated as "clearance" in Sample Group	Samples are not representative of pre-cleanup (background) conditions; clearance samples are associated with cleanup activities.	11,103	54	11,049
6	Exclude samples designated as "NAFU" in Sample Group	Samples not representative of background conditions; negative air filtration unit (NAFU) monitored during cleanup activities.	11,049	196	10,853
7	Exclude samples designated as "clear" in PrePostClear	Samples not representative of pre-cleanup (background) air conditions; clearance samples are associated with cleanup activities.	10,853	125	10,728
8	Exclude samples designated as "post" in PrePostClear	Samples not representative of pre-cleanup (background) air conditions; post-cleanup samples.	10,728	46	10,682
9	Exclude samples designated as "NAFU" in Location Description	Samples not representative of background air conditions; NAFU in use during cleanup activities.	10,682	566	10,116
10	Exclude samples designated as "make-up" (also "make up", "makeup", "makup", "flake up", "negative", and "exhaust") in Location Description	Samples not representative of background conditions; make-up air unit (a.k.a. NAFU) monitored during cleanup activities.	10,116	125	9,991
11	Exclude samples designated as "vac" in Location Description to remove records related to vacuum truck, vac truck exhaust, etc.	Samples not representative of background conditions; vac truck in operation during cleanup activities.	9,991	5	9,986
12	Exclude samples designated as "load out" (also "load-out", "wasteout", "waste out", "bagout", "bag out") in Location Description	Samples not representative of background conditions; load out areas put in use during cleanup activities.	9,986	26	9,960
13	Exclude samples designated as "exposure monitoring" in Sample Group	Samples not representative of background conditions; exposure monitoring samples collected during cleanup activities.	9,960	1	9,959
14	Exclude samples designated as "clean room" (also "cleanroom") in Location Description	Samples are not representative of background conditions; "clean room" is used during cleanup activities.	9,959	77	9,882
15	Exclude samples designated as "decon" in Sample Group	Samples not representative of background conditions; decon trailer in operation during cleanup activities.	9,882	76	9,806
16	Exclude samples designated as "decon" in Location Description	Samples not representative of background conditions; decon trailer in operation during cleanup activities.	9,806	44	9,762
17	Exclude samples designated as "containment" in Location Description	Samples not representative of background conditions; containment monitored during cleanup activities.	9,762	9	9,753
18	Exclude samples analyzed by PCM only	Since PCM does not discriminate between asbestos and non-asbestos fibers, only samples analyzed by TEM retained.	9,753	3,015	6,738
19	Exclude samples designated as "BNSF Libby Railyard" in Property Group	Samples collected during asbestos abatement; activities not representative of background conditions	6,738	183	6,555
20	Exclude samples designated as "Screening Plant" (and all variations of this address) in Property Group. *Note: "Pre" samples, and FA-1 samples collected when screening plant not in operation (from January 2002 through May 2002) were retained*	"Pre" samples indicate background samples; all other samples collected during periods when cleanup activies being conducted at the adjacent screening plant area, which are not representative of background conditions.	6,555	1,450	5,105
21	For properties with "Pre" samples designated: Exclude all non-"Pre" samples and samples collected subsequent to the "Pre" sample	"Pre" samples indicate background samples; all other samples collected during cleanup activities, which are not representative of background conditions	5,105	435	4,670
22	For properties without "Pre" samples designated: Exclude all samples not representative of "Pre" or backgound based on field log notes. *Note: deleted all records for cleanups that occurred after December 2002.*	Log notes were reviewed to determine if/when background samples were collected. Background samples were not required to be collected on exterior cleanups beginning January 2003.	4,670	4,011	659
22a	For properties without "Pre" samples designated: Exclude samples that were not verifiable as being background	Could not locate field log notes for 3 samples at 2 locations, samples were excluded.	659	3	656
23	Exclude samples collected from indoor-only cleanup properties where outdoor air was monitored during interior cleanup - property list taken from the WE 1/22/05 cleanup list maintained by N. Parker (CDM)	Samples collected during cleanup activities not representative of background conditions.	656	200	456

[redacted]

Table 1_Selection Process v2.xls, Table 1
12/5/2005

TABLE 2
SUMMARY STATISTICS FOR 404 AMBIENT AIR SAMPLES FROM LIBBY, MT

Zone	Total Samples	Total Detects	Detection Frequency	Detects Only		Non-Detects Only		All Samples	
				Air Concentration (s/cc)		Analysis Sensitivity $(cc)^{-1}$		Mean Air Concentration (s/cc)	90% Poisson Confidence Interval
				Mean	Range (Min-Max)	Mean	Range (Min-Max)		
1	108	12	11%	1.3E-03	2.0E-04 - 4.6E-03	3.5E-03	1.9E-04 - 4.3E-02	1.5E-04	4.9E-05 - 1.8E-04
2	100	2	2%	3.4E-03	3.4E-03 - 3.4E-03	3.0E-03	1.9E-04 - 7.1E-03	6.8E-05	2.3E-05 - 6.4E-05
3	53	2	4%	9.5E-04	2.2E-04 - 1.7E-03	3.0E-03	2.0E-04 - 1.4E-02	3.6E-05	0.0E+00 - 2.5E-05
4	119	40	34%	5.6E-03	3.2E-04 - 3.3E-02	1.3E-03	2.1E-04 - 3.7E-03	1.9E-03	1.7E-03 - 2.1E-03
5	24	4	17%	4.0E-03	1.4E-03 - 8.6E-03	2.3E-03	2.9E-04 - 4.6E-03	6.7E-04	5.7E-05 - 7.1E-04
ALL	404	60	15%	4.4E-03	2.0E-04 - 3.3E-02	2.7E-03	1.9E-04 - 4.3E-02	6.5E-04	5.5E-04 - 6.8E-04

TABLE 3
SUMMARY STATISTICS FOR 33 AMBIENT AIR SAMPLES SELECTED FOR RE-ANALYSIS

PANEL A: INITIAL RESULTS

Zone	Total Samples	Total Detects	Detection Frequency	Detects Only		Non-Detects Only		All Samples	
				Air Concentration (s/cc)		Analysis Sensitivity $(cc)^{-1}$		Mean Air Concentration (s/cc)	90% Poisson Confidence Interval
				Mean	Range (Min-Max)	Mean	Range (Min-Max)		
1	11	4	36%	1.3E-03	7.8E-04 - 2.7E-03	2.3E-03	1.9E-04 - 4.7E-03	4.7E-04	1.5E-04 - 8.5E-04
2	13	1	8%	3.4E-03	3.4E-03 - 3.4E-03	2.8E-03	1.9E-04 - 4.6E-03	2.6E-04	6.5E-05 - 4.5E-04
3	8	1	13%	1.7E-03	1.7E-03 - 1.7E-03	3.3E-03	8.7E-04 - 4.8E-03	2.1E-04	0.0E+00 - 5.2E-04
4	0	--	--	--	--	--	--	--	--
5	1	1	100%	8.6E-03	8.6E-03 - 8.6E-03	--	--	8.6E-03	0.0E+00 - 2.2E-02
ALL	33	7	21%	2.7E-03	7.8E-04 - 8.6E-03	2.8E-03	1.9E-04 - 4.8E-03	5.7E-04	2.6E-04 - 9.4E-04

PANEL B: RE-ANALYSIS RESULTS

Zone	Total Samples	Total Detects	Detection Frequency	Detects Only		Non-Detects Only		All Samples	
				Air Concentration (s/cc)		Analysis Sensitivity $(cc)^{-1}$		Mean Air Concentration (s/cc)	90% Poisson Confidence Interval
				Mean	Range (Min-Max)	Mean	Range (Min-Max)		
1	11	6	55%	4.4E-04	9.9E-05 - 1.1E-03	9.0E-05	6.9E-05 - 1.0E-04	2.4E-04	1.7E-04 - 3.2E-04
2	13	6	46%	2.9E-04	6.5E-05 - 9.3E-04	9.8E-05	9.5E-05 - 1.0E-04	1.4E-04	8.7E-05 - 1.9E-04
3	8	3	38%	5.9E-04	9.6E-05 - 9.6E-04	9.8E-05	9.4E-05 - 1.0E-04	2.2E-04	1.3E-04 - 3.1E-04
4	0	--	--	--	--	--	--	--	--
5	1	1	100%	2.4E-03	2.4E-03 - 2.4E-03	--	--	2.4E-03	1.6E-03 - 3.2E-03
ALL	33	16	48%	5.4E-04	6.5E-05 - 2.4E-03	9.6E-05	6.9E-05 - 1.0E-04	2.6E-04	2.2E-04 - 3.1E-04

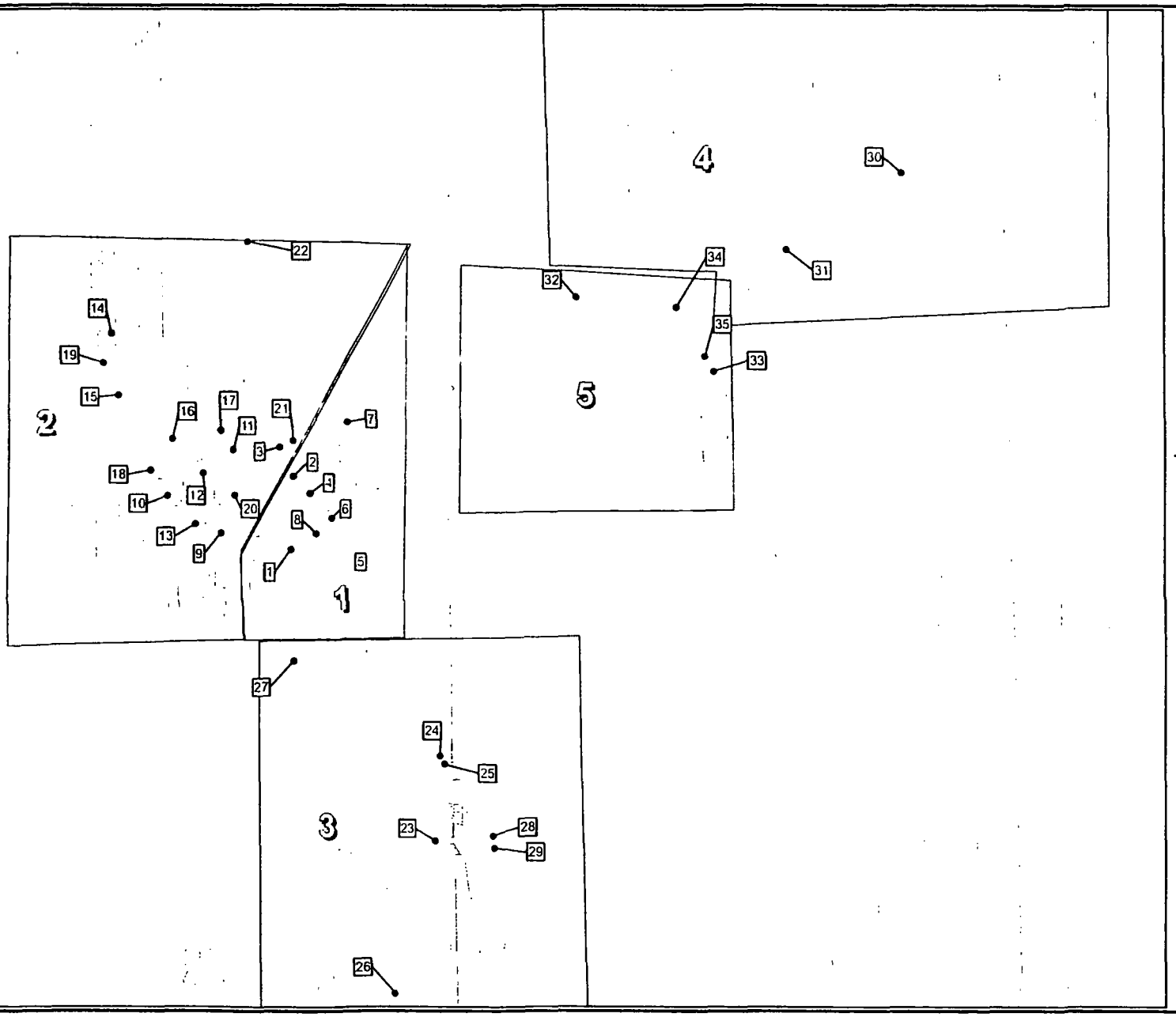

Figure 1
Ambient Air
Sampling Locations Stratified by Zone

See Map Legend (attached as page 2) for description of the unique locations IDs.

N
W E
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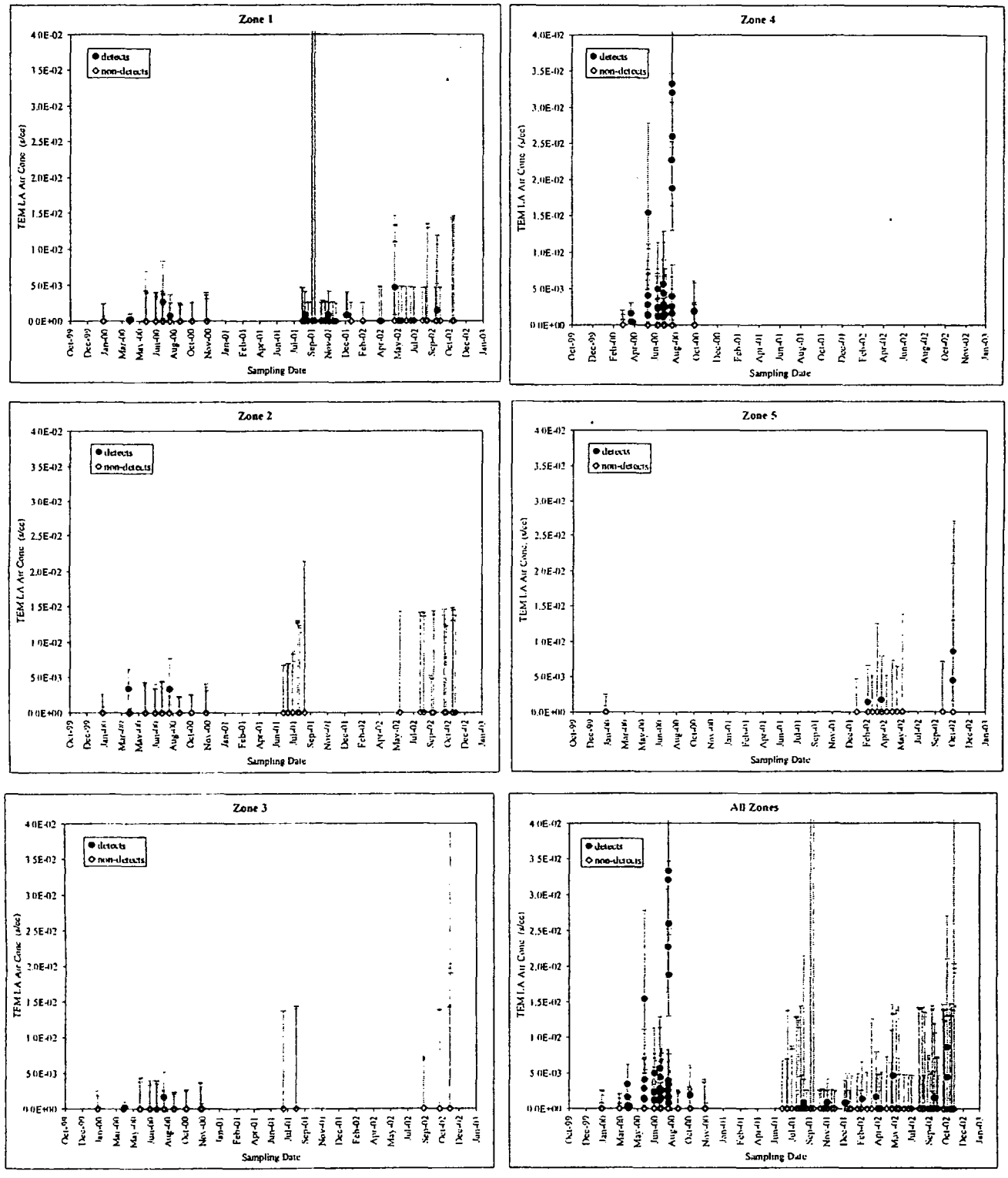
NOT TO SCALE

CDM

MAP LEGEND

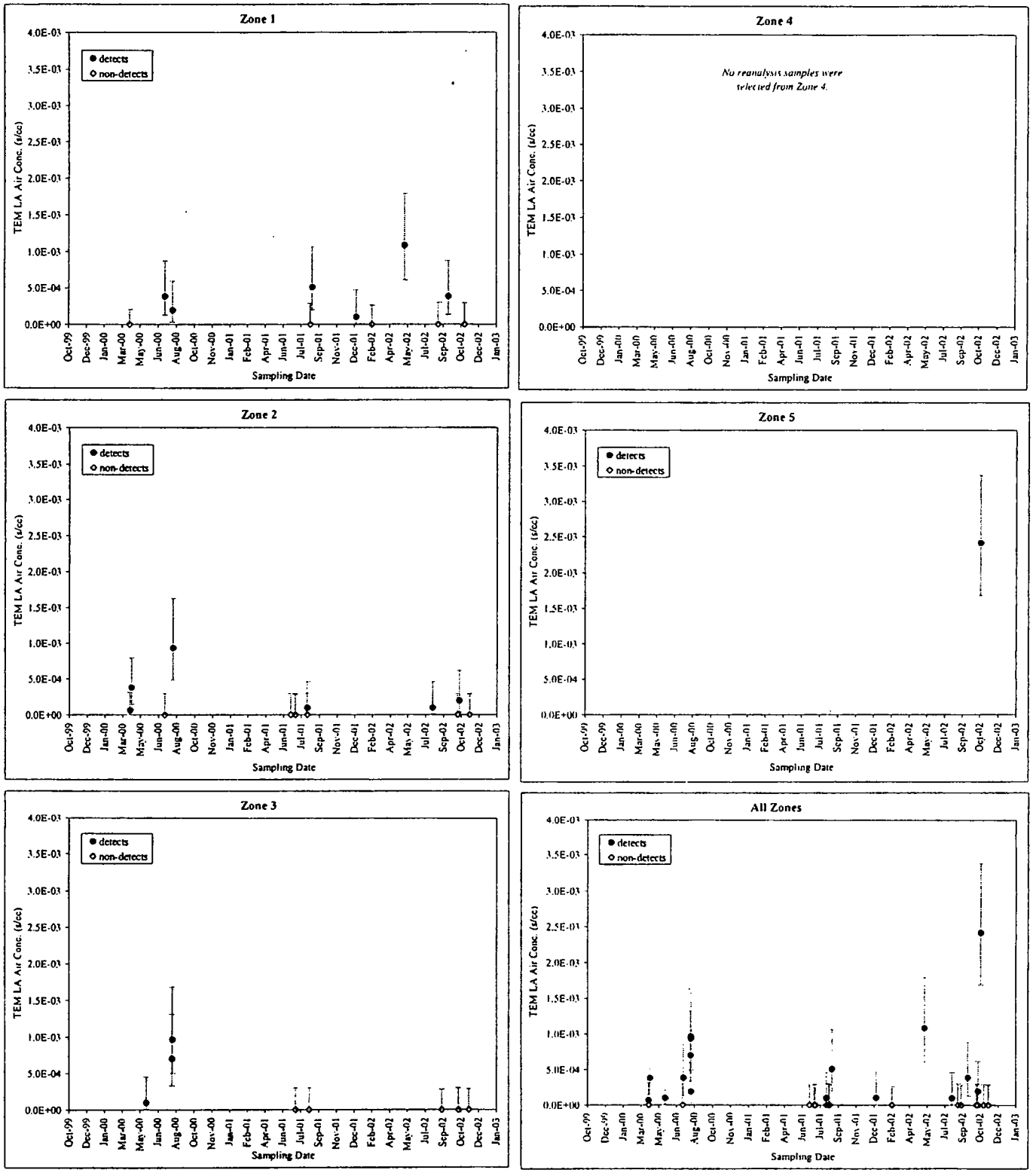
Zone	Map Identifier	Location Description	Number of Samples 2000	2001	2002
1	1	1417 Louisiana Ave			4
	2	418 Mineral Ave - County Annex Building		30	15
	3	510 W. 1st St			8
	4	605 Utah Ave			4
	5	875 Highway 2 S - Stimson Lumber			10
	6	952 E. Spruce St - Fitness Center	27		
	7	Champion Haul Rd			4
	8	MillWork West	6		
2	9	101 Ski Rd - Libby Middle School		12	
	10	110 Montgomery Dr			1
	11	123 Hamann Ave			4
	12	150 Education Way - Libby High School		12	
	13	154 Ski Rd			4
	14	156 S. Central Rd			4
	15	2113 Highway 2 W			4
	16	247 Indian Head Rd - Plummer Elementary School	27	4	4
	17	2608 W. 2nd St Ext			4
	18	319 Norman Ave			4
	19	500 Jay Effar Rd			4
	20	Armory		1	
	21	Export Plant	3		
	22	Lincoln County Landfill		4	4
3	23	34 Bowker St #13			4
	24	3496 Highway 2 S		6	
	25	3504 Highway 2 S			8
	26	781 Terrace View Rd			4
	27	819 Cabinet Heights Rd		4	
	28	899 Farm to Market Rd - McGrade Elementary	16		
	29	Jerry Dean Park, McGrade School	11		
4	30	Mine	96		
	31	Rainy Creek Rd	23		
5	32	4241 Highway 37 N			4
	33	KDC Flyway			5
	34	Rainy Creek Bank			6
	35	Screening Plant & Flyway	3		6
		Total:	**212**	**73**	**119**

FIGURE 2
CONCENTRATION OF LA IN 404 AMBIENT AIR SAMPLES FROM LIBBY
INITIAL ANALYSES



Error bars represent the 90% Poisson confidence interval.

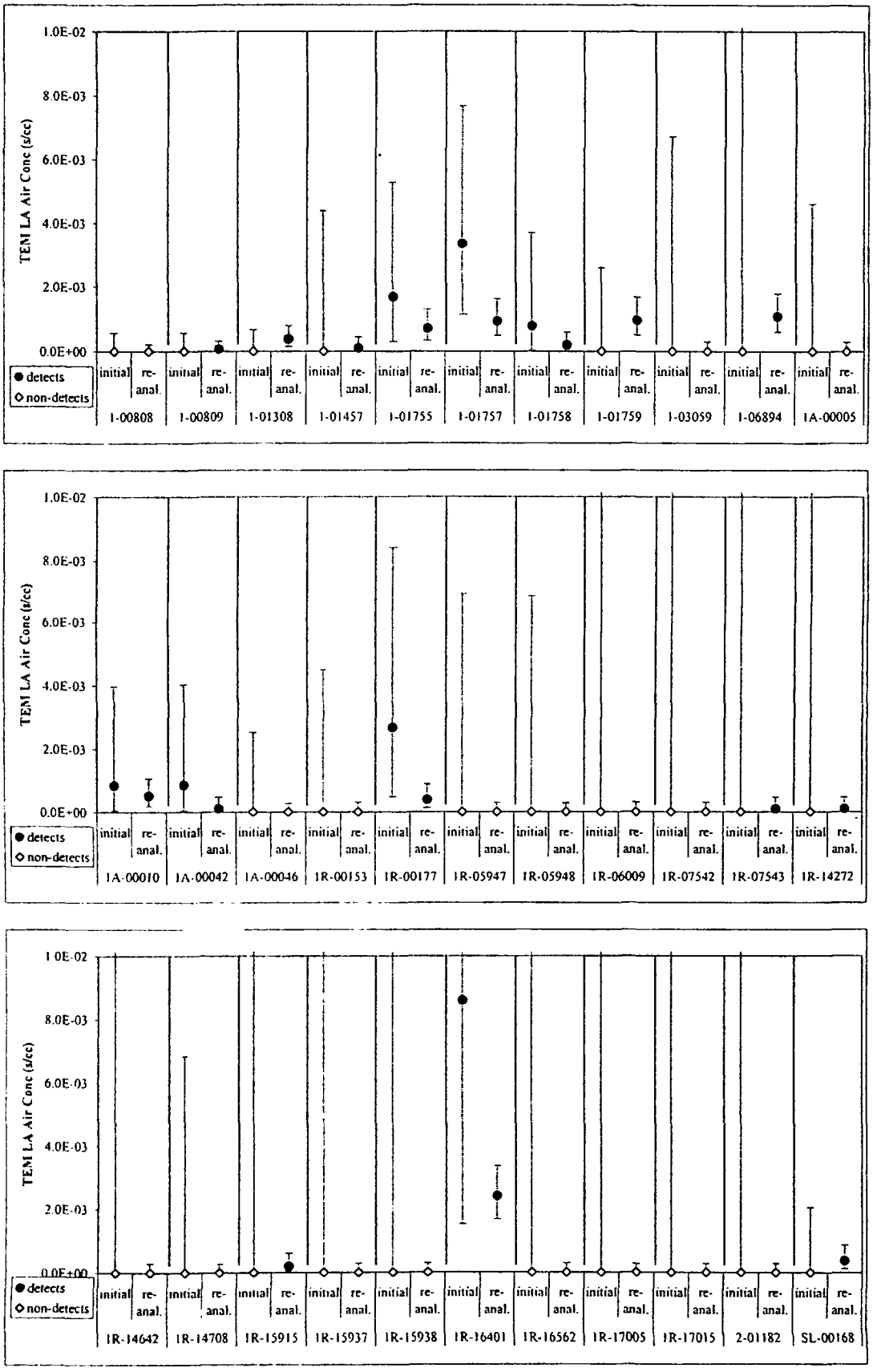
FIGURE 3
CONCENTRATION OF LA IN 33 AMBIENT AIR SAMPLES FROM LIBBY
RE-ANALYSIS AT IMPROVED SENSITIVITY



Error bars represent the 90% Poisson confidence interval.

Fig2&3_Temporal Plots v2.xls, plots_reanalysis

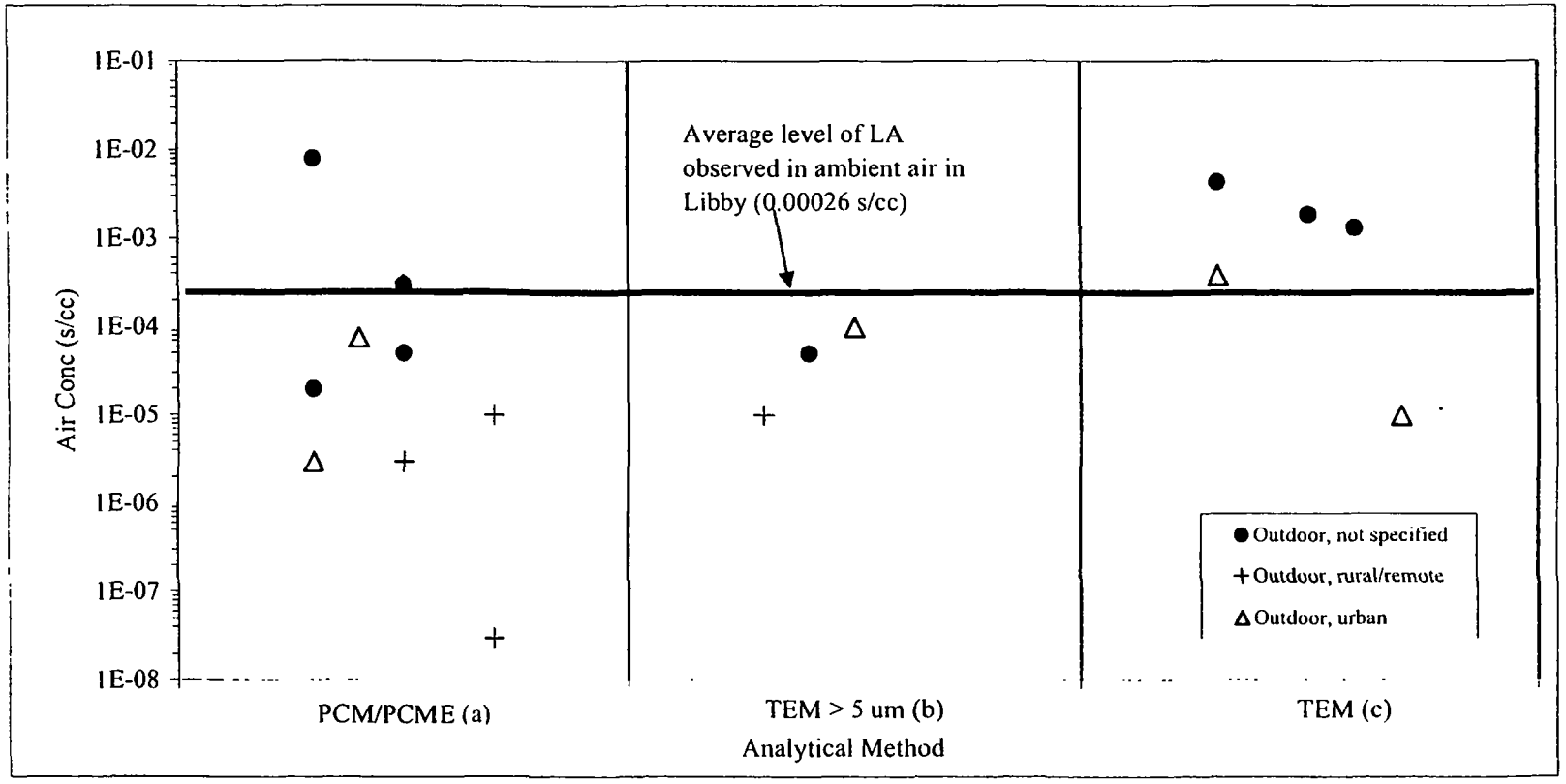
FIGURE 4. COMPARISON OF INTIAL AND RE-ANALYSIS RESULTS



Error bars represent the 90% Poisson confidence interval.

Fig4_Old vs New v2.xls

FIGURE 5. COMPARISON OF ASBESTOS LEVELS IN AMBIENT AIR IN LIBBY TO OUTDOOR AIR FROM OTHER LOCATIONS



Data Source: USEPA 2004

(a) PCM = structures counted by phase constrast microscopy (length > 5 um, width > 0.25 um, AR >= 3:1)
PCME = structures counted by TEM that have dimensions that meet the PCM rules above

(b) TEM > 5 um = all structures counted by TEM with length > 5 um

(c) TEM = all structures counted by TEM (details on counting rules not reported)

ATTACHMENT 1
MICROSOFT ACCESS QUERY FOR IDENTIFYING AMBIENT AIR SAMPLES

INITIAL QUERY

The Libby 2 Database was intially queried by Volpe on January 11, 2005.

Basic SQL Query Restrictions:

Media = Air
Matrix = Outdoor
Personal/Stationary = Stationary
Sample QC Type = Field Sample (FS)
Sample Date = 1/1/2000 through 11/30/2004

SQL Code:

```
WHERE (((dbo_tblSample.SamplePersonalStationary)="Stationary") AND
((dbo_refSampleMedia.SampleMediaDesc)="air") AND
((dbo_refSampleMatrix.SampleMatrixDesc)="outdoor") AND
((dbo_refSampleQCType.SampleQCTypeAbbr)="FS") AND ((dbo_tblSample.SampleDateBegin)
Between #1/1/2000# And #11/30/2004#));
```

SQL Query Results:

A total of 10,052 unique samples were identified (encompassing 4,190 PCM analyses, 4,115 AHERA analyses, and 3,383 ISO analyses in the Libby 2 Database as of January 11, 2005).

ADDITIONAL RESTRICTIONS

A series of 23 steps were used to restrict the initial query results from 10,052 samples to the subset of 404 ambient air samples utilized in the 2005 report. These steps were applied by CDM in consultation with EPA (January 18-26, 2005).

*See Table 1 for Step Details.

Step Results:

A total of 404 unique samples were identified (encompassing 105 AHERA analyses and 351 ISO analyses in the Libby 2 Database as of January 11, 2005).

FINAL QUERIES

Because the Libby 2 Database is updated continually, analytical results for the 404 ambient air samples may have been added or modified since the query performed by Volpe on January 11, 2005. In order to capture the most recent analytical results for the 404 unique ambient air samples, TEM results for these samples were downloaded from the Libby 2 Database by SRC on September 19, 2005 into a Microsoft Access database.

Access Query Results:

For these 404 samples, a total of 146 AHERA analyses and 384 ISO analyses were available (as of September 19, 2005, including Lab QC analyses).

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (s)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
4	Rainy Creek Rd	Vermiculite Mine, Upper Mine Road		1-00397	3/11/2000	7500	TEM-ISO10312	4/17/2000	direct	10	0.01	385	1	4488	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	4.7E+03	2.1E-04	0.0E+00	0.0E+00 - 6.4E-04
						7501	TEM-ISO10312	6/11/2000	direct	30	0.01	385	1	4488	0	2.9E-04	0.0E+00	0.0E+00 - 8.6E-04					
4	Rainy Creek Rd	Vermiculite Mine, Dam		1-00399	3/11/2000	7502	TEM-ISO10312	4/19/2000	direct	10	0.01	385	1	1426	0	2.7E-03	0.0E+00	0.0E+00 - 8.1E-03	0	1.5E+03	6.7E-04	0.0E+00	0.0E+00 - 2.0E-03
						7503	TEM-ISO10312	6/11/2000	direct	30	0.01	385	1	1426	0	9.0E-04	0.0E+00	0.0E+00 - 2.7E-03					
4	Rainy Creek Rd	Vermiculite Mine, Tailings pile		1-00400	3/11/2000	7504	TEM-ISO10312	4/19/2000	direct	10	0.01	385	1	3841	0	1.0E-03	0.0E+00	0.0E+00 - 3.0E-03	0	4.0E+03	2.5E-04	0.0E+00	0.0E+00 - 7.5E-04
						7505	TEM-ISO10312	6/11/2000	direct	30	0.01	385	1	3841	0	3.3E-04	0.0E+00	0.0E+00 - 1.0E-03					
4	Rainy Creek Rd	Vermiculite Mine, Road near dam		1-00401	3/11/2000	7506	TEM-ISO10312	4/17/2000	direct	10	0.01	385	1	2028	0	1.9E-03	0.0E+00	0.0E+00 - 5.7E-03	0	2.1E+03	4.7E-04	0.0E+00	0.0E+00 - 1.4E-03
						7507	TEM-ISO10312	6/11/2000	direct	30	0.01	385	1	2028	0	6.3E-04	0.0E+00	0.0E+00 - 1.9E-03					
4	Rainy Creek Rd	Vermiculite Mine, Upper Mine Road		1-00402	3/12/2000	7508	TEM-ISO10312	5/3/2000	direct	10	0.01	385	1	3900	0	9.9E-04	0.0E+00	0.0E+00 - 3.0E-03	0	4.1E+03	2.5E-04	0.0E+00	0.0E+00 - 7.4E-04
						7509	TEM-ISO10312	6/16/2000	direct	30	0.01	385	1	3900	0	3.3E-04	0.0E+00	0.0E+00 - 9.9E-04					
4	Rainy Creek Rd	Vermiculite Mine, Tailings pile		1-00404	3/12/2000	7510	TEM-ISO10312	5/3/2000	direct	10	0.01	385	1	4008	0	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03	0	4.2E+03	2.4E-04	0.0E+00	0.0E+00 - 7.2E-04
						7511	TEM-ISO10312	6/19/2000	direct	30	0.01	385	1	4008	0	3.2E-04	0.0E+00	0.0E+00 - 9.6E-04					
4	Rainy Creek Rd	Vermiculite Mine, Dam		1-00405	3/12/2000	7512	TEM-ISO10312	5/3/2000	direct	10	0.01	385	1	4152	0	9.3E-04	0.0E+00	0.0E+00 - 2.8E-03	0	4.3E+03	2.3E-04	0.0E+00	0.0E+00 - 6.9E-04
						7513	TEM-ISO10312	6/19/2000	direct	30	0.01	385	1	4152	0	3.1E-04	0.0E+00	0.0E+00 - 9.3E-04					
2	247 Indian Head Rd - Plummer Elementary School	Play Area, Playground		1-00799	4/4/2000	7645	TEM-ISO10312	5/10/2000	direct	30	0.01	385	1	4932	0	2.6E-04	0.0E+00	0.0E+00 - 7.8E-04	0	5.1E+03	2.0E-04	0.0E+00	0.0E+00 - 5.8E-04
						7646	TEM-ISO10312	5/10/2000	direct	10	0.01	385	1	4932	0	7.8E-04	0.0E+00	0.0E+00 - 2.3E-03					
3	899 Farm to Market Rd - McGrade Elementary	Property, Park		1-00800	4/4/2000	7647	TEM-ISO10312	5/10/2000	direct	30	0.01	385	1	4646	0	2.8E-04	0.0E+00	0.0E+00 - 8.3E-04	0	4.8E+03	2.1E-04	0.0E+00	0.0E+00 - 6.2E-04
						7648	TEM-ISO10312	5/10/2000	direct	10	0.01	385	1	4646	0	8.3E-04	0.0E+00	0.0E+00 - 2.5E-03					
1	952 E. Spruce St - Fitness Center	Property, Yard		1-00801	4/4/2000	7649	TEM-ISO10312	5/10/2000	direct	30	0.01	385	1	4728	1	2.7E-04	2.7E-04	1.4E-05 - 1.3E-03	1	4.9E+03	2.0E-04	2.0E-04	1.0E-05 - 9.7E-04
						7650	TEM-ISO10312	5/10/2000	direct	10	0.01	385	1	4728	0	8.1E-04	0.0E+00	0.0E+00 - 2.4E-03					
2	Export Plant	Lumber Yard, FIELD		1-00802	4/4/2000	7651	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	2256	4	5.7E-04	2.3E-03	7.6E-04 - 5.2E-03	8	2.3E+03	4.3E-04	3.4E-03	1.7E-03 - 6.2E-03
						7652	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	2256	4	1.7E-03	6.8E-03	2.3E-03 - 1.6E-02					
4	Rainy Creek Rd	Hwy 37		1-00804	4/4/2000	7653	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	4224	4	3.0E-04	1.2E-03	4.2E-04 - 2.8E-03	7	4.4E+03	2.3E-04	1.6E-03	7.5E-04 - 3.0E-03
						7654	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	4224	3	9.1E-04	2.7E-03	7.5E-04 - 7.1E-03					
2	247 Indian Head Rd - Plummer Elementary School	Play Area, Playground		1-00806	4/5/2000	7656	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	5040	0	2.5E-04	0.0E+00	0.0E+00 - 7.6E-04	0	5.2E+03	1.9E-04	0.0E+00	0.0E+00 - 5.7E-04
						7657	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	5040	0	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03					
3	899 Farm to Market Rd - McGrade Elementary	Property, Park		1-00807	4/5/2000	7658	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	4830	0	2.7E-04	0.0E+00	0.0E+00 - 8.0E-04	0	5.0E+03	2.0E-04	0.0E+00	0.0E+00 - 6.0E-04
						7659	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	4830	0	8.0E-04	0.0E+00	0.0E+00 - 2.4E-03					
1	952 E. Spruce St - Fitness Center	Property, Yard	1	1-00808	4/5/2000	7660	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	5040	0	2.5E-04	0.0E+00	0.0E+00 - 7.6E-04	0	5.2E+03	1.9E-04	0.0E+00	0.0E+00 - 5.7E-04
						7661	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	5040	0	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03					
2	Export Plant	Lumber Yard, FIELD	2	1-00809	4/5/2000	7662	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	5040	0	2.5E-04	0.0E+00	0.0E+00 - 7.6E-04	0	5.2E+03	1.9E-04	0.0E+00	0.0E+00 - 5.7E-04
						7663	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	5040	0	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03					
4	Rainy Creek Rd	Hwy 37		1-00811	4/5/2000	7664	TEM-ISO10312	5/12/2000	direct	30	0.01	385	1	5040	1	2.5E-04	2.5E-04	1.3E-05 - 1.2E-03	2	5.2E+03	1.9E-04	3.8E-04	6.8E-05 - 1.2E-03
						7665	TEM-ISO10312	5/12/2000	direct	10	0.01	385	1	5040	1	7.6E-04	7.6E-04	3.9E-05 - 3.6E-03					
2	247 Indian Head Rd - Plummer Elementary School	School		1-01305	4/9/2000	7753	TEM-ISO10312	5/16/2000	direct	30	0.01	385	1	4320	0	3.0E-04	0.0E+00	0.0E+00 - 8.9E-04	0	4.5E+03	2.2E-04	0.0E+00	0.0E+00 - 6.7E-04
						7754	TEM-ISO10312	5/16/2000	direct	10	0.01	385	1	4320	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03					
3	899 Farm to Market Rd - McGrade Elementary	Property		1-01306	4/9/2000	7755	TEM-ISO10312	5/16/2000	direct	30	0.01	385	1	4332	1	3.0E-04	3.0E-04	1.5E-05 - 1.4E-03	1	4.5E+03	2.2E-04	2.2E-04	1.1E-05 - 1.1E-03
						7756	TEM-ISO10312	5/16/2000	direct	10	0.01	385	1	4332	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03					
1	952 E. Spruce St - Fitness Center	Property, LAWN		1-01307	4/9/2000	7757	TEM-ISO10312	5/16/2000	direct	30	0.01	385	1	4320	1	3.0E-04	3.0E-04	1.5E-05 - 1.4E-03	1	4.5E+03	2.2E-04	2.2E-04	1.1E-05 - 1.1E-03
						7758	TEM-ISO10312	5/16/2000	direct	10	0.01	385	1	4320	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03					
2	Export Plant	Lumber Yard, FIELD	3	1-01308	4/9/2000	7759	TEM-ISO10312	5/17/2000	direct	30	0.01	385	1	4344	0	3.0E-04	0.0E+00	0.0E+00 - 8.9E-04	0	4.5E+03	2.2E-04	0.0E+00	0.0E+00 - 6.6E-04
						7760	TEM-ISO10312	5/17/2000	direct	10	0.01	385	1	4344	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03					
4	Rainy Creek Rd	Hwy 37, Roadside		1-01310	4/9/2000	7761	TEM-ISO10312	5/17/2000	direct	30	0.01	385	1	3012	1	4.3E-04	4.3E-04	2.2E-05 - 2.0E-03	1	3.1E+03	3.2E-04	3.2E-04	1.6E-05 - 1.5E-03
						7762	TEM-ISO10312	5/17/2000	direct	10	0.01	385	1	3012	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03					
4	Mine	Road, Lower Mine Road		1-01449	5/22/2000	7841	TEM-ISO10312	6/18/2000	direct	10	0.0064	385	1	4124	1	1.5E-03	1.5E-03	7.5E-05 - 6.9E-03	1	6.9E+02	1.5E-03	1.5E-03	7.5E-05 - 6.9E-03
4	Mine	Dam		1-01450	5/22/2000	7842	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	4175	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	6.9E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Tailings Pile		1-01451	5/22/2000	7843	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	2552	0	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03
4	Mine	Property, Mine Top		1-01452	5/22/2000	7844	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	3674	0	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03	0	6.1E+02	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03
4	Mine	Road Rainy Creek Rd		1-01453	5/22/2000	7845	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	3619	0	1.7E-03	0.0E+00	0.0E+00 - 5.0E-03	0	6.0E+02	1.7E-03	0.0E+00	0.0E+00 - 5.0E-03
1	MillWork West	Property, MillWork West		1-01454	5/22/2000	7846	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	2604	0	2.3E-03	0.0E+00	0.0E+00 - 6.9E-03	0	4.3E+02	2.3E-03	0.0E+00	0.0E+00 - 6.9E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School		1-01455	5/22/2000	7847	TEM-ISO10312	6/20/2000	direct	10	0.0064	385	1	4118	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
1	952 E. Spruce St	Property, City Hall/Fitness Center		1-01456	5/22/2000	7848	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4176	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	6.9E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school	4	1-01457	5/22/2000	7849	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4104	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Dam		1-01458	5/23/2000	7850	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4232	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	7.0E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Tailings Pile, Bottom of Tailings pile		1-01459	5/23/2000	7851	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	3288	0	1.8E-03	0.0E+00	0.0E+00 - 5.5E-03	0	5.5E+02	1.8E-03	0.0E+00	0.0E+00 - 5.5E-03
4	Mine	Property, Near motorcycle sign		1-01460	5/23/2000	7852	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4368	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.3E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (s)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^3)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Evsl. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
1	952 E. Spruce St	Property, City Hall		1-01461	5/23/2000	7853	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4332	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
3	899 Farm to Market Rd - McGrade Elementary	Property, McGrade school JERRY DEAN PARK		1-01462	5/23/2000	7854	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4140	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.9E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Road, Rainy Creek Rd Lower Gate		1-01464	5/23/2000	7856	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4103	1	1.5E-03	1.5E-03	7.5E-05 - 7.0E-03	1	6.8E+02	1.5E-03	1.5E-03	7.5E-05 - 7.0E-03
4	Mine	Road, Upper Rainy Creek Rd by gate		1-01465	5/23/2000	7857	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4267	2	1.4E-03	2.8E-03	5.0E-04 - 8.9E-03	2	7.1E+02	1.4E-03	2.8E-03	5.0E-04 - 8.9E-03
4	Mine	Property, Top of mountain		1-01466	5/23/2000	7858	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4255	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.1E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School		1-01468	5/23/2000	7859	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4332	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Dam		1-01471	5/24/2000	7862	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	1620	0	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.7E+02	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02
4	Mine	Tailings Pile		1-01472	5/24/2000	7863	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4324	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Road Lower Creek Rd		1-01473	5/24/2000	7864	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4612	1	1.3E-03	1.3E-03	6.7E-05 - 6.2E-03	1	7.7E+02	1.3E-03	1.3E-03	6.7E-05 - 6.2E-03
1	952 E. Spruce St	Property, City Hall/Fitness		1-01474	5/24/2000	7865	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4566	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.6E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
3	Jerry Dean Park, McGrade School	Property, McGrade/JJ Ferry Peak/Park		1-01475	5/24/2000	7866	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	4740	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03	0	7.9E+02	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03
4	Mine	Gate 2nd Lowest Gate		1-01481	5/24/2000	7871	TEM-ISO10312	6/21/2000	direct	10	0.0064	385	1	3120	8	1.9E-03	1.5E-02	7.7E-03 - 2.8E-02	8	5.2E+02	1.9E-03	1.5E-02	7.7E-03 - 2.8E-02
4	Mine	Gate Upper gate		1-01482	5/24/2000	7872	TEM-ISO10312	6/22/2000	direct	10	0.0064	385	1	2497	0	2.4E-03	0.0E+00	0.0E+00 - 7.2E-03	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.2E-03
4	Mine	Property Top of mountain		1-01483	5/24/2000	7873	TEM-ISO10312	6/22/2000	direct	10	0.0064	385	1	4444	3	1.4E-03	4.1E-03	1.1E-03 - 1.0E-02	3	7.4E+02	1.4E-03	4.1E-03	1.1E-03 - 1.0E-02
1	MillWork West	Field MillWork West Field		1-01484	5/24/2000	7874	TEM-ISO10312	6/22/2000	direct	10	0.0064	385	1	4680	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.8E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School		1-01485	5/24/2000	7875	TEM-ISO10312	6/22/2000	direct	10	0.0064	385	1	4632	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.7E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
3	899 Farm to Market Rd - McGrade Elemantary	Property, McGrade school		1-01541	6/20/2000	7886	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5280	0	1.1E-03	0.0E+00	0.0E+00 - 3.4E-03	0	8.8E+02	1.1E-03	0.0E+00	0.0E+00 - 3.4E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01542	6/20/2000	7887	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5220	0	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03	0	8.7E+02	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03
2	247 Indian Head Rd - Plummer Elemantary School	Property Plummer School		1-01543	6/20/2000	7888	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5106	0	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03	0	8.5E+02	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03
1	MillWork West	Property, Mill		1-01544	6/20/2000	7889	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5880	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.8E+02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
4	Mine	Gate, Upper gate		1-01545	6/20/2000	7890	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4900	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Property, Mine Top		1-01546	6/20/2000	7891	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4910	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.2E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Dam		1-01547	6/20/2000	7892	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5090	0	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03	0	8.5E+02	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03
4	Mine	Tailings Pile		1-01548	6/20/2000	7893	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4840	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.0E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Gate Lower gate		1-01549	6/20/2000	7894	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	2675	0	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03	0	4.4E+02	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03
4	Mine	Road, Bottom Mine Road		1-01550	6/20/2000	7895	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4940	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.2E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03
3	899 Farm to Market Rd - McGrade Elementary	Property, McGrade school		1-01551	6/21/2000	7896	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	5380	0	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03	0	8.9E+02	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School		1-01552	6/21/2000	7897	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4440	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.4E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01553	6/21/2000	7898	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4613	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.7E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
1	MillWork West	Property, Mill		1-01554	6/21/2000	7899	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4960	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.2E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03
4	Mine	Road, Rainy Creek Rd Bottom		1-01555	6/21/2000	7900	TEM-ISO10312	7/17/2000	direct	10	0.0064	385	1	4960	1	1.2E-03	1.2E-03	6.2E-05 - 5.8E-03	1	8.2E+02	1.2E-03	1.2E-03	6.2E-05 - 5.8E-03
4	Mine	Gate, Lower gate		1-01556	6/21/2000	7901	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	4910	2	1.2E-03	2.5E-03	4.4E-04 - 7.7E-03	2	8.2E+02	1.2E-03	2.5E-03	4.4E-04 - 7.7E-03
4	Mine	Tailings Pile		1-01557	6/21/2000	7902	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	4900	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Dam		1-01558	6/21/2000	7903	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	4880	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Gate, Upper gate		1-01559	6/21/2000	7904	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	5346	2	1.1E-03	2.3E-03	4.0E-04 - 7.1E-03	2	8.9E+02	1.1E-03	2.3E-03	4.0E-04 - 7.1E-03
4	Mine	Property, Mine Top		1-01560	6/21/2000	7905	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	4850	4	1.2E-03	5.0E-03	1.7E-03 - 1.1E-02	4	8.1E+02	1.2E-03	5.0E-03	1.7E-03 - 1.1E-02
3	899 Farm to Market Rd - McGrade Elementary	Property, McGrade school		1-01561	6/22/2000	7906	TEM-ISO10312	7/18/2000	direct	10	0.0064	385	1	4488	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.5E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01562	6/22/2000	7907	TEM-ISO10312	7/19/2000	direct	10	0.0064	385	1	4476	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.4E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
2	247 Indian Head Rd - Plummer Elemantary School	Property, Plummer School		1-01563	6/22/2000	7908	TEM-ISO10312	7/19/2000	direct	10	0.0064	385	1	5380	0	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03	0	8.9E+02	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03
1	MillWork West	Property, Mill		1-01564	6/22/2000	7909	TEM-ISO10312	7/19/2000	direct	10	0.0064	385	1	5412	0	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03	0	9.0E+02	1.1E-03	0.0E+00	0.0E+00 - 3.3E-03
4	Mine	Road Rainy Creek Rd Bottom		1-01565	6/22/2000	7910	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	4860	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Gate, Lower gate		1-01566	6/22/2000	7911	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	4840	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.0E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Tailings Pile		1-01567	6/22/2000	7912	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	4850	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Dam		1-01568	6/22/2000	7913	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	4830	1	1.2E-03	1.2E-03	6.4E-05 - 5.9E-03	1	8.0E+02	1.2E-03	1.2E-03	6.4E-05 - 5.9E-03
4	Mine	Gate, Upper gate		1-01569	6/22/2000	7914	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	4800	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03	0	8.0E+02	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03
4	Mine	Property, Mine Top		1-01570	6/22/2000	7915	TEM-ISO10312	7/20/2000	direct	10	0.0064	385	1	5400	1	1.1E-03	1.1E-03	5.7E-05 - 5.3E-03	1	9.0E+02	1.1E-03	1.1E-03	5.7E-05 - 5.3E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1-01741	7/31/2000	7980	TEM-ISO10312	9/28/2000	direct	10	0.011	385	1	4050	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	952 E. Spruce St	Property, City Hall		1-01742	7/31/2000	7981	TEM-ISO10312	9/28/2000	direct	10	0.011	385	1	4080	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01743	7/31/2000	7982	TEM-ISO10312	9/28/2000	direct	10	0.011	385	1	4401	0	8.0E-04	0.0E+00	0.0E+00 - 2.4E-03	0	1.3E+03	8.0E-04	0.0E+00	0.0E+00 - 2.4E-03
4	Mine	Property, Rainy Creek Rd Sign		1-01744	7/31/2000	30675	TEM-ISO10312	9/28/2000	DIRECT	10	0.011	385	1	4104	3	8.5E-04	2.6E-03	7.0E-04 - 6.6E-03	3	1.2E+03	8.5E-04	2.6E-03	7.0E-04 - 6.6E-03
4	Mine	Road, Fork by 401 and Mine Road		1-01746	7/31/2000	7985	TEM-ISO10312	12/1/2000	direct	10	0.011	385	1	4630	30	7.6E-04	2.3E-02	1.6E-02 - 3.1E-02	30	1.3E+03	7.6E-04	2.3E-02	1.6E-02 - 3.1E-02
4	Mine	Gate, Mine gate		1-01747	7/31/2000	7986	TEM-ISO10312	9/29/2000	direct	10	0.011	385	1	5220	0	6.7E-04	0.0E+00	0.0E+00 - 2.0E-03	0	1.5E+03	6.7E-04	0.0E+00	0.0E+00 - 2.0E-03
4	Rainy Creek Rd	Property, Rainy Creek Rd Lower gate		1-01750	8/1/2000	7989	TEM-ISO10312	10/3/2000	direct	10	0.011	385	1	4446	2	7.9E-04	1.6E-03	2.8E-04 - 5.0E-03	2	1.3E+03	7.9E-04	1.6E-03	2.8E-04 - 5.0E-03
4	Rainy Creek Rd	Junction of 401, Fork by 401 and Mine Road		1-01751	8/1/2000	7990	TEM-ISO10312	10/3/2000	direct	10	0.011	385	1	4313	41	8.1E-04	3.3E-02	2.5E-02 - 4.3E-02	41	1.2E+03	8.1E-04	3.3E-02	2.5E-02 - 4.3E-02
4	Rainy Creek Rd	Property, Mine gate		1-01752	8/1/2000	7991	TEM-ISO10312	10/3/2000	direct	10	0.011	385	1	4440	5	7.9E-04	3.9E-03	1.6E-03 - 8.3E-03	5	1.3E+03	7.9E-04	3.9E-03	1.6E-03 - 8.3E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01753	8/1/2000	7992	TEM-ISO10312	10/3/2000	direct	10	0.011	385	1	4910	0	7.1E-04	0.0E+00	0.0E+00 - 2.1E-03	0	1.4E+03	7.1E-04	0.0E+00	0.0E+00 - 2.1E-03

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (s)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
1	952 E. Spruce St	Property, City Hall		1-01754	8/1/2000	30246	TEM-ISO10312	10/3/2000	DIRECT	10	0.011	385	1	4190	0	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park	5	1-01755	8/1/2000	7994	TEM-ISO10312	10/3/2000	direct	10	0.011	385	1	4171	2	8.4E-04	1.7E-03	3.0E-04 - 5.3E-03	2	1.2E+03	8.4E-04	1.7E-03	3.0E-04 - 5.3E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School	6	1-01757	8/2/2000	(b)	TEM-ISO10312	2000	Direct	10	0.011	385	1	4171	4	8.4E-04	3.4E-03	1.1E-03 - 7.7E-03	4	1.2E+03	8.4E-04	3.4E-03	1.1E-03 - 7.7E-03
1	952 E. Spruce St	Property, City Hall	7	1-01758	8/2/2000	7997	TEM-ISO10312	12/4/2000	direct	10	0.011	385	1	4465	1	7.8E-04	7.8E-04	4.0E-05 - 3.7E-03	1	1.3E+03	7.8E-04	7.8E-04	4.0E-05 - 3.7E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park	8	1-01759	8/2/2000	(b)	TEM-ISO10312	2000	Direct	10	0.011	385	1	4032	0	8.7E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.7E-04	0.0E+00	0.0E+00 - 2.6E-03
4	Rainy Creek Rd	Property, Rainy Creek Rd Sign		1-01760	8/2/2000	7999	TEM-ISO10312	10/4/2000	direct	10	0.011	385	1	4456	33	7.9E-04	2.6E-02	1.9E-02 - 3.5E-02	33	1.3E+03	7.9E-04	2.6E-02	1.9E-02 - 3.5E-02
4	Rainy Creek Rd	Property, Rainy Creek Rd Lower gate		1-01761	8/2/2000	8000	TEM-ISO10312	10/4/2000	direct	10	0.011	385	1	4475	24	7.8E-04	1.9E-02	1.3E-02 - 2.6E-02	24	1.3E+03	7.8E-04	1.9E-02	1.3E-02 - 2.6E-02
4	Rainy Creek Rd	Junction of 401, Fork by 401 and Mine Road		1-01762	8/2/2000	8001	TEM-ISO10312	10/4/2000	direct	10	0.011	385	1	4700	43	7.4E-04	3.2E-02	2.4E-02 - 4.1E-02	43	1.3E+03	7.4E-04	3.2E-02	2.4E-02 - 4.1E-02
4	Rainy Creek Rd	Property, Mine gate		1-01763	8/2/2000	8002	TEM-ISO10312	10/4/2000	direct	10	0.011	385	1	4456	0	7.9E-04	0.0E+00	0.0E+00 - 2.4E-03	0	1.3E+03	7.9E-04	0.0E+00	0.0E+00 - 2.4E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01824	8/29/2000	8023	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	4935	0	7.8E-04	0.0E+00	0.0E+00 - 2.3E-03	0	1.3E+03	7.8E-04	0.0E+00	0.0E+00 - 2.3E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01825	8/29/2000	8024	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	4515	0	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1-01826	8/29/2000	8025	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	5460	0	7.1E-04	0.0E+00	0.0E+00 - 2.1E-03	0	1.4E+03	7.1E-04	0.0E+00	0.0E+00 - 2.1E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01829	8/30/2000	8028	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	5145	0	7.5E-04	0.0E+00	0.0E+00 - 2.2E-03	0	1.3E+03	7.5E-04	0.0E+00	0.0E+00 - 2.2E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01830	8/30/2000	8029	TEM-ISO10312	10/26/2000	direct	10	0.01	385	1	4992	0	7.7E-04	0.0E+00	0.0E+00 - 2.3E-03	0	1.3E+03	7.7E-04	0.0E+00	0.0E+00 - 2.3E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school		1-01831	8/30/2000	8030	TEM-ISO10312	10/26/2000	direct	10	0.01	385	1	4830	0	8.0E-04	0.0E+00	0.0E+00 - 2.4E-03	0	1.3E+03	8.0E-04	0.0E+00	0.0E+00 - 2.4E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01833	8/31/2000	8032	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	5250	0	7.3E-04	0.0E+00	0.0E+00 - 2.2E-03	0	1.4E+03	7.3E-04	0.0E+00	0.0E+00 - 2.2E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01834	8/31/2000	8033	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	5040	0	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03	0	1.3E+03	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school		1-01835	8/31/2000	8034	TEM-ISO10312	10/25/2000	direct	10	0.01	385	1	5040	0	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03	0	1.3E+03	7.6E-04	0.0E+00	0.0E+00 - 2.3E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school		1-01863	10/3/2000	8046	TEM-ISO10312	10/30/2000	direct	10	0.01	385	1	4320	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01864	10/3/2000	8047	TEM-ISO10312	10/30/2000	direct	10	0.01	385	1	4320	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01865	10/3/2000	8048	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4320	0	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	8.9E-04	0.0E+00	0.0E+00 - 2.7E-03
4	Mine	Road, Rainy Creek Rd Bottom		1-01866	10/3/2000	8049	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	3730	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.7E-02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
4	Mine	Gate, Lower gate		1-01867	10/3/2000	8050	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4200	0	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03
4	Mine	Gate, Middle gate		1-01868	10/3/2000	8051	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4200	0	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03
4	Mine	Gate, Upper gate		1-01869	10/3/2000	8052	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	3780	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.8E-02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school		1-01871	10/4/2000	8054	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4608	0	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01872	10/4/2000	8055	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4560	0	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01873	10/4/2000	8056	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4596	0	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03
4	Rainy Creek Rd	Property, Rainy Creek Rd Bottom		1-01874	10/4/2000	8057	TEM-ISO10312	11/1/2000	direct	10	0.01	385	1	4010	0	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03	0	1.0E+03	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03
4	Mine	Gate, Lower gate		1-01875	10/4/2000	8058	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4000	2	9.6E-04	1.9E-03	3.4E-04 - 6.1E-03	2	1.0E+03	9.6E-04	1.9E-03	3.4E-04 - 6.1E-03
4	Rainy Creek Rd	Property, Middle gate		1-01876	10/4/2000	8059	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4200	0	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03
4	Mine	Gate, Upper gate		1-01877	10/4/2000	8060	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4200	2	9.2E-04	1.8E-03	3.3E-04 - 5.8E-03	2	1.1E+03	9.2E-04	1.8E-03	3.3E-04 - 5.8E-03
3	899 Farm to Market Rd - McGrade Elementary	School, McGrade school		1-01879	10/5/2000	8062	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4221	0	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03
1	952 E. Spruce St - Fitness Center	Property, Fitness Center		1-01880	10/5/2000	8063	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4404	0	8.7E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.1E+03	8.7E-04	0.0E+00	0.0E+00 - 2.6E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1-01881	10/5/2000	8064	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4512	0	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03
4	Rainy Creek Rd	Base of road, Rainy Creek Rd Bottom		1-01882	10/5/2000	8065	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4210	0	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03
4	Rainy Creek Rd	Property, Lower Gate		1-01883	10/5/2000	8066	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4010	0	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03	0	1.0E+03	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03
4	Rainy Creek Rd	Property, Middle gate		1-01884	10/5/2000	8067	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4010	0	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03	0	1.0E+03	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03
4	Rainy Creek Rd	Property, Upper gate		1-01885	10/5/2000	8068	TEM-ISO10312	11/2/2000	direct	10	0.01	385	1	4200	0	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.2E-04	0.0E+00	0.0E+00 - 2.7E-03
2	Lincoln County Landfill	Property, P1 (Main Entrance)		1-03057	6/28/2001	87302	TEM-AHERA	7/30/2001	DIRECT	10	0.0129	385	1	1338	0	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03	0	4.5E+02	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03
2	Lincoln County Landfill	Property, P2 (Compost Pile)		1-03058	6/28/2001	87524	TEM-AHERA	7/30/2001	DIRECT	10	0.0129	385	1	1331	0	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03	0	4.5E+02	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03
2	Lincoln County Landfill	Property, P3 (Dirt Pile)	9	1-03059	6/28/2001	87525	TEM-AHERA	7/30/2001	DIRECT	10	0.0129	385	1	1331	0	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03	0	4.5E+02	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03
2	Lincoln County Landfill	Property, P4 (North side)		1-03060	6/28/2001	87526	TEM-AHERA	7/30/2001	DIRECT	10	0.0129	385	1	1335	0	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03	0	4.5E+02	2.2E-03	0.0E+00	0.0E+00 - 6.7E-03
1	510 W. 1st St	Property, South side of track		1-06891	5/16/2002	29792	TEM-AHERA	5/17/2002	DIRECT	4	0.0129	385	1	2022	0	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.7E+02	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02
1	510 W. 1st St	Property, South side of track		1-06892	5/16/2002	29793	TEM-AHERA	5/17/2002	DIRECT	4	0.0129	385	1	2029	0	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.7E+02	3.7E-03	0.0E+00	0.0E+00 - 1.1E-02
1	510 W. 1st St	Property, North side of track		1-06893	5/16/2002	29794	TEM-AHERA	5/17/2002	DIRECT	4	0.0129	385	1	2053	0	3.6E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.8E+02	3.6E-03	0.0E+00	0.0E+00 - 1.1E-02
1	510 W. 1st St	Property, North side of track	10	1-06894	5/16/2002	29795	TEM-AHERA	5/17/2002	DIRECT	4	0.0129	385	1	2048	0	3.6E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.7E+02	3.6E-03	0.0E+00	0.0E+00 - 1.1E-02
1	510 W. 1st St	Property, 10' S of center track @ 1319.41 switch		1-06897	5/17/2002	29798	TEM-AHERA	5/17/2002	DIRECT	5	0.0129	385	1	1352	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02
1	510 W. 1st St	Property, 10' S of center track, 50' W of 1316.41 switch		1-06898	5/17/2002	29799	TEM-AHERA	5/17/2002	DIRECT	5	0.0129	385	1	1343	1	4.4E-03	4.4E-03	2.3E-04 - 2.1E-02	2	4.3E+02	2.3E-03	4.6E-03	8.2E-04 - 1.5E-02
						30084	TEM-ISO10312	5/21/2002	DIRECT	10	0.0059	385	1	1343	1	4.9E-03	4.9E-03	2.5E-04 - 2.3E-02					
1	510 W. 1st St	Property, 10' N of center track, 50' W of 1319.41 switch		1-06899	5/17/2002	29800	TEM-AHERA	5/17/2002	DIRECT	5	0.0129	385	1	1362	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02
1	510 W. 1st St	Property, 10' N of center track, 100' W of 1319.41 switch		1-06900	5/17/2002	29801	TEM-AHERA	5/17/2002	DIRECT	5	0.0129	385	1	1339	0	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.2E+02	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00001	8/20/2001	9211	TEM-ISO10312	12/26/2001	direct	10	0.0061	385	1	4076	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00002	8/20/2001	9212	TEM-ISO10312	12/26/2001	direct	10	0.0061	385	1	4087	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00003	8/23/2001	9213	TEM-ISO10312	12/26/2001	direct	10	0.0061	385	1	4090	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00004	8/23/2001	9214	TEM-ISO10312	12/12/2001	direct	10	0.0061	385	1	4027	0	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03	0	6.4E+02	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (s)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018	11	1A-00005	8/23/2001	9215	TEM-ISO10312	12/26/2001	direct	10	0.0061	385	1	4104	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00008	8/29/2001	9217	TEM-ISO10312	10/3/2001	direct	10	0.011	385	1	4073	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00009	8/29/2001	9218	TEM-ISO10312	10/3/2001	direct	10	0.011	385	1	4058	1	8.6E-04	8.6E-04	4.4E-05 - 4.1E-03	1	1.2E+03	8.6E-04	8.6E-04	4.4E-05 - 4.1E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018	12	1A-00010	8/29/2001	(b)	TEM-ISO10312	2001	Direct	10	0.011	385	1	4166	1	8.4E-04	8.4E-04	4.3E-05 - 4.0E-03	1	1.2E+03	8.4E-04	8.4E-04	4.3E-05 - 4.0E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00013	9/7/2001	9221	TEM-ISO10312	10/10/2001	direct	10	0.011	385	1	4067	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00014	9/7/2001	9222	TEM-ISO10312	10/10/2001	direct	10	0.011	385	1	3963	0	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.1E+03	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00015	9/7/2001	9223	TEM-ISO10312	10/10/2001	direct	10	0.011	385	1	4203	0	8.3E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.3E-04	0.0E+00	0.0E+00 - 2.5E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00018	9/18/2001	9225	TEM-ISO10312	12/11/2001	indirect	10	0.0061	1295	0.125	4210	0	4.0E-02	0.0E+00	0.0E+00 - 1.2E-01	0	2.5E+01	4.0E-02	0.0E+00	0.0E+00 - 1.2E-01
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00019	9/19/2001	9226	TEM-ISO10312	12/11/2001	indirect	10	0.0061	1295	0.125	4104	0	4.1E-02	0.0E+00	0.0E+00 - 1.2E-01	0	2.4E+01	4.1E-02	0.0E+00	0.0E+00 - 1.2E-01
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00020	9/20/2001	9227	TEM-ISO10312	12/11/2001	indirect	10	0.0061	1295	0.125	3976	0	4.3E-02	0.0E+00	0.0E+00 - 1.3E-01	0	2.3E+01	4.3E-02	0.0E+00	0.0E+00 - 1.3E-01
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00023	9/27/2001	9229	TEM-ISO10312	12/12/2001	indirect	10	0.0061	1295	0.125	4099	0	4.1E-02	0.0E+00	0.0E+00 - 1.2E-01	0	2.4E+01	4.1E-02	0.0E+00	0.0E+00 - 1.2E-01
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00024	10/15/2001	27089	TEM-ISO10312	3/9/2002	DIRECT	10	0.011	385	1	4090	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00025	10/15/2001	27090	TEM-ISO10312	3/9/2002	DIRECT	10	0.011	385	1	4118	0	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00026	10/15/2001	27091	TEM-ISO10312	3/9/2002	DIRECT	10	0.011	385	1	4090	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00029	10/19/2001	27155	TEM-ISO10312	3/9/2002	DIRECT	9	0.011	385	1	4104	0	9.5E-04	0.0E+00	0.0E+00 - 2.8E-03	0	1.1E+03	9.5E-04	0.0E+00	0.0E+00 - 2.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00030	10/26/2001	69330	TEM-ISO10312	12/19/2001	DIRECT	10	0.011	385	1	3805	0	9.2E-04	0.0E+00	0.0E+00 - 2.8E-03	0	1.1E+03	9.2E-04	0.0E+00	0.0E+00 - 2.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00031	10/29/2001	9231	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4090	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00032	10/29/2001	9232	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4104	0	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00033	11/5/2001	9233	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4061	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00034	11/5/2001	9234	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4118	0	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00037	11/6/2001	9236	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4047	1	8.6E-04	8.6E-04	4.4E-05 - 4.1E-03	1	1.2E+03	8.6E-04	8.6E-04	4.4E-05 - 4.1E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00038	11/8/2001	9237	TEM-ISO10312	12/19/2001	direct	10	0.011	385	1	4047	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00039	11/19/2001	27524	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	3882	0	9.0E-04	0.0E+00	0.0E+00 - 2.7E-03	0	1.1E+03	9.0E-04	0.0E+00	0.0E+00 - 2.7E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00040	11/27/2001	27585	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	4210	0	8.3E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.3E-04	0.0E+00	0.0E+00 - 2.5E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00041	12/27/2001	27586	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	4144	1	8.4E-04	8.4E-04	4.3E-05 - 4.0E-03	1	1.2E+03	8.4E-04	8.4E-04	4.3E-05 - 4.0E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018	13	1A-00042	12/31/2001	(b)	TEM-ISO10312	2001	Direct	10	0.011	385	1	4104	1	8.5E-04	8.5E-04	4.4E-05 - 4.0E-03	1	1.2E+03	8.5E-04	8.5E-04	4.4E-05 - 4.0E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00045	1/10/2002	27068	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	4075	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018	14	1A-00046	2/13/2002	(b)	TEM-ISO10312	2002	Direct	10	0.011	385	1	4153	0	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.4E-04	0.0E+00	0.0E+00 - 2.5E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00047	2/13/2002	27070	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	4055	0	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.2E+03	8.6E-04	0.0E+00	0.0E+00 - 2.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00048	4/2/2002	38019	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4090	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00050	4/8/2002	39840	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4061	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.2E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00052	5/15/2002	38022	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4104	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00053	5/28/2002	39841	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4090	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00054	6/5/2002	39842	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4075	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.2E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00055	6/19/2002	38023	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4104	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00056	7/2/2002	38025	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4118	0	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00057	7/11/2002	38026	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4210	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00058	8/5/2002	38027	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4224	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00059	8/15/2002	38028	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4210	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00060	9/12/2002	39843	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4166	0	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03	0	6.4E+02	1.6E-03	0.0E+00	0.0E+00 - 4.7E-03
1	418 Mineral Ave - County Annex Building	Property, AIRS Site 30-053-0018		1A-00061	9/26/2002	38029	TEM-ISO10312	11/21/2002	DIRECT	10	0.0059	385	1	4210	0	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
4	Mine	Upper Disposal Area, Upper disposal area (UDA)		1R-00113	7/7/2000	9252	TEM-ISO10312	7/28/2000	direct	10	0.0064	385	1	4270	4	1.4E-03	5.6E-03	1.9E-03 - 1.3E-02	4	7.1E+02	1.4E-03	5.6E-03	1.9E-03 - 1.3E-02
4	Mine	Upper Disposal Area, UDA 2		1R-00114	7/7/2000	9253	TEM-ISO10312	7/28/2000	direct	10	0.0064	385	1	4038	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.7E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
4	Mine	Switchback, Switchback 1 between UDA and LDA by Rd		1R-00115	7/7/2000	9254	TEM-ISO10312	7/28/2000	direct	10	0.0064	385	1	4115	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Lower Disposal Area, LDA 1		1R-00116	7/7/2000	9255	TEM-ISO10312	7/28/2000	direct	10	0.0064	385	1	4850	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.1E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
4	Mine	Lower Disposal Area, LDA 2		1R-00117	7/7/2000	9256	TEM-ISO10312	7/28/2000	direct	10	0.0064	385	1	4977	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.3E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03
4	Mine	Lower Disposal Area, LDA 3		1R-00118	7/7/2000	9257	TEM-ISO10312	7/31/2000	direct	10	0.0064	385	1	5460	1	1.1E-03	1.1E-03	5.7E-05 - 5.2E-03	1	9.1E+02	1.1E-03	1.1E-03	5.7E-05 - 5.2E-03
4	Mine	Switchback, Switchback 2		1R-00119	7/7/2000	9258	TEM-ISO10312	7/31/2000	direct	10	0.0064	385	1	4550	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.6E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
4	Mine	Road, Mine Road 1		1R-00120	7/7/2000	9259	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4100	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Road, Mine Road 2		1R-00121	7/7/2000	9260	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4038	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.7E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
4	Mine	Gate, Mine gate		1R-00122	7/7/2000	9261	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	5100	2	1.2E-03	2.4E-03	4.2E-04 - 7.4E-03	2	8.5E+02	1.2E-03	2.4E-03	4.2E-04 - 7.4E-03
4	Mine	Road, Mine Road 2		1R-00124	7/8/2000	9263	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4085	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Road, Mine Road 1		1R-00125	7/8/2000	9264	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4408	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.3E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
4	Mine	Switchback, Switchback 2		1R-00126	7/8/2000	9265	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4387	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.3E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
4	Mine	Lower Disposal Area, LDA 3		1R-00127	7/8/2000	9266	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4280	4	1.4E-03	5.6E-03	1.9E-03 - 1.3E-02	4	7.1E+02	1.4E-03	5.6E-03	1.9E-03 - 1.3E-02
4	Mine	Lower Disposal Area, LDA 2		1R-00128	7/8/2000	9267	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4270	1	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03	1	7.1E+02	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (4)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	95% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	95% Poisson CI, Pooled TEM Air Conc (s/cc)
4	Mine	Lower Disposal Area, LDA 1		1R-00129	7/6/2000	9268	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4254	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.1E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Switchback, Switchback 1		1R-00130	7/6/2000	9269	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4100	3	1.5E-03	4.4E-03	1.2E-03 - 1.1E-02	3	6.8E+02	1.5E-03	4.4E-03	1.2E-03 - 1.1E-02
4	Mine	Upper Disposal Area, UDA 2		1R-00131	7/6/2000	9270	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4220	2	1.4E-03	2.9E-03	5.1E-04 - 9.0E-03	2	7.0E+02	1.4E-03	2.9E-03	5.1E-04 - 9.0E-03
4	Mine	Upper Disposal Area, UDA 1		1R-00132	7/6/2000	9271	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4315	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Road, Mine Road 2		1R-00134	7/6/2000	9273	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4170	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	6.9E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Road, Mine Road 1 BELOW LDA		1R-00135	7/6/2000	9274	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4123	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.9E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Switchback, Switchback 2 below LDA		1R-00136	7/6/2000	9275	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4123	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.9E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Lower Disposal Area, LDA Across Dead Pine		1R-00137	7/6/2000	9276	TEM-ISO10312	8/1/2000	direct	10	0.0064	385	1	4274	1	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03	1	7.1E+02	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03
4	Mine	Lower Disposal Area, LDA 2		1R-00138	7/6/2000	9277	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4300	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.1E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Lower Disposal Area, LDA 1		1R-00139	7/6/2000	9278	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4065	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Switchback, Switchback 1 between UDA and LDA by Rd		1R-00140	7/6/2000	9279	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4193	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	7.0E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Upper Disposal Area, UDA 2		1R-00141	7/6/2000	9280	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4280	1	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03	1	7.1E+02	1.4E-03	1.4E-03	7.2E-05 - 6.7E-03
4	Mine	Upper Disposal Area, Upper disposal area UDA 1		1R-00142	7/6/2000	9281	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4057	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.7E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Road, Rainy Creek Rd Bottom		1R-00144	7/10/2000	9283	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4000	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.6E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
4	Mine	Road, Rainy Creek Rd Lower Gate		1R-00145	7/10/2000	9284	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4160	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	6.9E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Dam		1R-00146	7/10/2000	9285	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4090	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
4	Mine	Tailings Pile		1R-00147	7/10/2000	9286	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4019	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.7E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
4	Mine	Switchback, Switchback 3		1R-00148	7/10/2000	9287	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4367	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.3E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
4	Mine	Road, Fork by 401 and Mine Road		1R-00149	7/10/2000	9288	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4144	1	1.5E-03	1.5E-03	7.4E-05 - 6.9E-03	1	6.9E+02	1.5E-03	1.5E-03	7.4E-05 - 6.9E-03
4	Mine	Gate, Mine gate		1R-00150	7/10/2000	9289	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4240	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	7.0E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Property, Top of mine		1R-00151	7/10/2000	9290	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4346	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
4	Mine	Property, MillWork West		1R-00152	7/10/2000	9291	TEM-ISO10312	8/2/2000	direct	10	0.0064	385	1	4066	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.8E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
1	952 E. Spruce St	Property, City Hall		1R-00154	7/10/2000	9293	TEM-ISO10312	8/4/2000	direct	10	0.0064	385	1	4294	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.1E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School	15	1R-00153	7/10/2000	9292	TEM-ISO10312	8/4/2000	direct	10	0.0064	385	1	3996	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.6E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-00155	7/10/2000	9294	TEM-ISO10312	8/4/2000	direct	10	0.0064	385	1	4490	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.5E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
4	Mine	Road, Rainy Creek Rd Bottom		1R-00157	7/11/2000	9296	TEM-ISO10312	8/4/2000	direct	10	0.0064	385	1	4304	1	1.4E-03	1.4E-03	7.2E-05 - 6.6E-03	1	7.2E+02	1.4E-03	1.4E-03	7.2E-05 - 6.6E-03
4	Mine	Road, Rainy Creek Rd Lower Gate		1R-00158	7/11/2000	9297	TEM-ISO10312	8/4/2000	direct	10	0.0064	385	1	4480	1	1.3E-03	1.3E-03	6.9E-05 - 6.4E-03	1	7.4E+02	1.3E-03	1.3E-03	6.9E-05 - 6.4E-03
4	Mine	Dam		1R-00159	7/11/2000	9298	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4199	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	7.0E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Tailings Pile		1R-00160	7/11/2000	9299	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4304	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.2E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Switchback, Switchback 3		1R-00161	7/11/2000	9300	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4264	0	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03	0	7.1E+02	1.4E-03	0.0E+00	0.0E+00 - 4.2E-03
4	Mine	Road, Fork by 401 and Mine Road		1R-00162	7/11/2000	9301	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4149	0	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03	0	6.9E+02	1.4E-03	0.0E+00	0.0E+00 - 4.3E-03
4	Mine	Gate, Mine gate		1R-00163	7/11/2000	9302	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4505	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.5E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
4	Mine	Property, MillWork West		1R-00165	7/11/2000	9303	TEM-ISO10312	8/7/2000	direct	10	0.0064	385	1	4494	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.5E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1R-00166	7/11/2000	9304	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4130	0	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03	0	6.9E+02	1.5E-03	0.0E+00	0.0E+00 - 4.4E-03
1	952 E. Spruce St	Property, City Hall		1R-00167	7/11/2000	9305	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4622	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.7E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-00168	7/11/2000	9306	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4631	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.7E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
4	Mine	Road, Rainy Creek Rd Bottom		1R-00170	7/12/2000	9308	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4570	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.6E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
4	Mine	Gate, Rainy Creek Rd Lower Gate		1R-00171	7/12/2000	9309	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4617	0	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03	0	7.7E+02	1.3E-03	0.0E+00	0.0E+00 - 3.9E-03
4	Mine	Dam		1R-00172	7/12/2000	9310	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4739	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03	0	7.9E+02	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03
4	Mine	Tailings Pile		1R-00173	7/12/2000	9311	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4115	1	1.5E-03	1.5E-03	7.5E-05 - 6.9E-03	1	6.8E+02	1.5E-03	1.5E-03	7.5E-05 - 6.9E-03
4	Mine	Switchback, Switchback 3		1R-00174	7/12/2000	9312	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4008	0	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03	0	6.7E+02	1.5E-03	0.0E+00	0.0E+00 - 4.5E-03
4	Mine	Road, Fork by 401 and Mine Road		1R-00175	7/12/2000	9313	TEM-ISO10312	8/8/2000	direct	10	0.0064	385	1	4875	2	1.2E-03	2.5E-03	4.4E-04 - 7.8E-03	2	8.1E+02	1.2E-03	2.5E-03	4.4E-04 - 7.8E-03
4	Mine	Property, Top of mine		1R-00176	7/12/2000	9314	TEM-ISO10312	8/11/2000	direct	10	0.0064	385	1	4895	2	1.2E-03	2.5E-03	4.4E-04 - 7.7E-03	2	8.1E+02	1.2E-03	2.5E-03	4.4E-04 - 7.7E-03
1	MillWork West	Property, MillWork West	16	1R-00177	7/12/2000	9315	TEM-ISO10312	8/11/2000	direct	10	0.0064	385	1	4506	2	1.3E-03	2.7E-03	4.7E-04 - 8.4E-03	2	7.5E+02	1.3E-03	2.7E-03	4.7E-04 - 8.4E-03
2	247 Indian Head Rd - Plummer Elementary School	Property, Plummer School		1R-00178	7/12/2000	9316	TEM-ISO10312	8/11/2000	direct	10	0.0064	385	1	4773	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03	0	7.9E+02	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03
1	952 E. Spruce St	Property, City Hall		1R-00179	7/12/2000	9317	TEM-ISO10312	8/11/2000	direct	10	0.0064	385	1	4931	0	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03	0	8.2E+02	1.2E-03	0.0E+00	0.0E+00 - 3.7E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-00180	7/12/2000	9318	TEM-ISO10312	8/11/2000	direct	10	0.0064	385	1	5099	0	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03	0	8.5E+02	1.2E-03	0.0E+00	0.0E+00 - 3.5E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-04005	11/14/2000	10198	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	4800	0	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03	0	8.0E+02	1.3E-03	0.0E+00	0.0E+00 - 3.8E-03
1	952 E. Spruce St	Property, City Hall/Athletic Club		1R-04006	11/14/2000	10199	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	4560	0	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03	0	7.6E+02	1.3E-03	0.0E+00	0.0E+00 - 4.0E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1R-04007	11/14/2000	10200	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	4380	0	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03	0	7.3E+02	1.4E-03	0.0E+00	0.0E+00 - 4.1E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1R-04009	11/16/2000	10201	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	5760	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.6E+02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-04010	11/16/2000	10202	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	5760	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.6E+02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
1	952 E. Spruce St	Property, City Hall		1R-04011	11/16/2000	10203	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	5760	0	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03	0	9.6E+02	1.0E-03	0.0E+00	0.0E+00 - 3.1E-03
3	Jerry Dean Park, McGrade School	Property, Jerry Dean Park		1R-04025	11/15/2000	10206	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	5004	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.3E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03
1	952 E. Spruce St	Property, City Hall		1R-04026	11/15/2000	10207	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	4968	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.3E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03
2	247 Indian Head Rd - Plummer Elementary School	School, Plummer School		1R-04027	11/15/2000	10208	TEM-ISO10312	11/27/2000	direct	10	0.0064	385	1	4980	0	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03	0	8.3E+02	1.2E-03	0.0E+00	0.0E+00 - 3.6E-03

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (a)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm²)	EFA (mm²)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity (cc)[1]	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity (cc)[1]	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
2	247 Indian Head Rd - Plummer Elementary School	Property, Indian Head Rd #1	17	1R-05947	7/11/2001	3048	TEM-AHERA	7/12/2001	direct		0.0516*			1504	0	5.0E-03	0.0E+00	0.0E+00 - 1.5E-02	0	4.3E+02	2.3E-03	0.0E+00	0.0E+00 - 6.9E-03
						10378	TEM-ISO10312	9/17/2001	direct	10	0.0059	385	1	1504	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02					
2	247 Indian Head Rd - Plummer Elementary School	Property, Indian Head Rd #2	18	1R-05948	7/11/2001	3049	TEM-AHERA	7/12/2001	direct		0.0516*			1519	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	4.4E+02	2.3E-03	0.0E+00	0.0E+00 - 6.9E-03
						10379	TEM-ISO10312	9/17/2001	direct	10	0.0059	385	1	1519	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02					
2	247 Indian Head Rd - Plummer Elementary School	Property, Indian Head Rd #3		1R-05949	7/11/2001	3050	TEM-AHERA	7/13/2001	direct		0.0516*			1498	0	5.0E-03	0.0E+00	0.0E+00 - 1.5E-02	0	4.3E+02	2.3E-03	0.0E+00	0.0E+00 - 7.0E-03
						10380	TEM-ISO10312	9/17/2001	direct	10	0.0059	385	1	1498	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02					
2	247 Indian Head Rd - Plummer Elementary School	Property, PES-1		1R-05955	7/13/2001	3051	TEM-AHERA	7/14/2001	direct		0.0645*			1323	0	4.5E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.3E+02	2.3E-03	0.0E+00	0.0E+00 - 6.9E-03
						29015	TEM-ISO10312	4/24/2002	DIRECT	10	0.0061	385	1	1323	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
3	3496 Highway 2 S	Property, Suite 1		1R-06007	7/14/2001	10406	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1380	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3496 Highway 2 S	Property, Suite 2		1R-06008	7/14/2001	10407	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1380	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3496 Highway 2 S	Property, Suite 3	19	1R-06009	7/14/2001	10408	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1377	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3496 Highway 2 S	Property, Suite 4		1R-06010	7/14/2001	10409	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1380	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3496 Highway 2 S	Property, Suite 5		1R-06011	7/14/2001	10410	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1380	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3496 Highway 2 S	Property, Suite 6		1R-06012	7/14/2001	10411	TEM-ISO10312	8/29/2001	direct	10	0.0061	385	1	1371	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	150 Education Way - Libby High School	Property, LHS truck route #4		1R-06164	7/26/2001	10475	TEM-ISO10312	9/5/2001	direct	10	0.011	385	1	1264	0	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03	0	3.6E+02	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03
2	150 Education Way - Libby High School	Property, LHS truck route #2		1R-06165	7/26/2001	10476	TEM-ISO10312	9/5/2001	direct	10	0.011	385	1	1264	0	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03	0	3.6E+02	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03
2	150 Education Way - Libby High School	Property, LHS truck route #3		1R-06166	7/26/2001	42515	TEM-ISO10312	8/15/2001	DIRECT	10	0.011	385	1	1257	0	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03	0	3.6E+02	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03
2	150 Education Way - Libby High School	Property, LHS truck route #4		1R-06167	7/26/2001	10478	TEM-ISO10312	8/16/2001	direct	10	0.011	385	1	1257	0	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03	0	3.6E+02	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03
2	150 Education Way - Libby High School	Property, LHS-1		1R-06177	7/26/2001	64139	TEM-ISO10312	8/3/2001	DIRECT	10	0.011	385	1	1203	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-2		1R-06178	7/26/2001	64140	TEM-ISO10312	8/3/2001	DIRECT	10	0.011	385	1	1203	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-3		1R-06179	7/26/2001	64141	TEM-ISO10312	8/3/2001	DIRECT	10	0.011	385	1	1206	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-4		1R-06180	7/26/2001	64142	TEM-ISO10312	8/3/2001	DIRECT	10	0.011	385	1	1203	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-5		1R-06181	7/26/2001	64143	TEM-ISO10312	8/3/2001	DIRECT	10	0.011	385	1	1200	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-6		1R-06182	7/26/2001	64144	TEM-ISO10312	8/3/2001	DIRECT	12	0.011	385	1	1203	0	2.4E-03	0.0E+00	0.0E+00 - 7.3E-03	0	4.1E+02	2.4E-03	0.0E+00	0.0E+00 - 7.3E-03
2	150 Education Way - Libby High School	Property, LHS-7		1R-06183	7/26/2001	64145	TEM-ISO10312	8/6/2001	DIRECT	10	0.011	385	1	1206	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	150 Education Way - Libby High School	Property, LHS-8		1R-06184	7/26/2001	67524	TEM-ISO10312	8/6/2001	DIRECT	10	0.011	385	1	1200	0	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03	0	3.4E+02	2.9E-03	0.0E+00	0.0E+00 - 8.7E-03
2	101 Sto Rd - Libby Middle School	Property, LMS-1		1R-07075	8/9/2001	10896	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1545	0	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.4E+02	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-2		1R-07076	8/9/2001	10897	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1534	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.4E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-3		1R-07077	8/9/2001	10898	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1534	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.4E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-4		1R-07078	8/9/2001	10899	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1534	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.4E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-5		1R-07079	8/9/2001	10900	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1503	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-6		1R-07080	8/9/2001	10901	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1537	0	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.4E+02	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-7		1R-07081	8/9/2001	10902	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1515	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, LMS-8		1R-07082	8/9/2001	10903	TEM-ISO10312	9/12/2001	direct	10	0.0059	385	1	1511	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	101 Sto Rd - Libby Middle School	Property, Parking Lot-1	20	1R-07542	8/14/2001	11061	TEM-ISO10312	1/23/2002	direct	10	0.0061	385	1	1666	0	3.8E-03	0.0E+00	0.0E+00 - 1.1E-02	0	2.6E+02	3.8E-03	0.0E+00	0.0E+00 - 1.1E-02
2	101 Sto Rd - Libby Middle School	Property, Parking Lot-2	21	1R-07543	8/14/2001	11062	TEM-ISO10312	1/23/2002	direct	10	0.0061	385	1	1571	0	4.0E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.5E+02	4.0E-03	0.0E+00	0.0E+00 - 1.2E-02
2	101 Sto Rd - Libby Middle School	Property, Parking Lot-3		1R-07544	8/14/2001	11063	TEM-ISO10312	1/23/2002	direct	10	0.0061	385	1	1534	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	101 Sto Rd - Libby Middle School	Property, Parking Lot-4		1R-07545	8/14/2001	11064	TEM-ISO10312	1/23/2002	direct	10	0.0061	385	1	1531	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	Armory	Property, Armory property along Road		1R-09016	8/30/2001	29162	TEM-ISO10312	5/1/2002	DIRECT	10	0.0061	385	1	883	0	7.1E-03	0.0E+00	0.0E+00 - 2.1E-02	0	1.4E+02	7.1E-03	0.0E+00	0.0E+00 - 2.1E-02
5	KDC Flyway	Property, FA-1		1R-13866	1/3/2002	6938	TEM-AHERA	1/4/2002	direct		0.0645*			1344	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.1E+02	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03
						42581	TEM-ISO10312	5/26/2002	DIRECT	10	0.011	385	1	1344	0	2.6E-03	0.0E+00	0.0E+00 - 7.8E-03					
5	KDC Flyway	Property, FA-1		1R-13875	1/15/2002	6945	TEM-AHERA	1/16/2002	direct	5	0.0645*			1427	0	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.5E+02	1.5E-03	0.0E+00	0.0E+00 - 4.6E-03
						29881	TEM-ISO10312	5/29/2002	DIRECT	10	0.011	385	1	1427	0	2.5E-03	0.0E+00	0.0E+00 - 7.3E-03					
5	KDC Flyway	Property, FA-1		1R-13878	2/2/2002	6947	TEM-AHERA	2/5/2002	direct	5	0.0645*			1358	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.2E+02	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03
						27534	TEM-ISO10312	3/18/2002	DIRECT	10	0.011	385	1	1358	0	2.6E-03	0.0E+00	0.0E+00 - 7.7E-03					
5	KDC Flyway	Property, FA-1		1R-13887	2/16/2002	27285	TEM-AHERA	2/19/2002	DIRECT	4	0.0129	385	1	1728	1	4.3E-03	4.3E-03	2.2E-04 - 2.0E-02	1	7.3E+02	1.4E-03	1.4E-03	7.1E-05 - 6.5E-03
						27055	TEM-ISO10312	3/30/2002	DIRECT	10	0.011	385	1	1728	0	2.0E-03	0.0E+00	0.0E+00 - 6.1E-03					
5	KDC Flyway	Property, FA-1		1R-13890	3/2/2002	27286	TEM-AHERA	3/3/2002	DIRECT	5	0.0129	385	1	1292	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	5.9E+02	1.7E-03	0.0E+00	0.0E+00 - 5.1E-03
						27149	TEM-ISO10312	3/31/2002	DIRECT	10	0.011	385	1	1292	0	2.7E-03	0.0E+00	0.0E+00 - 8.1E-03					
5	Screening Plant Flyway	Property, FA-1		1R-13917	3/16/2002	28383	TEM-AHERA	3/18/2002	DIRECT	5	0.0129	385	1	1431	0	4.2E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.2E-03	0.0E+00	0.0E+00 - 1.2E-02
5	Screening Plant Flyway	Property, FA-1		1R-13920	3/29/2002	27772	TEM-AHERA	4/1/2002	DIRECT	5	0.0129	385	1	1320	1	4.5E-03	4.5E-03	2.3E-04 - 2.1E-02	1	6.0E+02	1.7E-03	1.7E-03	8.6E-05 - 7.9E-03
						28469	TEM-ISO10312	4/17/2002	DIRECT	10	0.011	385	1	1320	0	2.7E-03	0.0E+00	0.0E+00 - 7.9E-03					
5	Screening Plant Flyway	Property, FA-1		1R-13943	4/13/2002	28520	TEM-AHERA	4/15/2002	DIRECT	5	0.0129	385	1	1289	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	5.8E+02	1.7E-03	0.0E+00	0.0E+00 - 8.1E-03
						28723	TEM-ISO10312	4/28/2002	DIRECT	10	0.011	385	1	1289	0	2.7E-03	0.0E+00	0.0E+00 - 8.1E-03					
5	Screening Plant Flyway	Property, FA-1		1R-13946	4/29/2002	28733	TEM-AHERA	5/3/2002	DIRECT	5	0.0128	385	1	1238	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	4.1E+02	2.4E-03	0.0E+00	0.0E+00 - 7.3E-03
						28737	TEM-ISO10312	5/3/2002	DIRECT	10	0.0064	385	1	1238	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02					

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (a)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
5	Screening Plant Flyway	Property, FA-1		1R-13949	5/13/2002	29603	TEM-AHERA	5/14/2002	DIRECT	5	0.0129	385	1	1450	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	4.7E+02	2.1E-03	0.0E+00	0.0E+00 - 8.4E-03
						29611	TEM-ISO10312	5/16/2002	DIRECT	10	0.0059	385	1	1450	0	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02					
5	Screening Plant Flyway	Property FA-1		1R-13957	5/28/2002	29810	TEM-AHERA	5/29/2002	DIRECT	5	0.0129	385	1	1299	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	110 Montgomery Dr	Yard 3' North of water main in front yard		1R-13981	6/3/2002	30034	TEM-AHERA	6/4/2002	DIRECT	5	0.0129	385	1	1249	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	156 S. Central Rd	Property, SW boundary of exclusion zone		1R-14271	8/2/2002	72434	TEM-AHERA	8/3/2002	DIRECT	5	0.0129	385	1	1290	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	156 S. Central Rd	Property, SE boundary of exclusion zone	22	1R-14272	8/2/2002	72435	TEM-AHERA	8/3/2002	DIRECT	5	0.0129	385	1	1290	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	156 S. Central Rd	Property, NE boundary of exclusion zone		1R-14273	8/2/2002	31315	TEM-AHERA	8/3/2002	DIRECT	5	0.0129	385	1	1270	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	156 S. Central Rd	Property NW boundary of exclusion zone		1R-14276	8/2/2002	32716	TEM-AHERA	8/3/2002	DIRECT	5	0.0129	385	1	1260	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	500 Jay Effar Rd	Property, South end exclusion area		1R-14501	8/12/2002	31722	TEM-AHERA	8/13/2002	DIRECT	5	0.0129	385	1	1316	0	4.5E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.5E-03	0.0E+00	0.0E+00 - 1.4E-02
2	500 Jay Effar Rd	Property, East end exclusion area		1R-14502	8/12/2002	31723	TEM-AHERA	8/13/2002	DIRECT	5	0.0129	385	1	1274	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	500 Jay Effar Rd	Property, North end exclusion area		1R-14503	8/12/2002	31724	TEM-AHERA	8/13/2002	DIRECT	5	0.0129	385	1	1267	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	500 Jay Effar Rd	Property West end exclusion area		1R-14504	8/12/2002	31725	TEM-AHERA	8/13/2002	DIRECT	5	0.0129	385	1	1260	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
1	Champion Haul Rd	Road, South end of exclusion zone		1R-14641	8/19/2002	32974	TEM-AHERA	8/20/2002	DIRECT	5	0.0129	385	1	1388	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
1	Champion Haul Rd	Road, North end of exclusion zone	23	1R-14642	8/19/2002	32975	TEM-AHERA	8/20/2002	DIRECT	5	0.0129	385	1	1328	0	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.2E+02	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02
1	Champion Haul Rd	Road East end of exclusion zone		1R-14643	8/19/2002	32976	TEM-AHERA	8/20/2002	DIRECT	5	0.0129	385	1	1337	0	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.2E+02	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02
1	Champion Haul Rd	Road West end of exclusion zone		1R-14644	8/19/2002	32977	TEM-AHERA	8/20/2002	DIRECT	5	0.0129	385	1	1336	0	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.2E+02	4.5E-03	0.0E+00	0.0E+00 - 1.3E-02
3	781 Terrace View Rd	Property, NW fence boundary	24	1R-14708	8/28/2002	72436	TEM-AHERA	8/29/2002	DIRECT	4	0.0129	385	1	1523	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	4.4E+02	2.3E-03	0.0E+00	0.0E+00 - 8.8E-03
						33587	TEM-ISO10312	8/29/2002	DIRECT	10	0.0059	385	1	1523	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02					
3	781 Terrace View Rd	Property, S fence boundary		1R-14709	8/28/2002	72437	TEM-AHERA	8/29/2002	DIRECT	5	0.0129	385	1	1370	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	4.4E+02	2.3E-03	0.0E+00	0.0E+00 - 8.8E-03
						33588	TEM-ISO10312	8/29/2002	DIRECT	10	0.0059	385	1	1370	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
3	781 Terrace View Rd	Property SE fence boundary		1R-14710	8/28/2002	72438	TEM-AHERA	8/29/2002	DIRECT	5	0.0129	385	1	1320	0	4.5E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03
						33589	TEM-ISO10312	8/29/2002	DIRECT	10	0.0059	385	1	1320	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02					
3	781 Terrace View Rd	Property, E fence boundary		1R-14711	8/28/2002	72439	TEM-AHERA	8/29/2002	DIRECT	5	0.0129	385	1	1269	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.1E+02	2.5E-03	0.0E+00	0.0E+00 - 7.4E-03
						33590	TEM-ISO10312	8/29/2002	DIRECT	10	0.0059	385	1	1269	0	5.1E-03	0.0E+00	0.0E+00 - 1.5E-02					
2	123 Hamann Ave	Property, North side exclusion zone		1R-14987	9/4/2002	32453	TEM-AHERA	9/7/2002	DIRECT	6	0.011	385	1	1372	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.3E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
						32687	TEM-ISO10312	9/7/2002	DIRECT	10	0.011	385	1	1372	0	2.6E-03	0.0E+00	0.0E+00 - 7.6E-03					
2	123 Hamann Ave	Property, West side exclusion zone		1R-14988	9/4/2002	32436	TEM-AHERA	9/7/2002	DIRECT	6	0.011	385	1	1360	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.2E+02	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03
						32688	TEM-ISO10312	9/7/2002	DIRECT	10	0.011	385	1	1360	0	2.6E-03	0.0E+00	0.0E+00 - 7.7E-03					
2	123 Hamann Ave	Property, South side exclusion zone		1R-14989	9/4/2002	32437	TEM-AHERA	9/7/2002	DIRECT	6	0.011	385	1	1341	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	6.1E+02	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03
						32689	TEM-ISO10312	9/7/2002	DIRECT	10	0.011	385	1	1341	0	2.6E-03	0.0E+00	0.0E+00 - 7.8E-03					
2	123 Hamann Ave	Property, East side exclusion zone		1R-14990	9/4/2002	32438	TEM-AHERA	9/7/2002	DIRECT	6	0.011	385	1	1259	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	5.8E+02	1.7E-03	0.0E+00	0.0E+00 - 5.2E-03
						32703	TEM-ISO10312	9/7/2002	DIRECT	10	0.011	385	1	1259	0	2.8E-03	0.0E+00	0.0E+00 - 8.3E-03					
2	319 Norman Ave	Property, E. boundary		1R-15120	9/10/2002	34564	TEM-AHERA	9/11/2002	DIRECT	5	0.0129	385	1	1239	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	319 Norman Ave	Property, N. boundary		1R-15121	9/10/2002	34566	TEM-AHERA	9/11/2002	DIRECT	5	0.0129	385	1	1249	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	319 Norman Ave	Property, W. boundary		1R-15122	9/10/2002	34567	TEM-AHERA	9/11/2002	DIRECT	5	0.0129	385	1	1280	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	319 Norman Ave	Property, S. boundary		1R-15123	9/10/2002	34568	TEM-AHERA	9/11/2002	DIRECT	5	0.0129	385	1	1300	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
5	Ramy Creek Bank	Property, East end exclusion zone		1R-15374	9/23/2002	35273	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1252	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.2E-03
						34369	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1252	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
5	Ramy Creek Bank	Property, North east side exclusion zone		1R-15375	9/23/2002	35274	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1266	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03
						34370	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1266	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
5	Ramy Creek Bank	Property, North west side exclusion zone		1R-15376	9/23/2002	35275	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1260	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03
						34371	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1260	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
5	Ramy Creek Bank	Property, West end exclusion zone		1R-15377	9/23/2002	35276	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1246	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.2E-03
						34372	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1246	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
5	Ramy Creek Bank	Property, South west side exclusion zone		1R-15378	9/23/2002	35277	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1277	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.3E+02	2.3E-03	0.0E+00	0.0E+00 - 7.0E-03
						34373	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1277	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02					
5	Ramy Creek Bank	Property, South east side exclusion zone		1R-15379	9/23/2002	35278	TEM-AHERA	9/24/2002	DIRECT	5	0.0129	385	1	1260	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	4.2E+02	2.4E-03	0.0E+00	0.0E+00 - 7.1E-03
						34374	TEM-ISO10312	10/6/2002	DIRECT	10	0.0064	385	1	1260	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02					
3	34 Bowker St #13	Property, SW corner		1R-15911	10/14/2002	35675	TEM-AHERA	10/15/2002	DIRECT	5	0.0129	385	1	1280	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	154 Sto Rd	Property, S side		1R-15914	10/16/2002	35677	TEM-AHERA	10/17/2002	DIRECT	5	0.0129	385	1	1460	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	154 Sto Rd	Property, W side	25	1R-15915	10/16/2002	35678	TEM-AHERA	10/17/2002	DIRECT	5	0.0129	385	1	1449	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	154 Sto Rd	Property, E side		1R-15916	10/16/2002	35679	TEM-AHERA	10/17/2002	DIRECT	5	0.0129	385	1	1460	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	154 Sto Rd	Property N side		1R-15917	10/16/2002	35680	TEM-AHERA	10/17/2002	DIRECT	5	0.0129	385	1	1449	0	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.1E-03	0.0E+00	0.0E+00 - 1.2E-02
2	247 Indian Head Rd - Plummer Elementary School	Property, West side of exclusion zone		1R-15931	10/12/2002	35642	TEM-AHERA	10/12/2002	DIRECT	5	0.0129	385	1	1296	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	247 Indian Head Rd - Plummer Elementary School	Property, South side of exclusion zone		1R-15932	10/11/2002	35643	TEM-AHERA	10/12/2002	DIRECT	5	0.0129	385	1	1223	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.0E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
2	247 Indian Head Rd - Plummer Elementary School	Property, East side of exclusion zone		1R-15933	10/11/2002	35644	TEM-AHERA	10/12/2002	DIRECT	5	0.0129	385	1	1296	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (a)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
2	247 Indian Head Rd - Plummer Elementary School	Property, North side of exclusion zone	26	1R-15937	10/11/2002	35646	TEM-AHERA	10/12/2002	DIRECT	5	0.0129	385	1	1432	0	4.2E-03	0.0E+00	0.0E+00 - 1.2E-02	0	2.4E+02	4.2E-03	0.0E+00	0.0E+00 - 1.2E-02
3	34 Bowker St #13	Property, NE corner	27	1R-15938	10/14/2002	35682	TEM-AHERA	10/15/2002	DIRECT	5	0.0129	385	1	1302	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	34 Bowker St #13	Property, SE corner		1R-15939	10/14/2002	35683	TEM-AHERA	10/15/2002	DIRECT	5	0.0129	385	1	1293	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	34 Bowker St #13	Property, S side		1R-15940	10/14/2002	35684	TEM-AHERA	10/15/2002	DIRECT	5	0.0129	385	1	1286	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
5	4241 Highway 37 N	Property, South end of EZ	28	1R-16401	10/23/2002	36396	TEM-AHERA	10/24/2002	DIRECT	5	0.0129	385	1	1388	2	4.3E-03	8.6E-03	1.5E-03 - 2.7E-02	2	2.3E+02	4.3E-03	8.6E-03	1.5E-03 - 2.7E-02
5	4241 Highway 37 N	Property, West end of EZ		1R-16402	10/23/2002	36397	TEM-AHERA	10/24/2002	DIRECT	5	0.0129	385	1	1369	0	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.4E-03	0.0E+00	0.0E+00 - 1.3E-02
5	4241 Highway 37 N	Property, East end of EZ		1R-16403	10/23/2002	36398	TEM-AHERA	10/24/2002	DIRECT	5	0.0129	385	1	1385	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
5	4241 Highway 37 N	Property, North end of EZ		1R-16404	10/23/2002	36399	TEM-AHERA	10/24/2002	DIRECT	5	0.0129	385	1	1345	1	4.4E-03	4.4E-03	2.3E-04 - 2.1E-02	1	2.3E+02	4.4E-03	4.4E-03	2.3E-04 - 2.1E-02
1	605 Utah Ave	Yard, North side of exclusion zone		1R-16561	10/31/2002	39320	TEM-AHERA	11/1/2002	DIRECT	5	0.0129	385	1	1244	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
1	605 Utah Ave	Yard, West end of exclusion zone	29	1R-16562	10/31/2002	37147	TEM-AHERA	11/1/2002	DIRECT	5	0.0129	385	1	1265	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
1	605 Utah Ave	Yard, South end of exclusion zone		1R-16563	10/31/2002	37148	TEM-AHERA	11/1/2002	DIRECT	5	0.0129	385	1	1284	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
1	605 Utah Ave	Yard, East end of exclusion zone		1R-16564	10/31/2002	37149	TEM-AHERA	11/1/2002	DIRECT	5	0.0129	385	1	1280	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
2	2113 Highway 2 W	Property, East side of flower garden		1R-16652	11/4/2002	37084	TEM-AHERA	11/5/2002	DIRECT	5	0.0129	385	1	1211	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.0E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
2	2113 Highway 2 W	Property, West side of flower garden		1R-16653	11/4/2002	37085	TEM-AHERA	11/5/2002	DIRECT	5	0.0129	385	1	1375	0	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.3E+02	4.3E-03	0.0E+00	0.0E+00 - 1.3E-02
2	2113 Highway 2 W	Property, East side of pump house		1R-16654	11/4/2002	37086	TEM-AHERA	11/5/2002	DIRECT	5	0.0129	385	1	1208	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.0E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
2	2113 Highway 2 W	Property, West side of pump house		1R-16655	11/4/2002	37087	TEM-AHERA	11/5/2002	DIRECT	5	0.0129	385	1	1208	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.0E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
1	1417 Louisiana Ave	Property, Northeast of former garden		1R-16761	11/5/2002	37110	TEM-AHERA	11/6/2002	DIRECT	5	0.0129	385	1	1224	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
1	1417 Louisiana Ave	Property, South west flower bed		1R-16764	11/5/2002	37112	TEM-AHERA	11/6/2002	DIRECT	5	0.0129	385	1	1228	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
1	1417 Louisiana Ave	Property, North east flower bed		1R-16765	11/5/2002	37113	TEM-AHERA	11/6/2002	DIRECT	5	0.0129	385	1	1228	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
1	1417 Louisiana Ave	Property, South west of former garden area		1R-16766	11/5/2002	37114	TEM-AHERA	11/6/2002	DIRECT	5	0.0129	385	1	1228	0	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.9E-03	0.0E+00	0.0E+00 - 1.5E-02
2	2608 W. 2nd St Ext	Property, 19ft away from front of house 23ft toward center		1R-16774	11/6/2002	39846	TEM-AHERA	11/7/2002	DIRECT	5	0.0129	385	1	1234	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	2608 W. 2nd St Ext	Property, 19ft North from SE corner of house 10ft East of		1R-16775	11/6/2002	39847	TEM-AHERA	11/7/2002	DIRECT	5	0.0129	385	1	1234	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0 *	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	2608 W. 2nd St Ext	Property, 31ft toward center of house from NE corner 24ft		1R-16776	11/6/2002	39848	TEM-AHERA	11/7/2002	DIRECT	5	0.0129	385	1	1234	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	2608 W. 2nd St Ext	Property, 29 ft north of southwest corner of house		1R-16777	11/6/2002	37115	TEM-AHERA	11/7/2002	DIRECT	5	0.0129	385	1	1231	0	4.8E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.5E-02
3	3504 Highway 2 S	Property, N. Side	30	1R-17005	11/12/2002	38352	TEM-AHERA	11/13/2002	DIRECT	5	0.0129	385	1	1258	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3504 Highway 2 S	Property, S. Side		1R-17006	11/12/2002	38353	TEM-AHERA	11/13/2002	DIRECT	5	0.0129	385	1	1251	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3504 Highway 2 S	Property E Side		1R-17007	11/12/2002	38354	TEM-AHERA	11/13/2002	DIRECT	5	0.0129	385	1	1231	0	4.8E-03	0.0E+00	0.0E+00 - 1.5E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.5E-02
3	3504 Highway 2 S	Property, West side		1R-17008	11/12/2002	38355	TEM-AHERA	11/13/2002	DIRECT	5	0.0129	385	1	1248	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
2	Lincoln County Landfill	Property, South side of decon pad		1R-17013	11/13/2002	38358	TEM-AHERA	11/14/2002	DIRECT	5	0.0129	385	1	1302	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	Lincoln County Landfill	Property, West side of decon pad		1R-17014	11/13/2002	38360	TEM-AHERA	11/14/2002	DIRECT	5	0.0129	385	1	1302	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	Lincoln County Landfill	Property, North side of decon pad	31	1R-17015	11/13/2002	38361	TEM-AHERA	11/14/2002	DIRECT	5	0.0129	385	1	1302	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
2	Lincoln County Landfill	Property, East side of decon		1R-17016	11/13/2002	38362	TEM-AHERA	11/14/2002	DIRECT	5	0.0129	385	1	1302	0	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.2E+02	4.6E-03	0.0E+00	0.0E+00 - 1.4E-02
3	3504 Highway 2 S	Property, North side		1R-17081	11/13/2002	38391	TEM-AHERA	11/14/2002	DIRECT	10	0.0129	385	1	469	0	6.4E-03	0.0E+00	0.0E+00 - 1.9E-02	0	1.6E+02	6.4E-03	0.0E+00	0.0E+00 - 1.9E-02
3	3504 Highway 2 S	Property, South side		1R-17082	11/13/2002	38392	TEM-AHERA	11/14/2002	DIRECT	10	0.0129	385	1	454	0	6.6E-03	0.0E+00	0.0E+00 - 2.0E-02	0	1.5E+02	6.6E-03	0.0E+00	0.0E+00 - 2.0E-02
3	3504 Highway 2 S	Property, East side		1R-17083	11/13/2002	38393	TEM-AHERA	11/14/2002	DIRECT	10	0.0129	385	1	440	0	6.8E-03	0.0E+00	0.0E+00 - 2.0E-02	0	1.5E+02	6.8E-03	0.0E+00	0.0E+00 - 2.0E-02
3	3504 Highway 2 S	Property, West side		1R-17084	11/13/2002	38394	TEM-AHERA	11/14/2002	DIRECT	10	0.0129	385	1	207	0	1.4E-02	0.0E+00	0.0E+00 - 4.3E-02	0	6.9E+01	1.4E-02	0.0E+00	0.0E+00 - 4.3E-02
3	819 Cabinet Heights Rd	Property Northeast Perimeter		2-01181	8/21/2001	13481	TEM-ISO10312	9/5/2001	direct	10	0.0061	385	1	1350	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02
3	819 Cabinet Heights Rd	Property Northwest Perimeter	32	2-01182	8/21/2001	13482	TEM-ISO10312	9/5/2001	direct	10	0.0061	385	1	1319	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
3	819 Cabinet Heights Rd	Property Southwest Perimeter		2-01183	8/21/2001	13483	TEM-ISO10312	9/5/2001	direct	10	0.0061	385	1	1312	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
3	819 Cabinet Heights Rd	Property, Southeast Perimeter		2-01184	8/21/2001	13484	TEM-ISO10312	9/5/2001	direct	10	0.0061	385	1	1319	0	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.1E+02	4.8E-03	0.0E+00	0.0E+00 - 1.4E-02
5	Screening Plant	#2 North Main Gate Perimeter, BALLFIELD Corner		28-28116	1/19/2000	50542	TEM-ISO10312	2/21/2000	DIRECT	30	0.011	385	1	3960	0	2.9E-04	0.0E+00	0.0E+00 - 8.8E-04	0	3.4E+03	2.9E-04	0.0E+00	0.0E+00 - 8.8E-04
1	952 E. Spruce St	Property, HEALTH AND FITNESS CENTER		28-28117	1/19/2000	50543	TEM-ISO10312	2/21/2000	DIRECT	30	0.011	385	1	5040	0	2.3E-04	0.0E+00	0.0E+00 - 6.9E-04	0	4.3E+03	2.3E-04	0.0E+00	0.0E+00 - 6.9E-04
2	247 Indian Head Rd - Plummer Elementary School	Play Area, Left playground, 75 feet from Corner of school		28-28118	1/19/2000	50544	TEM-ISO10312	2/21/2000	DIRECT	30	0.011	385	1	4140	0	2.8E-04	0.0E+00	0.0E+00 - 8.4E-04	0	3.5E+03	2.8E-04	0.0E+00	0.0E+00 - 8.4E-04
3	899 Farm to Market Rd - McGrade Elementary	Property Park next to school 50 feet from restroom		28-28119	1/19/2000	50545	TEM-ISO10312	2/21/2000	DIRECT	30	0.011	385	1	4500	0	2.6E-04	0.0E+00	0.0E+00 - 7.8E-04	0	3.9E+03	2.6E-04	0.0E+00	0.0E+00 - 7.8E-04
3	899 Farm to Market Rd - McGrade Elementary	Property, Park next to school		28-28680	1/20/2000	76452	TEM-ISO10312	2/21/2000	DIRECT	10	0.011	385	1	4140	0	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03
1	952 E. Spruce St	Field FIELD NEXT TO FITNESS CLUB		28-28681	1/20/2000	50546	TEM-ISO10312	2/21/2000	DIRECT	10	0.011	385	1	4500	0	7.8E-04	0.0E+00	0.0E+00 - 2.3E-03	0	1.3E+03	7.8E-04	0.0E+00	0.0E+00 - 2.3E-03
5	Screening Plant	#2 North Main Gate Perimeter, BALLFIELD Corner OF HWY 37		28-28682	1/20/2000	45235	TEM-ISO10312	2/22/2000	DIRECT	10	0.011	385	1	4140	0	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03
2	247 Indian Head Rd - Plummer Elementary School	Play Area, Left playground 75 feet from Corner of school		28-28683	1/20/2000	45236	TEM-ISO10312	2/22/2000	DIRECT	10	0.011	385	1	3960	0	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.1E+03	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03
3	899 Farm to Market Rd - McGrade Elementary	Property, Park		28-28688	1/21/2000	45241	TEM-ISO10312	2/22/2000	DIRECT	10	0.011	385	1	5580	0	6.3E-04	0.0E+00	0.0E+00 - 1.9E-03	0	1.6E+03	6.3E-04	0.0E+00	0.0E+00 - 1.9E-03
1	952 E. Spruce St	Field FIELD NEXT TO CENTER		28-28689	1/21/2000	45242	TEM-ISO10312	2/22/2000	DIRECT	10	0.011	385	1	4320	0	8.1E-04	0.0E+00	0.0E+00 - 2.4E-03	0	1.2E+03	8.1E-04	0.0E+00	0.0E+00 - 2.4E-03
5	Screening Plant	#2 North Main Gate Perimeter BALLFIELD		28-28692	1/21/2000	45245	TEM-ISO10312	2/23/2000	DIRECT	10	0.011	385	1	4140	0	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03	0	1.2E+03	8.5E-04	0.0E+00	0.0E+00 - 2.5E-03
2	247 Indian Head Rd - Plummer Elementary School	Play Area, Playground		28-28693	1/21/2000	45246	TEM-ISO10312	2/22/2000	DIRECT	10	0.011	385	1	3960	0	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03	0	1.1E+03	8.8E-04	0.0E+00	0.0E+00 - 2.6E-03
1	875 Highway 2 S - Stimson Lumber	Property, Employee parking lot, southeast corner		SL-00127	9/14/2002	35068	TEM-AHERA	9/18/2002	DIRECT	4	0.0129	385	1	4650	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	1.7E+03	5.8E-04	0.0E+00	0.0E+00 - 1.7E-03
						33559	TEM-ISO10312	9/28/2002	DIRECT	10	0.00921	385	1	4650	0	9.0E-04	0.0E+00	0.0E+00 - 2.7E-03					
1	875 Highway 2 S - Stimson Lumber	Property, Employee parking lot, south side, center of side		SL-00128	9/14/2002	35069	TEM-AHERA	9/18/2002	DIRECT	4	0.0129	385	1	4650	0	1.6E-03	0.0E+00	0.0E+00 - 4.8E-03	0	1.7E+03	5.8E-04	0.0E+00	0.0E+00 - 1.7E-03
						33560	TEM-ISO10312	9/28/2002	DIRECT	10	0.00921	385	1	4650	0	9.0E-04	0.0E+00	0.0E+00 - 2.7E-03					

ATTACHMENT 2. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES FROM LIBBY, MT

LOCATION & SAMPLE INFORMATION						ANALYSIS INFORMATION									TEM RESULTS				POOLED TEM RESULTS				
Zone	Address	Location Description	Selected for Re-Analysis (a)	Index ID	Sample Date	Analysis ID	Analysis Method	Analysis Date	Prep Method	GOs Counted	GO Size (mm^2)	EFA (mm^2)	F-Factor	Volume (L)	N LA Struc	Analysis Sensitivity $(cc)^{-1}$	Air Conc (s/cc)	90% Poisson CI, Air Conc (s/cc)	Total N LA Struc	Total Amount Eval. (cc)	Total Sensitivity $(cc)^{-1}$	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)
1	875 Highway 2 S - Stimson Lumber	Property, Employee parking lot, northeast corner		SL-00129	9/14/2002	35070	TEM-AHERA	9/18/2002	DIRECT	4	0.0129	385	1	4579	0	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03	0	1.7E+03	5.9E-04	0.0E+00	0.0E+00 - 1.8E-03
						33561	TEM-ISO10312	9/28/2002	DIRECT	10	0.00921	385	1	4579	0	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03					
1	875 Highway 2 S - Stimson Lumber	Property, Employee parking lot, in railroad tracks		SL-00130	9/14/2002	35072	TEM-AHERA	9/18/2002	DIRECT	4	0.0129	385	1	4590	0	1.6E-03	0.0E+00	0.0E+00 - 4.9E-03	0	1.7E+03	5.8E-04	0.0E+00	0.0E+00 - 1.7E-03
						34017	TEM-ISO10312	9/28/2002	DIRECT	10	0.00921	385	1	4590	0	9.1E-04	0.0E+00	0.0E+00 - 2.7E-03					
1	875 Highway 2 S - Stimson Lumber	Property, Outside logyard log truck scale shed		SL-00167	9/16/2002	34408	TEM-AHERA	9/23/2002	DIRECT	4	0.0098	385	1	2330	0	4.2E-03	0.0E+00	0.0E+00 - 1.3E-02	0	2.8E+02	3.6E-03	0.0E+00	0.0E+00 - 1.1E-02
						34306	TEM-ISO10312	10/1/2002	INDIRECT	10	0.0098	1297	0.25	2330	0	2.3E-02	0.0E+00	0.0E+00 - 6.8E-02					
1	875 Highway 2 S - Stimson Lumber	Property, Outside logyard storage shed	33	SL-00168	9/16/2002	34394	TEM-AHERA	9/21/2002	DIRECT	4	0.0098	385	1	4092	0	2.4E-03	0.0E+00	0.0E+00 - 7.2E-03	0	1.9E+03	6.9E-04	0.0E+00	0.0E+00 - 2.1E-03
						34088	TEM-ISO10312	9/30/2002	DIRECT	10	0.0098	385	1	4092	0	9.6E-04	0.0E+00	0.0E+00 - 2.9E-03					
1	875 Highway 2 S - Stimson Lumber	Property, At loader crane		SL-00181	9/16/2002	34395	TEM-AHERA	9/21/2002	DIRECT	4	0.0098	385	1	2090	0	4.7E-03	0.0E+00	0.0E+00 - 1.4E-02	0	2.5E+02	4.0E-03	0.0E+00	0.0E+00 - 1.2E-02
						34318	TEM-ISO10312	10/1/2002	INDIRECT	10	0.0098	1297	0.25	2090	0	2.5E-02	0.0E+00	0.0E+00 - 7.6E-02					
1	875 Highway 2 S - Stimson Lumber	Property, Logyard near head gate		SL-00182	9/16/2002	34409	TEM-AHERA	9/23/2002	DIRECT	5	0.0098	385	1	1500	0	5.2E-03	0.0E+00	0.0E+00 - 1.6E-02	0	5.7E+02	1.7E-03	0.0E+00	0.0E+00 - 5.2E-03
						33989	TEM-ISO10312	10/1/2002	DIRECT	10	0.0098	385	1	1500	0	2.6E-03	0.0E+00	0.0E+00 - 7.8E-03					
1	875 Highway 2 S - Stimson Lumber	Property, Outside logyard log truck scale shed		SL-00203	9/16/2002	34419	TEM-AHERA	9/23/2002	DIRECT	4	0.0098	385	1	1903	0	5.2E-03	0.0E+00	0.0E+00 - 1.5E-02	1	6.8E+02	1.5E-03	1.5E-03	7.6E-05 - 7.0E-03
						33992	TEM-ISO10312	10/1/2002	DIRECT	10	0.0098	385	1	1903	1	2.1E-03	2.1E-03	1.1E-04 - 9.8E-03					
1	875 Highway 2 S - Stimson Lumber	Property, At loader crane		SL-00204	9/16/2002	34420	TEM-AHERA	9/23/2002	DIRECT	4	0.0098	385	1	1930	0	5.1E-03	0.0E+00	0.0E+00 - 1.5E-02	1	6.9E+02	1.5E-03	1.5E-03	7.5E-05 - 6.9E-03
						33993	TEM-ISO10312	10/1/2002	DIRECT	10	0.0098	385	1	1930	1	2.0E-03	2.0E-03	1.0E-04 - 9.7E-03					

* In some older AHERA analyses, the analytical laboratory only reported the product of GOs counted x Area of GO and Analysis Sensitivity, and other analysis details (Gos counted, F-factor, EFA) were not provided

(a) Sample identified for re-analysis. Results shown in this attachment provide only the initial results. Re-analysis results for the 33 selected ambient air samples are provided in Attachment 3.

(b) For several samples selected for re-analysis, the initial results as reported in this table are not available in the Libby 2 Database. This is because the re-analysis TEM file provided by the laboratory included both the initial data and the supplemental data combined, and this combined TEM file replaced in the initial results in the Libby 2 Database. For the purposes of this attachment, the initial results were re-created from the combined re-analysis TEM file utilizing information provided in the comment field. See Attachment 3 for a comparison of the initial results to the supplemental results.

ATTACHMENT 3. DETAILED TEM RESULTS FOR AMBIENT AIR SAMPLES THAT WERE RE-ANALYZED

Zone	Index ID	Sample Date	Volume (L)	ORIGINAL RESULTS												Pooled Original Results			RE-ANALYSIS RESULTS										POOLED TEM RESULTS ACROSS BOTH ANALYSES				Difference (original - re-analysis) (s/cc)
				Analysis ID	Analysis Method	Prep Method	GO Counted	GO Area (mm^2)	EFA (mm^2)	F-factor	TAE (cc)	Analysis Sensitivity (cc)[1]	N LA Struc	Air Conc (s/cc)	TAE (cc)	Total N LA Struc	Air Conc (s/cc) ND=0	Analysis ID	Analysis Method	Prep Method	GO Counted	GO Area (mm^2)	EFA (mm^2)	F-factor	Analysis Sensitivity (cc)[1]	N LA Struc	Air Conc (s/cc)	Total N LA Struc	Total Sensitivity (cc)[1]	Pooled TEM Air Conc (s/cc)	90% Poisson CI, Pooled TEM Air Conc (s/cc)	
1	1-00808	6/5/2000	5040	7661	TEM-ISO10312	direct	10	0.01	385	1	1.3E-03	7.6E-04	0	0.0E+00	5.2E-03	0	0.0E+00	106560	TEM-ISO10312	direct	64	0.011	385	1	1.1E-04	0	0.0E+00	0	6.9E-05	0.0E+00	0.0E+00 - 2.1E-04	0.0E+00
				7660	TEM-ISO10312	direct	30	0.01	385	1	3.9E-03	2.5E-04	0	0.0E+00																			
2	1-00809	6/5/2000	5040	7662	TEM-ISO10312	direct	30	0.01	385	1	3.9E-03	2.5E-04	0	0.0E+00	5.2E-03	0	0.0E+00	106561	TEM-ISO10312	direct	70	0.011	385	1	9.9E-05	1	9.9E-05	1	6.5E-05	6.5E-05	3.3E-06 - 3.1E-04	-9.9E-05
				7663	TEM-ISO10312	direct	10	0.01	385	1	1.3E-03	7.6E-04	0	0.0E+00																			
2	1-01308	4/8/2000	4344	7760	TEM-ISO10312	direct	10	0.01	385	1	1.1E-03	8.9E-04	0	0.0E+00	4.5E-03	0	0.0E+00	106562	TEM-ISO10312	direct	70	0.011	385	1	1.2E-04	5	5.8E-04	5	7.6E-05	3.8E-04	1.5E-04 - 8.0E-04	-5.8E-04
				7759	TEM-ISO10312	direct	30	0.01	385	1	3.4E-03	3.0E-04	0	0.0E+00																			
3	1-01457	5/22/2000	4104	7849	TEM-ISO10312	direct	10	0.0064	385	1	8.8E-02	1.5E-03	0	0.0E+00	1.6E-03	0	0.0E+00	107230	TEM-ISO10312	direct	158	0.0058	385	1	1.0E-04	1	1.0E-04	1	9.6E-05	9.6E-05	4.9E-06 - 4.5E-04	-1.0E-04
3	1-01755	8/1/2000	4171	7894	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.4E-04	2	1.7E-03	8.4E-04	2	1.7E-03	112773	TEM-ISO10312	direct	74	0.011	385	1	1.1E-04	5	5.7E-04	7	1.0E-04	7.0E-04	3.3E-04 - 1.3E-03	1.1E-03
2	1-01757	8/2/2000	4171	(a)	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.4E-04	4	3.4E-03	8.4E-04	4	3.4E-03	106583 (a)	TEM-ISO10312	direct	71	0.011	385	1	1.2E-04	5	5.9E-04	9	1.0E-04	9.3E-04	4.9E-04 - 1.6E-03	2.8E-03
1	1-01758	8/2/2000	4465	7897	TEM-ISO10312	direct	10	0.011	385	1	1.3E-03	7.8E-04	1	7.8E-04	7.8E-04	1	7.8E-04	106564	TEM-ISO10312	direct	73	0.011	385	1	1.1E-04	1	1.1E-04	2	9.4E-05	1.9E-04	3.4E-05 - 5.9E-04	6.8E-04
3	1-01759	8/2/2000	4032	(a)	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.7E-04	0	0.0E+00	8.7E-04	0	0.0E+00	106565	TEM-ISO10312	direct	71	0.011	385	1	1.2E-04	8	1.1E-03	9	1.1E-04	8.6E-04	5.0E-04 - 1.7E-03	-1.1E-03
2	1-03059	6/28/2001	1331	87525	TEM-AHERA	direct	10	0.0129	385	1	4.5E-02	2.2E-03	0	0.0E+00	2.2E-03	0	0.0E+00	108570	TEM-AHERA	direct	217	0.013	385	1	1.0E-04	0	0.0E+00	0	9.8E-05	0.0E+00	0.0E+00 - 2.9E-04	0.0E+00
1	1-06894	5/16/2002	2048	29795	TEM-AHERA	direct	4	0.0129	385	1	2.7E-02	3.6E-03	0	0.0E+00	3.6E-03	0	0.0E+00	106571	TEM-AHERA	direct	143	0.013	385	1	1.0E-04	11	1.1E-03	11	9.8E-05	1.1E-03	8.1E-04 - 1.8E-03	-1.1E-03
1	1A-00005	8/23/2001	4104	9215	TEM-ISO10312	direct	10	0.0061	385	1	8.5E-02	1.5E-03	0	0.0E+00	1.6E-03	0	0.0E+00	107772	TEM-ISO10312	direct	159	0.0058	385	1	1.0E-04	0	0.0E+00	0	9.5E-05	0.0E+00	0.0E+00 - 2.8E-04	0.0E+00
1	1A-00010	8/28/2001	4166	(a)	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.4E-04	1	8.4E-04	8.4E-04	1	8.4E-04	106970 (a)	TEM-ISO10312	direct	73	0.011	385	1	1.2E-04	4	4.6E-04	5	1.0E-04	5.1E-04	2.0E-04 - 1.1E-03	3.8E-04
1	1A-00042	12/31/2001	4104	(a)	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.5E-04	1	8.5E-04	8.5E-04	1	8.5E-04	108567 (a)	TEM-ISO10312	direct	76	0.011	385	1	1.1E-04	0	0.0E+00	1	9.8E-05	9.8E-05	5.1E-06 - 4.7E-04	8.5E-04
1	1A-00048	2/13/2002	4153	(a)	TEM-ISO10312	direct	10	0.011	385	1	1.2E-03	8.4E-04	0	0.0E+00	8.4E-04	0	0.0E+00	106568 (a)	TEM-ISO10312	direct	85	0.011	385	1	9.8E-05	0	0.0E+00	0	8.9E-05	0.0E+00	0.0E+00 - 2.7E-04	0.0E+00
2	1R-00153	7/10/2000	3996	9292	TEM-ISO10312	direct	10	0.0064	385	1	6.6E-02	1.5E-03	0	0.0E+00	1.5E-03	0	0.0E+00	107231	TEM-ISO10312	direct	141	0.0064	385	1	1.1E-04	0	0.0E+00	0	1.0E-04	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
1	1R-00177	7/12/2000	4506	9315	TEM-ISO10312	direct	10	0.0064	385	1	7.5E-02	1.3E-03	2	2.7E-03	1.3E-03	2	2.7E-03	107270	TEM-ISO10312	direct	130	0.0064	385	1	1.0E-04	2	2.1E-04	4	9.9E-05	3.8E-04	1.3E-04 - 8.7E-04	2.5E-03
2	1R-05947	7/11/2001	1504	10378	TEM-ISO10312	direct	10	0.0059	385	1	2.3E-02	4.3E-03	0	0.0E+00	4.3E-02	0	2.7E-03	107317	TEM-ISO10312	direct	432	0.0058	385	1	1.0E-04	0	0.0E+00	0	9.8E-05	0.0E+00	0.0E+00 - 2.8E-04	2.7E-03
				3048	TEM-AHERA	direct	--	0.0516	--	--	2.0E-02	5.0E-03	0	0.0E+00				AHERA results not reanalyzed															
2	1R-05948	7/11/2001	1519	10379	TEM-ISO10312	direct	10	0.0059	385	1	2.3E-02	4.3E-03	0	0.0E+00	4.4E-02	0	2.7E-03	107504	TEM-ISO10312	direct	441	0.0058	385	1	9.9E-05	0	0.0E+00	0	9.5E-05	0.0E+00	0.0E+00 - 2.8E-04	2.7E-03
				3049	TEM-AHERA	direct	--	0.0516	--	--	2.0E-02	4.9E-03	0	0.0E+00				AHERA results not reanalyzed															
3	1R-06009	7/14/2001	1377	10408	TEM-ISO10312	direct	10	0.0061	385	1	2.2E-02	4.6E-03	0	0.0E+00	4.6E-03	0	0.0E+00	107281	TEM-ISO10312	direct	475	0.0058	385	1	1.0E-04	0	0.0E+00	0	9.9E-05	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
2	1R-07542	8/14/2001	1668	11061	TEM-ISO10312	direct	10	0.0061	385	1	2.6E-02	3.8E-03	0	0.0E+00	3.8E-03	0	0.0E+00	107562	TEM-ISO10312	direct	387	0.0058	385	1	1.0E-04	0	0.0E+00	0	1.0E-04	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
2	1R-07543	8/14/2001	1571	11062	TEM-ISO10312	direct	10	0.0061	385	1	2.5E-02	4.0E-03	0	0.0E+00	4.0E-03	0	0.0E+00	107563	TEM-ISO10312	direct	426	0.0058	385	1	9.9E-05	1	9.9E-05	1	9.7E-05	9.7E-05	5.0E-06 - 4.6E-04	-9.9E-05
2	1R-14272	8/2/2002	1290	72435	TEM-AHERA	direct	5	0.0129	385	1	2.2E-02	4.6E-03	0	0.0E+00	4.6E-03	0	0.0E+00	108835	TEM-AHERA	direct	232	0.013	385	1	9.8E-05	1	8.9E-05	1	9.7E-05	9.7E-05	5.0E-06 - 4.6E-04	-8.9E-05
1	1R-14842	8/19/2002	1329	32975	TEM-AHERA	direct	5	0.0129	385	1	2.2E-02	4.5E-03	0	0.0E+00	4.5E-03	0	0.0E+00	108836	TEM-AHERA	direct	217	0.013	385	1	1.0E-04	0	0.0E+00	0	1.0E-04	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
3	1R-14708	8/28/2002	1523	33587	TEM-ISO10312	direct	10	0.0059	385	1	2.3E-02	4.3E-03	0	0.0E+00	4.4E-02	0	0.0E+00	ISO results not reanalyzed										0	9.4E-05	0.0E+00	0.0E+00 - 2.8E-04	0.0E+00
				72436	TEM-AHERA	direct	4	0.0129	385	1	2.0E-02	4.9E-03	0	0.0E+00				106919	TEM-AHERA	direct	198	0.013	385	1	9.8E-05	0	0.0E+00							
2	1R-15915	10/16/2002	1449	35678	TEM-AHERA	direct	5	0.0129	385	1	2.4E-02	4.1E-03	0	0.0E+00	4.1E-03	0	0.0E+00	106572	TEM-AHERA	direct	204	0.013	385	1	1.0E-04	2	2.0E-04	2	9.8E-05	2.0E-04	3.5E-05 - 6.2E-04	-2.0E-04
2	1R-15937	10/11/2002	1432	35648	TEM-AHERA	direct	5	0.0129	385	1	2.4E-02	4.2E-03	0	0.0E+00	4.2E-03	0	0.0E+00	106838	TEM-AHERA	direct	205	0.013	385	1	1.0E-04	0	0.0E+00	0	9.8E-05	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
3	1R-15938	10/14/2002	1302	35682	TEM-AHERA	direct	5	0.0129	385	1	2.2E-02	4.6E-03	0	0.0E+00	4.6E-03	0	0.0E+00	107144	TEM-AHERA	direct	223	0.013	385	1	1.0E-04	0	0.0E+00	0	1.0E-04	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
5	1R-16401	10/23/2002	1388	36396	TEM-AHERA	direct	5	0.0129	385	1	2.3E-02	4.3E-03	2	8.6E-03	4.3E-03	2	8.6E-03	106880	TEM-AHERA	direct	216	0.013	385	1	9.9E-05	23	2.3E-03	25	9.7E-05	2.4E-03	1.7E-03 - 3.4E-03	8.3E-03
1	1R-16562	10/31/2002	1265	37147	TEM-AHERA	direct	5	0.0129	385	1	2.1E-02	4.7E-03	0	0.0E+00	4.7E-03	0	0.0E+00	106920	TEM-AHERA	direct	234	0.013	385	1	1.0E-04	0	0.0E+00	0	9.8E-05	0.0E+00	0.0E+00 - 2.9E-04	0.0E+00
3	1R-17005	11/12/2002	1258	38352	TEM-AHERA	direct	5	0.0129	385	1	2.1E-02	4.7E-03	0	0.0E+00	4.7E-03	0	0.0E+00	107145	TEM-AHERA	direct	242	0.013	385	1	9.7E-05	0	0.0E+00	0	9.5E-05	0.0E+00	0.0E+00 - 2.9E-04	0.0E+00
2	1R-17015	11/13/2002	1302	38361	TEM-AHERA	direct	5	0.0129	385	1	2.2E-02	4.6E-03	0	0.0E+00	4.6E-03	0	0.0E+00	106958	TEM-AHERA	direct	230	0.013	385	1	9.9E-05	0	0.0E+00	0	9.7E-05	0.0E+00	0.0E+00 - 2.9E-04	0.0E+00
3	2-01182	8/21/2001	1319	13482	TEM-ISO10312	direct	10	0.0061	385	1	2.1E-02	4.8E-03	0	0.0E+00	4.8E-03	0	0.0E+00	107774	TEM-ISO10312	direct	497	0.0058	385	1	1.0E-04	0	0.0E+00	0	9.9E-05	0.0E+00	0.0E+00 - 3.0E-04	0.0E+00
1	SL-00168	9/16/2002	4092	34088	TEM-ISO10312	direct	10	0.0098	385	1	1.0E-03	9.6E-04	0	0.0E+00	1.5E-03	0	0.0E+00	105352 (a)	TEM-ISO10312	direct	87	0.0097	385	1	1.1E-04	4	4.5E-04	4	9.6E-05	3.8E-04	1.3E-04 - 8.8E-04	-4.5E-04
				34394	TEM-AHERA	direct	4	0.0098	385	1	4.2E-02	2.4E-03	0	0.0E+00				AHERA results not reanalyzed															

* In some older AHERA analyses, the analytical laboratory only reported the product of GOs counted x Area of GO and Analysis Sensitivity, and other analysis details (GOs counted, F-factor, EFA) were not provided.

(a) For several samples selected for re-analysis, the initial and supplemental results as reported in this table are not available in the Libby 2 Database. This is because the re-analysis TEM file provided by the laboratory included both the initial data and the supplemental data combined, and this combined TEM file replaced in the initial results in the Libby 2 Database. For the purposes of this attachment the initial and supplemental results were re-created from the combined re-analysis TEM file utilizing information provided in the comment field.

ATTACHMENT 4

MONTE CARLO SIMULATION OF UNCERTAINTY IN THE MEAN OF MULTIPLE MEASUREMENTS OF ASBESTOS IN AIR

1.0 INTRODUCTION

Exposure of humans to environmental contaminants is usually evaluated on the basis of an exposure unit. If multiple measures of concentration of a contaminant exist for the exposure unit, the preferred statistic for use in exposure assessment is the mean across all relevant samples. However, the true mean can only be estimated from a finite set of measurements, so there is uncertainty in the estimate of the mean. Methods are well developed for estimating the uncertainty around the mean when the value for each sample is considered to be accurate and the only source of uncertainty is variability between different samples (EPA 2002). However, in the case of measures of asbestos concentration in air, each individual sample result has uncertainty that is related to the total number of asbestos structures observed and the total amount of sample analyzed. This document summarizes a Monte Carlo based simulation approach for characterizing the uncertainty around the mean of a set of asbestos air samples.

2.0 SIMULATION APPROACH

The concentration of asbestos in an air sample is computed from the analytical results of a microscopic examination of the air filter using the following equation:

$$C = N \cdot S$$

where:

C = concentration in air (s/cc)
N = total number of asbestos structures observed during analysis
S = sensitivity $(cc)^{-1}$

The value of sensitivity is given by:

$$S = EFA / (GO \cdot Ago \cdot V \cdot 1000)$$

where:

EFA = Effective filter area (mm^2)
GO = Number of grid opening evaluated
Ago = Area of one grid opening (mm^2)
V = volume of air drawn through the filter (L)
1000 = Conversion factor (cc per L)

Note that sensitivity is best interpreted as 1 / the volume of air that passed through the portion of the filter examined by the microscopist.

The number of structures observed in any given analysis of a sample is a random variable described by the Poisson distribution: .

$$N = \text{Poisson}(\lambda / S)$$

where:

λ = True concentration (s/cc)
S = Sensitivity $(cc)^{-1}$

The best estimate of λ is equal to $N_{observed} \cdot S$, so that the uncertainty distribution around any observed N is given by:

$$N \sim \text{Poisson}(N_{observed})$$

Thus, given a set of "i" samples, each with a measured value for N_i and S_i, the uncertainty distribution around the mean of the samples is simulated as follows:

Step 1: Draw a random value for N_i for each sample "i" from the Poisson distribution for that sample: $N_i = \text{Poisson}(N_{observed})_i$
Step 2: Compute the concentration for each sample as $C_i = N_i \cdot S_i$
Step 3. Compute the mean concentration across the set of "i" samples
Step 4: Repeat steps 1 to 3 many times, recording the mean value each time
Step 5: Find the 5th and 95th percentile values of the distribution of the mean values. This represents the uncertainty bounds around the best estimate of the mean.

3.0 REFERENCES

EPA. 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. Office of Emergency and Remedial Response. US Environmental Protection Agency. OSWER 9285.6-10. December 2002.

ATTACHMENT 5

SUMMARY OF PUBLISHED MEASUREMENTS OF ASBESTOS LEVELS IN AMBIENT AIR

DRAFT--FOR USEPA REVIEW ONLY

Summary of Published Measurements of Asbestos Levels in Ambient Air

Prepared for USEPA Region 8
Denver, CO

by

Syracuse Research Corporation
Denver, CO

7/30/04

Summary of Published Measurements of Asbestos Levels in Ambient Air

1.0 Introduction

Libby, Montana, is a community that has been impacted by past and potentially on-going releases of asbestos into air from waste materials associated with historic mining activities at a nearby vermiculite mine. However, it is important to understand that asbestos is a naturally occurring material and has also been widely used in commercial products in the past, and particles of asbestos are often detectable in air at locations that are not associated with any specific sources. The purpose of this technical memorandum is to summarize data from published reports on the levels of asbestos that have been reported in air at a number of other locations across the country. These data provide a perspective on "background" levels of asbestos in air, and may help with risk management decision making at the site.

2.0 Strategy for Locating Information on Airborne Concentrations of Asbestos

Primary and secondary literature sources were screened for information on ambient concentrations of airborne asbestos in outdoor air and in buildings. Documents prepared by ATSDR (2001) and WHO (1998) were initially screened for information on airborne concentrations of asbestos and relevant references. Relevant references identified in these documents were subsequently reviewed for additional sources of information. Bibliographic searches were conducted using Medline and Toxline to identify any recent documents published since the reviews by ATSDR (2001) and WHO (1998). A keyword search was conducted on the internet using Google. Ultimately, the most useful approach for identifying relevant data was screening of the secondary sources and review articles. No additional relevant data were identified by the Medline, Toxline, or internet searches. Types of data intentionally excluded were occupational exposure data, data collected in regions with "natural" sources (e.g., data for California schools near serpentine rock outcrops), and data associated with building collapse or demolition (e.g., levels associated with destruction of the World Trade Center).

3.0 Results

Summarization and evaluation of data on asbestos levels in air are complicated by the large number of independent variables which may influence the data, including:

- Analysis method (PCM, TEM) and counting rules (ISO, AHERA, Yamate, etc.)
- Asbestos type (chrysotile, amphibole)
- Sample collection location (indoors, outdoors, urban, rural)
- Sample collection method (stationary sampler, personal sampler)
- Sample preparation (direct, indirect)

For the purposes of this summary, data have been characterized based on analytical method and sampling location. The units reported are those used in the cited reference. With the exception of the data reviewed by ATSDR (2001), which appear to include concentrations obtained by various analytical methodologies and are expressed in units of PCM fibers, the data reported were generally obtained using transmission electron microscopy and a direct transfer method for analysis.

Data from NRC (1984) (as cited in ATSDR 2001) indicate that ambient outdoor air remote from any special sources generally contains $3x10^{-8}$ to $3x10^{-6}$ PCM f/mL, whereas the median concentration in U.S. cities is $7.5x10^{-5}$ PCM f/mL. The Health Effects Institute-Asbestos Research (1991) reports that the average concentration of asbestos in rural air is $1x10^{-5}$ PCM fibers/mL (see additional data from the HEI-AR review below). Most ambient air concentrations in urban areas range from $3x10^{-6}$ to $3x10^{-4}$ PCM f/mL, but may range up to $3x10^{-3}$ PCM f/mL near local sources (Corn, 1994; EPA, 1991; IARC, 1977; Nicholson and Pundsack, 1973; Selikoff et al., 1973). Two additional investigations reported in WHO (1998) and cited in ATSDR (2001) indicate that levels of asbestos in outdoor air in the U.S. range from not detected to $8x10^{-3}$ PCM f/mL, with mean and median levels of $5x10^{-5}$ PCM f/mL and $3x10^{-4}$ PCM f/mL, respectively. ATSDR (2001) did not provide information on the geographical distribution of the sampling programs associated with these estimates or the analytical methodology employed.

Chesson et al. (1990) reported the results of a study in which the U.S. Environmental Protection Agency (U.S. EPA) sampled air inside and outside 49 government-owned buildings for asbestos. The results of this study are also reported in U.S. EPA (1988), Crump and Farrar (1989), and Spengler et al. (1989). The geographical distribution of the buildings included two cities on the east coast, one midwestern city, one western city, and a west coast region consisting of two cities. Three types of buildings were defined: 1) buildings without asbestos containing material (Category 1); 2) buildings with all or most asbestos-containing material in good condition (Category 2); and 3) buildings with at least one area of significantly damaged asbestos-containing material (Category 3). Air samples were collected at seven locations inside each building (two samples per location) and at one location outside of each building. Within the buildings, approximately 50% of the air samples were collected near the most damaged asbestos-containing material, while the remaining samples were collected from public areas. Air samples were analyzed by transmission electron microscopy (TEM) using a direct transfer preparation technique. All asbestos structures, including fibers, bundles and clusters, and asbestos-containing matrices, were included in total structure counts. A comprehensive quality assurance plan covered all aspects of the study.

The results of this study are summarized in Table 1. Data were obtained from a total of 387 air samples. No asbestos structures were detected in 83% of the samples. The mean concentration of asbestos in outdoor air was 0.00039 ± 0.00096 s/cc. The median concentration in outdoor air was <0.00001 s/cc. Pairwise statistical comparisons showed that the concentration of asbestos in indoor air did not differ significantly from the concentration in outdoor air.

Table 1 Airborne Asbestos Levels Reported by Chesson et al. (1990)[a]

Statistic	Outdoor Air (s/cc)	Buildings (s/cc)		
		Category 1 (No Asbestos)	Category 2 (Good Condition)	Category 3 (Damaged)
Sample size	48 sites	6 buildings	6 buildings	37 buildings
Median	<0.00001	0.00010	0.00040	0.00058
Mean	0.00039	0.00099[b]	0.00059	0.00073
Standard Dev.	0.00096	0.00198	0.00052	0.00072

[a] Statistics were calculated using the average concentration within each building (indoor samples) or the concentration outside each building (outdoor samples) as the basic data.
[b] This mean was heavily influenced by one sample that gave an unusually high estimate of airborne asbestos concentration. If the sample is excluded as an outlier, the mean is 0.00020 s/cc.

In a brief correspondence, Crump (1990) reported average indoor concentrations of airborne asbestos fibers in 71 schools, 34 Minnesota universities, and 72 Maryland public buildings involved in litigation regarding the presence of asbestos-containing materials (Table 2). No data for outdoor air were included. Data were reported for fibers > 5 μm (method of analysis not reported). In addition, Crump (1990) reported indoor concentration data for fibers >5μm in Government Services Administration (GSA) buildings surveyed by the U.S. EPA.

Table 2 Average Indoor Concentrations of Airborne Asbestos Fibers > 5 μm (Crump, 1990)

Sites	No. of Buildings	No. of Samples	Structures/cm^3
GSA Buildings – No ACM	6	42	0.0
GSA Buildings – Undamaged ACM	6	42	0.00007
GSA Buildings – Damaged ACM	37	256	0.00008
Schools	71	328	0.00024
Minnesota Universities	34	170	0.00003
Maryland Public Buildings	72	91	0.00009

Abbreviations: ACM, asbestos-containing materials

The Health Effects Institute – Asbestos Research (HEI-AR, 1991) reviewed and synthesized information on airborne asbestos concentrations in public and commercial buildings and outdoor air. Information sources included peer-reviewed publications and unpublished reports. The data included here are taken from the executive summary of the document. The average concentration of asbestos fibers > 5μm in outdoor air in rural areas (except near asbestos-containing rock outcrops) was reported to be on the order of 0.00001 f/mL, with average levels in urban areas being up to approximately 10-fold higher. These averages are based on direct measurement methods using TEM. The report noted that airborne concentrations above 0.0001 g/mL have been reported as a result of local sources, including proximity to areas of frequent vehicle braking or activities involving the demolition or application of asbestos products.

HEI-AR (1991) also reported airborne concentrations of asbestos inside schools, residences, and public and commercial buildings. Data were reported as means for all

samples pooled and for samples stratified by building type and litigation status. Indoor levels of airborne asbestos were measured in 1377 air samples collected from 198 buildings containing asbestos-containing materials, but not involved in litigation, and in 1260 samples collected for litigation purposes from 231 buildings. For buildings not involved in litigation, the mean concentration for pooled samples is 0.00027 f/mL, with 90th and 95th percentile values of 0.0007 and 0.0014 f/mL, respectively. Table 3 summarizes mean concentrations of asbestos fibers > 5μm by building category and litigation status. Some samples were collected in areas with higher levels of asbestos as a result of custodial or maintenance activities. Because the means were sensitive to these higher concentrations, subsets of data excluding the highest measured concentration were also analyzed ("Selected Data", Table 3).

Table 3 Summary of Airborne Asbestos Concentrations by Building Type and Litigation Status (HEI-AR, 1991)[a]

Building Category	Non-Litigation		Litigation
	All Data	Selected Data	All Data
Schools/Colleges	0.00051	0.00038	0.00011
Residences	0.00019	--	< Limit of Detection
Public/Commercial	0.00020	0.00008	0.00006
All Buildings	0.00027	--	--

[a] As reported in the Executive Summary

Lee et al. (1992) reported the concentration of airborne asbestos inside and outside of buildings that were the subject of litigation related to suits alleging that the general building occupants were exposed to a potential health hazard as a result of exposure to asbestos-containing materials. A subset of these data (for airborne concentrations in 71 schools) were published by Corn et al. (1991). The analytical procedures used were reported in detail. Typically, one outdoor and five indoor samples were analyzed for each building. Samples were analyzed by TEM. Structures with an aspect ratio of greater than 3 to 1 length to width were identified morphologically. Bundles, clusters, and matrices were classified according to the U.S. EPA level II protocol (Yamate et al., 1984). The number, length, width, aspect ratio, and type were recorded for all particles having a length:width ratio greater than 3:1. Particles meeting this definition were classified as chrysotile, amphibole, or nonasbestos using definitions developed by Yamate et al. (1984). According to the authors, all amphiboles were reported as asbestos, although (in general) the amphiboles observed were not asbestiform. The following concentrations were calculated for each individual sample: the total structures per unit air volume (s/mL), the number of fibers ≥ 5μm (f/mL), the number of fibers ≥ 5μm with a width of at least 0.25 μm (i.e., the fraction of "optically equivalent" structures that would be identified by phase contrast microscopy), and the number of fibers having length ≥ 0.5μm and at least five times the width (i.e., AHERA fibers, s/mL). Samples with no asbestos fibers counted were treated as 0 s/mL for statistical analyses. Air samples collected within each building were averaged prior to calculation of summary averages and percentiles. Averages and percentiles for outdoor and personal air are based on individual data rather than building averages.

A total of 2892 air samples from 315 public, commercial, residential, school, and university buildings were analyzed by TEM. This total included 1693 indoor samples, 759 outdoor samples, 106 personal samples and 334 blanks. The data from schools includes measurements reported for 71 schools also reported by Corn et al. (1991, 1994) and the data for universities includes measurements reported in the brief correspondence by Crump et al. (1990; see above). No asbestos was detected in 75% of the outdoor samples and 48% of the indoor samples. Summary statistics for outdoor air are shown in Table 4. The average concentration of asbestos structures for all outdoor air samples was 0.00188 s/mL; the average concentration for asbestos fibers ≥ 5μm for all outdoor air samples was 0.00005 f/mL. The corresponding mean concentrations were 0.02485 s/mL and 0.00013 f/mL for all indoor air samples and 0.00866 s/mL and 0.00012 f/mL for personal samples (Table 5). There were significant differences in the concentration of total asbestos structures among all building types and between indoor and outdoor air. For fibers ≥ 5μm, there was no significant difference in indoor concentrations among buildings or between indoor and outdoor concentrations for commercial, public, or university buildings; however, the level of fibers ≥ 5μm in schools was significantly higher indoors than outdoors.

Table 4 Summary Statistics for Asbestos in Outdoor Air (Lee et al., 1992)

Statistic[a]	Total Structures (s/mL)	Asbestos Fibers ≥ 5μm (f/mL)	AHERA (s/mL)	Optical f/mL
Mean ± Standard Dev.	0.00188 ± 0.00854	0.00005 ± 0.00040	0.00134 ± 0.0060	0.00002 ±0.00026
Median	0.00000	0.00000	0.00000	0.00000
90th Percentile	0.00437	0.00000	0.00000	0.00000

[a] n=759 samples

Table 5 Comparison of Airborne Asbestos Concentrations in Indoor, Outdoor and Personal Air (Lee et al. (1992)

Sample Type	No. of Samples	Total structures (s/mL)	Asbestos Fibers ≥ 5μm (f/mL)	AHERA (s/mL)
Indoor	1693	0.02485	0.00013	0.01193
Outdoor	759	0.00188	0.00005	0.00134
Personal	106	0.00866	0.00012	0.00465

4.0 Summary

Figure 1 summarizes the data presented above, stratified by analysis method and sampling location. As seen, ambient levels of asbestos range widely, regardless of analytical method and sampling location. This variability is not unexpected, since concentration levels in air depend not only on the concentration of asbestos in source materials, but also on the nature and intensity of forces that act on the fibers to cause them to become suspended in air.

In outdoor air in rural and remote areas, reported levels range from 10^{-8} to 10^{-5} PCM fibers/mL. Ambient levels in outdoor air in urban areas are generally somewhat higher, mainly ranging from 10^{-5} to 10^{-3} PCM fiber/mL. Estimates for outdoor and indoor air based on total TEM structures then to be mainly in the 10^{-4} to 10^{-2} fibers/mL range, while concentrations of fibers longer than 5 µm (these are the particles suspected to be of greatest health concern) tend to fall mainly in the 10^{-5} to 10^{-3} fibers/mL range.

5.0 References

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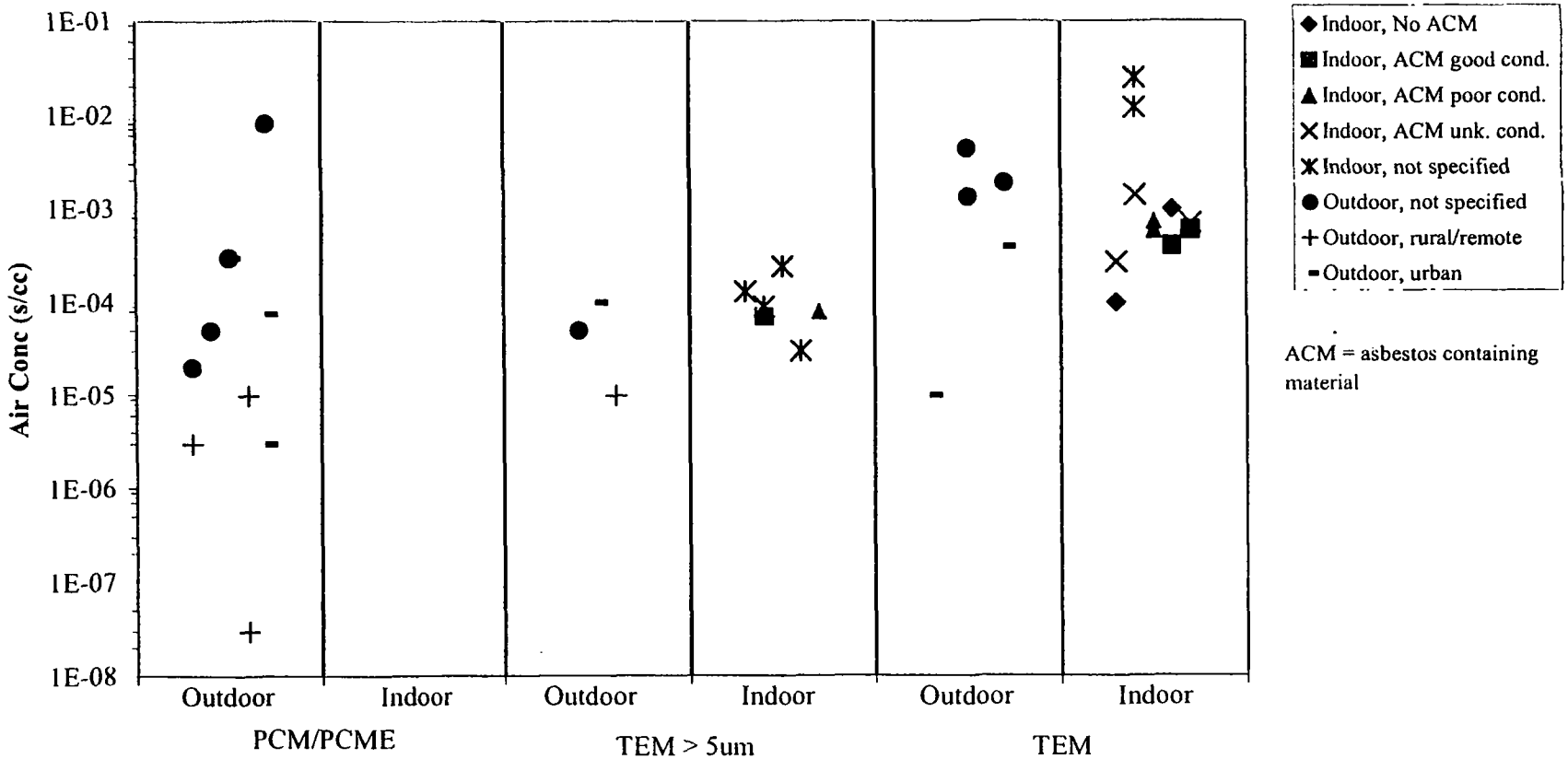
FIGURE 1. SUMMARY OF ASBESTOS DATA IN AMBIENT AIR