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To: Interested Parties

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Date: November 7, 2005

Subject: Asbestos Exposure and Human Health Risk Assessment, Asbestos Air Sampling, Conducted November 2nd and 3rd, 2004, Clear Creek Management Area, California – Part 1: Adult Individual Activities

The subject technical memorandum, prepared by CH2MHILL for the U.S. Environmental Protection Agency, has been reviewed and approved for public release.

Asbestos Exposure and Human Health Risk Assessment, Asbestos Air Sampling, Conducted November 2nd and 3rd, 2004, Clear Creek Management Area, California – Part 1: Adult Individual Activities

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DATE:	November 4, 2005

Executive Summary

This memorandum evaluates the asbestos exposure levels and potential human health cancer risks caused by inhaling asbestos, generated by recreational activities at the Clear Creek Management Area (CCMA), based on November 2 and 3, 2004 sampling results. Asbestos exposure concentrations, expressed as Phase Contrast Microscope equivalent fibers per cubic centimeter (PCMe fibers/cc) are presented for adult receptors. In addition, potential Excess Lifetime Cancer Risks (ELCR), based on U.S. EPA's asbestos inhalation unit risk factor for carcinogenic effects, are estimated. Potential ELCRs for combined recreational activities and for child receptors, based on this sampling event, will be presented in a future technical memorandum (Part 2: Child Receptors and Combined Adult Activities).

Asbestos air samples were collected, using activity-based sampling techniques, for the following adult recreation scenarios (Table 1):

- Motorcyclists and trailing riders
- ATV (4-wheel all terrain vehicle) riders and trailing riders
- SUV (sport utility vehicle) riders and trailing vehicle riders
- Hiker
- Camper
- Sleeping Camper
- Vehicle Washer
- Vehicle Vacuumer.

Ambient air samples were also collected using high volume, stationary pumps at 4 locations. Two ambient air sampling locations were outside of the Hazardous Asbestos Area (HAA) at the CCMA, and two were inside the hazardous zone. The HAA at the

CCMA is a 30,000 acre area that is designated as hazardous by the Bureau of Land Management (BLM) due to elevated soil concentrations of naturally occurring asbestos.

Since BLM employees engage in OHV (off highway vehicle), hiking, and vehicle cleaning activities while working within the hazardous zone, exposure concentrations based on activity-based samples, are compared with airborne asbestos standards established by OSHA (Table 2A). These standards include the Permissible Exposure Limit (PEL) and the 30-minute Maximum Excursion Limit. Ambient airborne asbestos concentrations, based on stationary sampling, are reported in Table 2B.

Excess Lifetime Cancer Risk (ELCR) values are also estimated (Table 3A and 3B), using exposure assumptions appropriate for recreational users at this site. These ELCR values are compared to the risk management range of 1E-06 to 1E-04, which is used by EPA's Superfund Program to define an acceptable risk, if managed appropriately. Estimated ELCR values exceeding this range are considered unacceptable, requiring a more aggressive approach to mitigate risk.

Sample results show that hiking and camping activities created the least asbestos exposure, while OHV riding (motorcycle, ATV, and SUV) and vehicle cleaning activities created the greatest asbestos exposures. Exposures for trailing OHV riders and vehicle cleaning activities frequently exceeded OSHA's PEL (0.1 fiber/cc) and, in one case, exceeded the 30-minute excursion limit (1 fiber/cc) (Table 2A).

The estimated ELCRs for trailing motorcycle, ATV, and SUV riding frequently exceeded 1E-04 (100 in a million), when the user is assumed to ride 2-3 days/year (Table 3A and 3B). The ELCRs for lead vehicle riders were often ten times less than for trailing riders and sometimes less than 1E-06. Asbestos cancer risks for most other recreational scenarios fell between 1E-04 and 1E-06.

These data show that BLM workers engaged in OHV riding or vehicle cleaning activities within the hazardous zone at the CCMA may be frequently exposed to airborne asbestos concentrations that exceed standards established by OSHA. ELCRs for recreational users, calculated from these same concentrations, indicate unacceptable cancer risks for OHV riders, especially those in trailing positions, using EPA's Superfund risk assessment guidance as a standard. However, hiking, camping, and vehicle cleaning activities were within EPA's risk management range, indicating that these risks could, potentially, be mitigated through appropriate management decisions.

Ambient samples collected from stationary samplers showed no discernible difference in airborne asbestos concentrations from inside and outside the hazardous asbestos zone. The ambient concentrations were generally at least 10 times less than OSHA standards. Clearly, ambient sampling with stationary samplers does not provide a representative measure of exposure concentrations in the breathing zones of recreational users or workers at the CCMA.

Background

The CCMA, located in San Benito County, California, is an approximately 76,000 acre area that contains the New Idria Serpentine Formation. This 30,000 acre geological area, which has been designed a Hazardous Asbestos Area (HAA) by the Bureau of Land Management (BLM), has soils with large amounts of naturally occurring asbestos. The CCMA is one of four geographically distinct areas of the Atlas Asbestos Mine Superfund Site. It is managed by the BLM, Hollister, California. The naturally barren slopes, bald ridges, network of bulldozed mining trails, and isolated location make the CCMA a popular location for recreational use by OHV users, hunters, hikers, and campers, including many families with children.

Since the 1970's investigators have studied asbestos dust exposures of recreational users and BLM employees within the HAA (Cooper et al., 1979, Popendorf and Wenk, 1983). The "Human Health Risk Assessment for the Clear Creek Management Area" was developed for the BLM by PTI Environmental Services (1992) to assess the potential hazards and risks posed to public health associated with the inhalation of airborne asbestos generated during OHV use, as well as other uses that generate less dust. The current work is part of the task to update BLM's 1992 Human Health Risk Assessment (HHRA). This study differs from the BLM study in using transmission electron microscopy, rather than phase contrast microscopy, to analyze air samples for asbestos. In addition, this study specifically evaluates asbestos exposures to children (Part 2 of this report).

Introduction

Asbestos air sampling was conducted at the CCMA on November 2 and 3, 2004. The asbestos air sampling and analysis approach and methodology are presented in the "Sampling and Analysis Plan for Asbestos Air Sampling, Clear Creek Management Area" (CH2M HILL, 2004).

Breathing zone air samples were collected by adult study participants while performing recreational activities (i.e. activity-based samples), listed in Table 1. Using standard asbestos sampling techniques, air was sampled from the personal breathing space of the participants. This was done using a calibrated air pump attached to a plastic cassette, which contained an asbestos fiber-sampling filter.

The collected samples were sent to an analytical laboratory, EMSL Analytical, Inc., which analyzed the filters for asbestos type and concentrations in air by Transmission Electron Microscopy (TEM), using ISO 10312 methodology. The analytical results were compiled and reported as PCMe (Phase Contrast Microscope equivalent) fibers by Lockheed Martin REAC (Table A1). The number of samples counted, and both minimum and maximum asbestos exposure point concentrations in units of PCMe fibers/cc (which are equivalent to fibers/ml), are presented for adult receptors and ambient air (Table 2A and 2B).

For this human health risk assessment, exposures and risks were calculated using EPA based approaches and methodology as presented in the PTI Environmental Services HRA (1992), as described in the following sections.

Asbestos Dose-Response:

The EPA weight of evidence classification for asbestos is known human carcinogen (Table 4). The basis of the classification, the observation of increased mortality and incidence of lung cancer, mesothelioma, and gastrointestinal cancer in occupationally exposed workers, are consistent across investigators and study populations (U.S. EPA, 2005).

The inhalation unit risk for asbestos is 2.3E-01 $(f/ml)^{-1}$ [fibers/milliliter] $^{-1}$. The unit risk should not be used if the air concentration exceeds 4E-02 fibers/ml, since above this concentration the slope factor may differ from that stated (U.S. EPA 2005). In this risk assessment the calculated chronic exposure concentrations were compared to 4E-02 fibers/ml and none of the values were found to exceed that value. The unit risk is based on fiber counts made by phase contrast microscopy (PCM). In this study PCM equivalent (PCMe) fibers are measured using transmission electron microscopy (TEM) and are defined as asbestos fibers > 5 microns long, $\geq$ 0.25 microns and $\leq$3 microns in width, with an aspect ratio $\geq$ 3:1. These dimensions are used because they are equivalent to the range of fiber dimensions that can be detected with a PCM.

The quantitative unit risk estimate is limited by uncertainty in the exposure estimates, which results from a lack of data on early exposure in occupational studies and the uncertainty of conversions between various analytical measurements for asbestos.

Exposure Estimate:

The following airborne asbestos inhalation exposure algorithm is based on the 1992 PTI HRA:

$$EC = \frac{C_a \times ET \times EF \times ED}{AT}$$

Where,

EC = Chronic Exposure Concentration (averaged over a 70-year lifetime) [f/ml]
C_a = Asbestos Concentration in fibers per cubic centimeter (f/ml)
ET = Exposure Time in hours/day
EF = Exposure Frequency in days/year
ED = Exposure Duration in years
AT = Averaging Time of 24 hours/day x 365 days/year x 70 years (lifetime).

Exposure assumptions appropriate for adult recreational users are presented in Table 5. All Chronic Exposure Concentrations estimated in this study (Tables 6 to 12) were less than 4E-02 fibers/ml.

Risk Calculation:

The upper-bound excess lifetime cancer risks were calculated using the following equation described in EPA risk assessment guidance documents (EPA 1989) and is presented in the 1992 PTI HRA:

ELCR = EC x URF

Where,

ELCR = Excess Lifetime Cancer Risk
EC = Chronic Daily Exposure Concentration (averaged over a 70-year lifetime) [f/ml]
URF = Unit Risk Factor for inhalation of asbestos [0.23 $(f/ml)^{-1}$].

Estimated potential future cancer risks for individual adult scenarios are presented in Tables 6 to 12 and summarized in Table 3.

Results

Activity-based asbestos air sampling, conducted on November 2-3, included off highway vehicle riding (OHVs included motorcycles, ATVs and SUVs), hiking, camping, and vehicle cleaning (Table 1). OHV riders in trailing positions were exposed to airborne asbestos concentrations, in their breathing zones, that frequently exceeded the OSHA PEL of 0.1 fiber/cc (Table 2A). However, most exposures for lead OHV riders did not exceed the PEL. One trailing ATV rider was exposed to a concentration (2.0 PCMe fibers/cc) two times OSHA's 30-minute "not to exceed" excursion level of 1.0 fiber/cc. The maximum concentrations observed during washing and vacuuming vehicles also exceeded OSHA's PEL. Hiking and camping exposures did not exceed OSHA's PEL.

Excess Lifetime Cancer Risks (ELCR) were calculated from exposure parameters for 1-day per year, 5-day per year (Reasonable Maximum Exposure [RME]) and 12-days per year (high use) exposure frequencies (Table 5). Calculations for individual adult activities are shown in Tables 6 - 12, and the ranges of ELCR values are presented in Table 3A and 3B. These values indicate that trailing OHV riders frequently exceeded the upper limit (1E-04) of EPA Superfund Program's risk management range (1E-06 to 1E-04), when 2-3 riding days are assumed (Table 3A and 3B). The risks posed by riding for only one day per year in a trailing position usually fell within the risk management range. Cancer risks for lead OHV riders were often about ten times less than for trailing riders, with the maximum risks usually falling within the risk management range. Some hiker, camper, sleeping camper, and vehicle cleaning exposures exceeded an ELCR of 1E-06 for minimum air concentrations, but none exceeded the upper limit of the risk management range of 1E-04.

Ambient asbestos concentrations (Table 2B), collected from stationary samplers, were 100 to 1,000 times less than activity-based asbestos concentrations. Further, the concentrations reported for samples taken within the hazardous zone at the CCMA did not differ from concentrations reported for samples taken outside the hazardous zone.

Uncertainty Analysis:

This risk assessment presents quantitative estimates of some potential current and future cancer risks for recreational users of the CCMA. However, it is important to note that these numbers do not predict individual exposures, nor actual health outcomes. Specific

uncertainties should be considered when interpreting the results for this risk assessment, as follows:

► SAMPLING UNCERTAINTY

- Seasonal Variability

Data presented herein represent results from a two-day sampling event in November, 2004, initiated within one week of a two day rainfall event that produced about one inch of precipitation in the Clear Creek area (recorded by California Department of Water Resources gauging stations at Hernandez Reservoir and Santa Rita Peak). During this sampling event, low-lying areas at the CCMA contained standing water, while elevated areas were nearly dry. Soil moisture is likely to affect dust generation and asbestos exposure during recreational activities, such that dry season samples are likely to over-estimate exposure during the wet season and wet season samples are likely to underestimate exposure during other times of the year. This uncertainty is addressed in this study by sampling during different seasons, ranging from very dry to very wet. Thus far, samples have been collected in September and November 2004, and February and September, 2005. In addition, soil samples were collected along all routes traveled during activity-based sampling, and analyzed for soil moisture (soil data will be presented and interpreted in a future report).

- Within Season Variability
  - Time of Day, Style of Riding, Vehicle Type, Other Non-seasonal Factors. Exposure concentrations may vary due to time of day, style of riding, vehicle type, distance from preceding rider, height of rider, etc. These sources of variation could result in exposure concentrations greater or less than those observed during this sampling event. This uncertainty was addressed by performing each sampling scenario (e.g., ATV riding at the tail of three riders) more than once per day and on consecutive sampling days, to obtain a range of exposure concentrations for each scenario within a sampling event. Due to logistic and cost considerations, sample sizes were limited. Therefore, it is likely that the observed range in exposure concentrations is narrower than would be observed if more samples had been taken with a variety of riders and riding styles.
  - Child vs. Adult Exposures. Children may experience different exposures than adults for three reasons: 1) they are shorter, so their distance from the asbestos source (ground) is less than for adults engaged in the same activity; 2) they tend to be trailing, rather than lead motorcycle or ATV riders. In the case of SUVs, children will often ride in the back, rather than front seat. To address this source of uncertainty, asbestos filter cassettes were placed on adult study participants at heights to simulate a child's breathing zone. In the SUV scenario, filter cassettes were placed on the backrest of the back seat to simulate a child's breathing zone. The exposure data and cancer risks associated with these child scenarios will be presented in Part 2 of this report.

- Scenario Routes. Exposure concentrations could, potentially, vary with the route traveled during the sampling activity. The potential for variability within a particularly activity scenario (motorcycle, ATV, SUV, hiking) was limited by selecting routes for each scenario and repeating those routes, to the extent possible, during all sampling events. This approach reduced sampling variability within activity scenarios (e.g. ATV riding). However, different routes were selected for each activity (the ATV route was different from the SUV route), which could contribute to variability in asbestos concentrations across scenarios. To address this source of variation, soil samples were taken along each route and analyzed for soil moisture and asbestos concentration, since these parameters could, potentially, be linked to differences in asbestos dust generation. The results of soil sampling will be presented and interpreted in a future report.

► ANALYTICAL UNCERTAINTY

- Overloaded Filters. The analysis of asbestos fibers on filters has inherent limitations and uncertainties. If samples are overloaded with asbestos fibers or dust, it may not be possible to analyze them accurately. To address this concern, two different sample volumes were collected concurrently for each sampling event, based on anticipated air concentrations from previous site-specific experience. For this sampling event, we obtained at least one filter, per activity sampling, that was not over-loaded, thereby eliminating this source of uncertainty.

- Laboratory Uncertainty. Laboratory uncertainty may result in either over- or underestimates of exposure concentrations. There are numerous potential sources of uncertainties in analyzing asbestos samples using transmission electron microscopy. These uncertainties are addressed to a large degree by the protocol for preparing and analyzing asbestos samples, developed by the International Organization for Standardization, known as ISO 10312. This method includes very specific definitions of structure types, which minimizes subjective decisions by analysts. In addition, it contains very specific counting rules and Quality Assurance/Quality Control (QA/QC) procedures. These include field duplicates, field blanks, and internal checks for consistency among analysts. Laboratory uncertainty may result in either over- or underestimates of exposure concentrations.

► UNCERTAINTIES IN CALCULATING RISK

- Exposure Parameters. The exposure parameters used in these risk calculations (hours/day, days/year use of the CCMA) were based on estimates reported by recreational motorcyclists at a CCMA public meeting (PTI, 1992). The estimates by the recreational riders at the CCMA public meeting included the high-end estimates of long-term OHV use by attendees. Variations in exposure parameters will exist. For example, the range of use (1 to 12 days per year), used herein, probably does not include extreme uses of the CCMA. The BLM ranger who patrols the CCMA, for example, may ride many more than 12 days per year. Uncertainties in exposure parameters are easily addressed by producing tables of risk that encompass the

broadest expected ranged of use. Future reports may expand the range of exposure parameters used to calculate risk, if warranted.

- EPA Cancer Slope Factor for Asbestos Fibers. The EPA Integrated Risk Information System (IRIS) was the source of the asbestos cancer slope factor used in the risk calculations. The IRIS slope factor is derived from occupational studies where elevated rates of cancer were observed in workers whose occupations exposed them to high concentrations of asbestos for extended periods of time. Neither the actual dose each individual received in these studies nor the actual extent of their individual exposure was measured directly, which can lead to some uncertainty in the derived slope factor. The calculation of the slope factor is done using health protective assumptions. That is, where uncertainties are encountered, health protective assumptions are used so as not to underestimate the risk. Also, there is an uncertainty in extrapolating from high occupational doses over extended times to lower environmental exposures for much shorted time. This type of extrapolation may over estimate but should not underestimate the potential risks.

- Risks for Individual vs. Combined Activities. This assessment estimates risks for individual recreational activities. Combined activities (e.g., SUV driving to reach a staging area, then motorcycling followed by camping), are more likely to occur for users of the CCMA. Estimated risks for individual activities are likely to underestimate total risks for users of the CCMA. Risks of combined activities will be estimated and presented in Part 2 of this report.

Conclusions:

Asbestos air concentration data for the November 2-3, 2004 sampling event at the CCMA ranged from 0.0005 PCMe fibers/cc to 2.0 PCMe fibers/cc, depending upon the sampling scenario. Trailing off highway vehicle riders (motorcycle, ATV and SUV) were exposed to asbestos concentrations that exceeded occupational standards established by OSHA (PEL and 30 minute excursion limit). Vehicle washing and vacuuming activities also generated asbestos exposures that exceeded these occupational standards. These high levels occurred even though the sampling occurred within one week after a rainfall event that produced 1 inch of precipitation at the CCMA.

Lead OHV riding, hiking and camping activities generated significantly less airborne exposures with concentrations less than OSHA standards. The extent to which soil moisture affects airborne asbestos exposure will be discussed in greater detail in a final report, which will summarize and interpret seasonal data from four sampling events (September and November, 2004; February and September, 2005)

Ambient airborne asbestos concentrations, collected with stationary samplers, ranged from 0.0005 PCMe fibers/cc to 0.0056 PCMe fibers/cc, with no discernible difference between airborne concentrations sampled from inside and outside the hazardous asbestos zone. These values are 100 to 1,000 times less than OSHA standards. Clearly, ambient sampling with stationary samplers does not provide a representative measure of exposure concentrations in the breathing zones of recreational users or workers at the CCMA.

Further, the ambient concentrations during this sampling event did not reflect potential differences in asbestos concentrations in the soils within and outside the hazardous zone of the CCMA. Asbestos concentrations in CCMA soils will be reported and discussed in a future report.

The estimated ELCRs for trailing motorcycle, ATV, and SUV riding frequently exceeded 1E-04 (100 in a million), when the user was assumed to ride 2-3 days per year. The ELCRs for lead vehicle riders were often an order of magnitude or more lower, sometimes less than 1E-06. Asbestos exposure concentrations for most other recreational scenarios fell between 1E-04 and 1E-06. These data indicate that risks for trailing OHV riders generally exceed EPA Superfund Program's risk management range, which is a standard for determining the need for remedial action. Since naturally occurring asbestos cannot be cleaned up, aggressive risk management strategies are needed to mitigate these risks.

In short, these results show that BLM workers engaged in OHV riding or vehicle cleaning activities may be frequently exposed to airborne asbestos concentrations that exceed standards established by OSHA. ELCRs for recreational users of the CCME, calculated from these same concentrations, indicate unacceptable cancer risks for recreational OHV riders, especially those in trailing positions, using EPA's Superfund risk assessment guidance as a standard. However, hiking, camping, and vehicle cleaning activities were within EPA's risk management range, indicating that these risks could, potentially, be mitigated through appropriate management decisions.

Asbestos exposure and cancer risks for child users and for combined recreational scenarios (e.g., weekend SUV travel to campsite combined with motorcycle riding and camping within the hazardous zone) will be presented in a future technical memorandum (Part II).

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Table 1
CCMA Recreational Use Exposure Scenarios - Adult
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Activity	Exposure Scenario
	Adult
Motorcyclist	
Lead	X
First Trailing	X
Second Trailing	X
ATV Rider	
Lead	X
First Trailing	X
Second Trailing	X
SUV Driver/Rider	
Lead	X
Trailing	X
Hiker	X
Camper	X
Sleeping Camper	X
Vehicle Washer/Vacuumer	
Powerspray Wash	X
Hose Wash	X
HEPA Vacuum	X
Normal Vacuum	X

Table 2A
CCMA Recreational User Asbestos Exposure Point Concentration and Comparison to OSHA Occupational Standards - Adult
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Receptor	Number of Samples Counted	Asbestos Exposure Point Concentration (PCMe f/cc)	
		Minimum	Maximum
Motorcyclist			
Lead	3	2.0E-02	9.4E-02
First Trailing	5	**2.0E-01**	**4.4E-01**
Second Trailing	5	**1.4E-01**	**4.4E-01**
ATV Rider			
Lead	3	9.8E-03	4.6E-02
First Trailing	2	**5.7E-01**	**8.0E-01**
Second Trailing	3	**1.2E-01**	**2.0E+00**
SUV Driver			
Lead	4	4.6E-02	**2.0E-01**
Trailing	4	**1.4E-01**	**6.7E-01**
Hiker	4	5.0E-03	3.1E-02
Camper	2	5.0E-03	5.3E-02
Sleeping Camper*	2	5.0E-04	5.6E-03
Vehicle Washer/Vacuumer			
Powerspray Wash	3	9.8E-03	**4.1E-01**
Hose Wash	3	1.9E-02	**5.3E-01**
HEPA Vacuum	2	1.0E-02	**1.4E-01**
Normal Vacuum	2	6.0E-02	**1.1E-01**

Notes:
PCMe = Phase Contrast Microscope equivalent
f/cc = fibers/cubic centimeter (f/cc is equivalent to f/ml (fibers/milliliter)
* Staging Area 2 (High Volume Pump)
OSHA = Occupational Safety and Health Administration
Bold font values = Exceeds OSHA PEL of 0.1 fiber/cc
Bold font values (Shaded) = Exceeds OSHA 30-minute exposure limit of 1 fiber/cc

Table 2B
CCMA: Within Asbestos Hazardous Zone and Outside Asbestos Hazardous Zone, Asbestos Ambient Air Concentrations
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Location	Number of Samples Counted	Asbestos Exposure Point Concentration (PCMe f/cc)	
		Minimum	Maximum
Within Asbestos Hazardous Zone			
Staging Area #2	2	5.0E-04	5.6E-03
Staging Area #6	2	2.5E-03	5.2E-03
Outside Asbestos Hazardous Zone			
Oak Flat Campground	3	5.1E-04	3.9E-03
BLM Decontamination Area	2	2.4E-03	5.5E-03
(Staging Area #8)			

Notes:
PCMe = Phase Contrast Microscope equivalent
f/cc = fibers/cubic centimeter (f/cc is equivalent to f/ml (fibers/milliliter)

Table 3A
Summary of Adult Excess Lifetime Cancer Risk Results (Minimum)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Receptor	One-day Per Year Exposure Cancer Risk	Reasonable Maximum Exposure Cancer Risk	High Estimate Exposure Cancer Risk
Motorcyclist			
Lead	1E-06	**6E-06**	**2E-05**
First Trailing	**1E-05**	**6E-05**	**2E-04**
Second Trailing	**9E-06**	**4E-05**	**1E-04**
ATV Rider			
Lead	6E-07	**3E-06**	**9E-06**
First Trailing	**3E-05**	**2E-04**	**5E-04**
Second Trailing	**7E-06**	**4E-05**	**1E-04**
SUV Driver			
Lead	**3E-06**	**1E-05**	**4E-05**
Trailing	**9E-06**	**4E-05**	**1E-04**
Hiker	6E-08	1E-06	**4E-06**
Camper	5E-07	**2E-06**	**5E-06**
Sleeping Camper	5E-08	2E-07	5E-07
Vehicle Washer/Vacuumer			
Powerspray Wash	4E-08	2E-07	4E-07
Hose Wash	7E-08	4E-07	8E-07
HEPA Vacuum	4E-08	2E-07	4E-07
Regular Vacuum	2E-07	1E-06	**3E-06**

Notes:
Bolded results = an excess lifetime cancer risk greater than 1E-06
Bolded results (Shaded) = an excess lifetime cancer risk greater than 1E-04

Table 3B
Summary of Adult Excess Lifetime Cancer Risk Results (Maximum)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Receptor	One-day Per Year Exposure Cancer Risk	Reasonable Maximum Exposure Cancer Risk	High Estimate Exposure Cancer Risk
Motorcyclist			
Lead	**6E-06**	**3E-05**	**9E-05**
First Trailing	**3E-05**	**1E-04**	**4E-04**
Second Trailing	**3E-05**	**1E-04**	**4E-04**
ATV Rider			
Lead	**3E-06**	**1E-05**	**4E-05**
First Trailing	**5E-05**	**2E-04**	**8E-04**
Second Trailing	**1E-04**	**6E-04**	**2E-03**
SUV Driver			
Lead	**1E-05**	**6E-05**	**2E-04**
Trailing	**4E-05**	**2E-04**	**6E-04**
Hiker	3E-07	**7E-06**	**3E-05**
Camper	**5E-06**	**2E-05**	**6E-05**
Sleeping Camper	5E-07	**3E-06**	**6E-06**
Vehicle Washer/Vacuumer			
Powerspray Wash	**2E-06**	**8E-06**	**2E-05**
Hose Wash	**2E-06**	**1E-05**	**2E-05**
HEPA Vacuum	5E-07	**3E-06**	**6E-06**
Regular Vacuum	4E-07	**2E-06**	**5E-06**

Notes:
Bolded results = an excess lifetime cancer risk greater than 1E-06
Bolded results (Shaded) = an excess lifetime cancer risk greater than 1E-04

Table 4
Carcinogenic Toxicity Values
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Constituent	Carcinogenic WOE Classification	Inhalation Carcinogenic Unit Risk $[f/ml]^{-1}$	Inhalation SF Source
Asbestos [1]	A	0.23	IRIS

Notes:
EPA Group: A - Human carcinogen
IRIS: Integrated Risk Information System. EPA 2004.

[1] The unit risk should not be used if the air concentrations exceed 4E-02 fibers/ml, since above this concentration the slope factor may differ from that stated (IRIS, USEPA, 2004). In this risk assessment the calculated Chronic Exposure Concentrations are compared to 4E-02 fibers/ml.

Table 5 **DRAFT**
Exposure Assumptions - Adult
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Parameter		One-day Per Year Exposure		Reasonable Maximum Exposure (RME)		High Estimate Exposure	
		Motorcyclist	**Source**	**Motorcyclist**	**Source**	**Motorcyclist**	**Source**
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	5.4	PTI, 1992	5.4	PTI, 1992	7	PTI, 1992
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		ATV Rider		**ATV Rider**		**ATV Rider**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	5.4	PTI, 1992	5.4	PTI, 1992	7	PTI, 1992
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		SUV Driver		**SUV Driver**		**SUV Driver**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	5.4	PTI, 1992	5.4	PTI, 1992	7	PTI, 1992
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		Hiker		**Hiker**		**Hiker**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	1	EPA, 2005	4	EPA, 2005	6	EPA, 2005
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		Camper		**Camper**		**Camper**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	8	EPA, 2005	8	EPA, 2005	8	EPA, 2005
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		Sleeping Camper		**Sleeping Camper**		**Sleeping Camper**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	8	EPA, 2005	8	EPA, 2005	8	EPA, 2005
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989
		Vehicle Washer/Vacuumer		**Vehicle Washer/Vacuumer**		**Vehicle Washer/Vacuumer**	
Exposure Frequency (days/year)	EF	1	PTI, 1992	5	PTI, 1992	12	PTI, 1992
Exposure Time for inhalation of asbestos (hours/day)	ET	0.33	EPA, 2005	0.33	EPA, 2005	0.33	EPA, 2005
Exposure Duration (years)	ED	30	EPA, 1989	30	EPA, 1989	30	EPA, 1989
Averaging Time for carcinogens (yr)	ATc	70	EPA, 1989	70	EPA, 1989	70	EPA, 1989

EPA, 2005 (Region 9, Professional Judgement)

Table 6A
Risk Calculation Worksheet - Carcinogenic Effects: Adult Motorcyclist
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	Motorcyclist
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead Motorcyclist***				
	Minimum Concentration	2.00E-02	5.28E-06	2.30E-01	1.22E-06
	Maximum Concentration	9.40E-02	2.48E-05	2.30E-01	5.71E-06
	First Trailing Motorcyclist				
	Minimum Concentration	2.00E-01	5.28E-05	2.30E-01	1.22E-05
	Maximum Concentration	4.40E-01	1.16E-04	2.30E-01	2.67E-05
	Second Trailing Motorcyclist				
	Minimum Concentration	1.40E-01	3.70E-05	2.30E-01	8.51E-06
	Maximum Concentration	4.40E-01	1.16E-04	2.30E-01	2.67E-05

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 6B
Risk Calculation Worksheet - Carcinogenic Effects: Adult Motorcyclist
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	Motorcyclist
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead Motorcyclist***				
	Minimum Concentration	2.00E-02	2.64E-05	2.30E-01	6.08E-06
	Maximum Concentration	9.40E-02	1.24E-04	2.30E-01	2.86E-05
	First Trailing Motorcyclist				
	Minimum Concentration	2.00E-01	2.64E-04	2.30E-01	6.08E-05
	Maximum Concentration	4.40E-01	5.81E-04	2.30E-01	1.34E-04
	Second Trailing Motorcyclist				
	Minimum Concentration	1.40E-01	1.85E-04	2.30E-01	4.25E-05
	Maximum Concentration	4.40E-01	5.81E-04	2.30E-01	1.34E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 6C
Risk Calculation Worksheet - Carcinogenic Effects: Adult Motorcyclist
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	Motorcyclist
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	7
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead Motorcyclist***				
	Minimum Concentration	2.00E-02	8.22E-05	2.30E-01	1.89E-05
	Maximum Concentration	9.40E-02	3.86E-04	2.30E-01	8.88E-05
	First Trailing Motorcyclist				
	Minimum Concentration	2.00E-01	8.22E-04	2.30E-01	1.89E-04
	Maximum Concentration	4.40E-01	1.81E-03	2.30E-01	4.16E-04
	Second Trailing Motorcyclist				
	Minimum Concentration	1.40E-01	5.75E-04	2.30E-01	1.32E-04
	Maximum Concentration	4.40E-01	1.81E-03	2.30E-01	4.16E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 7A
Risk Calculation Worksheet - Carcinogenic Effects: Adult ATV Rider
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	ATV Rider
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead ATV Rider***				
	Minimum Concentration	9.80E-03	2.59E-06	2.30E-01	5.95E-07
	Maximum Concentration	4.60E-02	1.22E-05	2.30E-01	2.80E-06
	First Trailing ATV Rider				
	Minimum Concentration	5.70E-01	1.51E-04	2.30E-01	3.46E-05
	Maximum Concentration	8.00E-01	2.11E-04	2.30E-01	4.86E-05
	Second Trailing ATV Rider				
	Minimum Concentration	1.20E-01	3.17E-05	2.30E-01	7.29E-06
	Maximum Concentration	2.00E+00	5.28E-04	2.30E-01	1.22E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 7B
Risk Calculation Worksheet - Carcinogenic Effects: Adult ATV Rider
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	ATV Rider
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead ATV Rider***				
	Minimum Concentration	9.80E-03	1.29E-05	2.30E-01	2.98E-06
	Maximum Concentration	4.60E-02	6.08E-05	2.30E-01	1.40E-05
	First Trailing ATV Rider				
	Minimum Concentration	5.70E-01	7.53E-04	2.30E-01	1.73E-04
	Maximum Concentration	8.00E-01	1.06E-03	2.30E-01	2.43E-04
	Second Trailing ATV Rider				
	Minimum Concentration	1.20E-01	1.59E-04	2.30E-01	3.65E-05
	Maximum Concentration	2.00E+00	2.64E-03	2.30E-01	6.08E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 7C
Risk Calculation Worksheet - Carcinogenic Effects: Adult ATV Rider
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	ATV Rider
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	7
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead ATV Rider***				
	Minimum Concentration	9.80E-03	4.03E-05	2.30E-01	9.26E-06
	Maximum Concentration	4.60E-02	1.89E-04	2.30E-01	4.35E-05
	First Trailing ATV Rider				
	Minimum Concentration	5.70E-01	2.34E-03	2.30E-01	5.39E-04
	Maximum Concentration	8.00E-01	3.29E-03	2.30E-01	7.56E-04
	Second Trailing ATV Rider				
	Minimum Concentration	1.20E-01	4.93E-04	2.30E-01	1.13E-04
	Maximum Concentration	2.00E+00	8.22E-03	2.30E-01	1.89E-03

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 8A
Risk Calculation Worksheet - Carcinogenic Effects: Adult SUV Driver
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	SUV Driver
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead SUV Driver***				
	Minimum Concentration	4.60E-02	1.22E-05	2.30E-01	2.80E-06
	Maximum Concentration	2.00E-01	5.28E-05	2.30E-01	1.22E-05
	Trailing SUV Driver				
	Minimum Concentration	1.40E-01	3.70E-05	2.30E-01	8.51E-06
	Maximum Concentration	6.70E-01	1.77E-04	2.30E-01	4.07E-05

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 8B
Risk Calculation Worksheet - Carcinogenic Effects: Adult SUV Driver
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	SUV Driver
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	5.4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead SUV Driver***				
	Minimum Concentration	4.60E-02	6.08E-05	2.30E-01	1.40E-05
	Maximum Concentration	2.00E-01	2.64E-04	2.30E-01	6.08E-05
	Trailing SUV Driver				
	Minimum Concentration	1.40E-01	1.85E-04	2.30E-01	4.25E-05
	Maximum Concentration	6.70E-01	8.85E-04	2.30E-01	2.04E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 8C
Risk Calculation Worksheet - Carcinogenic Effects: Adult SUV Driver
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	SUV Driver
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	7
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Lead SUV Driver***				
	Minimum Concentration	4.60E-02	1.89E-04	2.30E-01	4.35E-05
	Maximum Concentration	2.00E-01	8.22E-04	2.30E-01	1.89E-04
	Trailing SUV Driver				
	Minimum Concentration	1.40E-01	5.75E-04	2.30E-01	1.32E-04
	Maximum Concentration	6.70E-01	2.75E-03	2.30E-01	6.33E-04

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 9A
Risk Calculation Worksheet - Carcinogenic Effects: Adult Hiker
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	Hiker
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	1
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	2.45E-07	2.30E-01	5.63E-08
	Maximum Concentration	3.10E-02	1.52E-06	2.30E-01	3.49E-07

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 9B
Risk Calculation Worksheet - Carcinogenic Effects: Adult Hiker
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	Hiker
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	4
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	4.89E-06	2.30E-01	1.13E-06
	Maximum Concentration	3.10E-02	3.03E-05	2.30E-01	6.98E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 9C
Risk Calculation Worksheet - Carcinogenic Effects: Adult Hiker
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	Hiker
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	6
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	1.76E-05	2.30E-01	4.05E-06
	Maximum Concentration	3.10E-02	1.09E-04	2.30E-01	2.51E-05

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 10A
Risk Calculation Worksheet - Carcinogenic Effects: Adult Camper
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	1.96E-06	2.30E-01	4.50E-07
	Maximum Concentration	5.30E-02	2.07E-05	2.30E-01	4.77E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 10B
Risk Calculation Worksheet - Carcinogenic Effects: Adult Camper
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	9.78E-06	2.30E-01	2.25E-06
	Maximum Concentration	5.30E-02	1.04E-04	2.30E-01	2.39E-05

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 10C
Risk Calculation Worksheet - Carcinogenic Effects: Adult Camper
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-03	2.35E-05	2.30E-01	5.40E-06
	Maximum Concentration	5.30E-02	2.49E-04	2.30E-01	5.73E-05

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 11A
Risk Calculation Worksheet - Carcinogenic Effects: Adult Sleeping Camper
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	Sleeping Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-04	1.96E-07	2.30E-01	4.50E-08
	Maximum Concentration	5.60E-03	2.19E-06	2.30E-01	5.04E-07

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 11B
Risk Calculation Worksheet - Carcinogenic Effects: Adult Sleeping Camper
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	Sleeping Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-04	9.78E-07	2.30E-01	2.25E-07
	Maximum Concentration	5.60E-03	1.10E-05	2.30E-01	2.52E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 11C
Risk Calculation Worksheet - Carcinogenic Effects: Adult Sleeping Camper
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	Sleeping Camper
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	8
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	Minimum Concentration	5.00E-04	2.35E-06	2.30E-01	5.40E-07
	Maximum Concentration	5.60E-03	2.63E-05	2.30E-01	6.05E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 12A
Risk Calculation Worksheet - Carcinogenic Effects: Adult Vehicle Washer/Vacuumer
One-day Per Year Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	1-day per year
	Receptor Population:	Vehicle Washer
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	1
Exposure Time for inhalation (hours/day)	ET	0.33
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Vehicle, Powerspray Wash***				
	Minimum Concentration	9.80E-03	1.58E-07	2.30E-01	3.64E-08
	Maximum Concentration	4.10E-01	6.62E-06	2.30E-01	1.52E-06
	Vehicle, Hose Wash				
	Minimum Concentration	1.90E-02	3.07E-07	2.30E-01	7.06E-08
	Maximum Concentration	5.30E-01	8.56E-06	2.30E-01	1.97E-06
	Vehicle, HEPA Vacuum				
	Minimum Concentration	1.00E-02	1.61E-07	2.30E-01	3.71E-08
	Maximum Concentration	1.40E-01	2.26E-06	2.30E-01	5.20E-07
	Vehicle, Regular Vacuum				
	Minimum Concentration	6.00E-02	9.69E-07	2.30E-01	2.23E-07
	Maximum Concentration	1.10E-01	1.78E-06	2.30E-01	4.08E-07

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 12B
Risk Calculation Worksheet - Carcinogenic Effects: Adult Vehicle Washer/Vacuumer
Reasonable Maximum Exposure (RME)
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information		
	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	RME
	Receptor Population:	Vehicle Washer
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	5
Exposure Time for inhalation (hours/day)	ET	0.33
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Vehicle, Powerspray Wash***				
	Minimum Concentration	9.80E-03	7.91E-07	2.30E-01	1.82E-07
	Maximum Concentration	4.10E-01	3.31E-05	2.30E-01	7.61E-06
	Vehicle, Hose Wash				
	Minimum Concentration	1.90E-02	1.53E-06	2.30E-01	3.53E-07
	Maximum Concentration	5.30E-01	4.28E-05	2.30E-01	9.84E-06
	Vehicle, HEPA Vacuum				
	Minimum Concentration	1.00E-02	8.07E-07	2.30E-01	1.86E-07
	Maximum Concentration	1.40E-01	1.13E-05	2.30E-01	2.60E-06
	Vehicle, Regular Vacuum				
	Minimum Concentration	6.00E-02	4.84E-06	2.30E-01	1.11E-06
	Maximum Concentration	1.10E-01	8.88E-06	2.30E-01	2.04E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table 12C
Risk Calculation Worksheet - Carcinogenic Effects: Adult Vehicle Washer/Vacuumer
High Estimate Exposure
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Exposure Scenario Information	Exposure Scenario:	Recreational User
	Exposure Medium:	Air
	Exposure:	High Estimate Exposure
	Receptor Population:	Vehicle Washer
	Receptor Age:	Adult

Exposure Parameter (units)	**Variable**	**Value**
Exposure Frequency (days/year)	EF	12
Exposure Time for inhalation (hours/day)	ET	0.33
Exposure Duration (years)	ED	30
Averaging Time for carcinogens, 70 year lifetime (hours)	ATc	613,200

Risk Calculations

Exposure Route	**Asbestos**	**EPC Value [PCMe f/ml]**	**Chronic Exposure Concentration [PCMe f/ml]**	**Unit Risk [fibers/ml]$^{-1}$**	**Cancer Risk**
Inhalation	***Vehicle, Powerspray Wash***				
	Minimum Concentration	9.80E-03	1.90E-06	2.30E-01	4.37E-07
	Maximum Concentration	4.10E-01	7.94E-05	2.30E-01	1.83E-05
	Vehicle, Hose Wash				
	Minimum Concentration	1.90E-02	3.68E-06	2.30E-01	8.47E-07
	Maximum Concentration	5.30E-01	1.03E-04	2.30E-01	2.36E-05
	Vehicle, HEPA Vacuum				
	Minimum Concentration	1.00E-02	1.94E-06	2.30E-01	4.46E-07
	Maximum Concentration	1.40E-01	2.71E-05	2.30E-01	6.24E-06
	Vehicle, Regular Vacuum				
	Minimum Concentration	6.00E-02	1.16E-05	2.30E-01	2.67E-06
	Maximum Concentration	1.10E-01	2.13E-05	2.30E-01	4.90E-06

Notes:
Minimum Concentration (or Maximum) = Minimum or maximum air concentration

Table A1
Tabulated Results for CCMA Asbestos Air Sampling on November 2 and 3, 2004
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Sample No.	Activity/Location	Receptor/ Modifier	Date Collected	Matrix	Volume	Volume Units	PCMe(asb)	PCMe Units	Notes
09515	ATV Lead	Adult	11/03/2004	Air	120	Liters	9.8E-03	f/ml	
09452	ATV Lead	Adult	11/02/2004	Air	160	Liters	2.8E-02	f/ml	(Highest of 2 counts)
09401	ATV Lead	Adult	11/02/2004	Air	136	Liters	4.6E-02	f/ml	
09453	ATV Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09402	ATV Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09514	ATV Lead	Adult	11/03/2004	Air	80	Liters	NA	f/ml	
09516	ATV Lead	Child	11/03/2004	Air	120	Liters	4.4E-02	f/ml	
09454	ATV Lead	Child	11/02/2004	Air	120	Liters	1.3E-01	f/ml	
09403	ATV Lead	Child	11/02/2004	Air	120	Liters	1.5E-01	f/ml	
09404	ATV Lead	Child	11/02/2004	Air	80	Liters	NA	f/ml	
09455	ATV Lead	Child	11/02/2004	Air	80	Liters	NA	f/ml	
09517	ATV Lead	Child	11/03/2004	Air	72	Liters	NA	f/ml	
09518	ATV Middle	Adult	11/03/2004	Air	160	Liters	5.7E-01	f/ml	
09456	ATV Middle	Adult	11/02/2004	Air	160	Liters	8.0E-01	f/ml	
09457	ATV Middle	Adult	11/02/2004	Air	112	Liters	NA	f/ml	
09519	ATV Middle	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09520	ATV Middle	Child	11/03/2004	Air	120	Liters	1.3E+00	f/ml	
09459	ATV Middle	Child	11/02/2004	Air	80	Liters	1.3E+00	f/ml	
09458	ATV Middle	Child	11/02/2004	Air	120	Liters	NA	f/ml	Overloaded
09521	ATV Middle	Child	11/03/2004	Air	80	Liters	NA	f/ml	
09522	ATV Tail	Adult	11/03/2004	Air	122	Liters	1.2E-01	f/ml	
09406	ATV Tail	Adult	11/02/2004	Air	120	Liters	7.2E-01	f/ml	
09461	ATV Tail	Adult	11/02/2004	Air	120	Liters	2.0E+00	f/ml	
09405	ATV Tail	Adult	11/02/2004	Air	140	Liters	NA	f/ml	Overloaded
09460	ATV Tail	Adult	11/02/2004	Air	60	Liters	NA	f/ml	
09523	ATV Tail	Adult	11/03/2004	Air	108	Liters	NA	f/ml	
09462	ATV Tail	Child	11/02/2004	Air	120	Liters	5.6E-01	f/ml	
09524	ATV Tail	Child	11/03/2004	Air	120	Liters	6.4E-01	f/ml	
09408	ATV Tail	Child	11/02/2004	Air	80	Liters	7.5E-01	f/ml	
09407	ATV Tail	Child	11/02/2004	Air	116	Liters	NA	f/ml	Overloaded
09463	ATV Tail	Child	11/02/2004	Air	68	Liters	NA	f/ml	
09525	ATV Tail	Child	11/03/2004	Air	80	Liters	NA	f/ml	
09479	Camp 1	Adult	11/02/2004	Air	245	Liters	5.0E-03	f/ml	
09483	Camp 2	Adult	11/02/2004	Air	228	Liters	5.3E-02	f/ml	
09481	Camp 1	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09485	Camp 2	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09480	Camp 1	Child	11/02/2004	Air	245	Liters	1.5E-02	f/ml	
09484	Camp 2	Child	11/02/2004	Air	245	Liters	4.4E-02	f/ml	
09482	Camp 1	Child	11/02/2004	Air	120	Liters	NA	f/ml	
09486	Camp 2	Child	11/02/2004	Air	120	Liters	NA	f/ml	

Table A1
Tabulated Results for CCMA Asbestos Air Sampling on November 2 and 3, 2004
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Sample No.	Activity/Location	Receptor/ Modifier	Date Collected	Matrix	Volume	Volume Units	PCMe(asb)	PCMe Units	Notes
09587	Decon	Hepa Vac	11/03/2004	Air	123	Liters	1.0E-02	f/ml	(Highest of 2 counts)
09496	Decon	Hepa Vac	11/02/2004	Air	123	Liters	1.4E-01	f/ml	
09582	Decon	Reg. Vac	11/03/2004	Air	123	Liters	6.0E-02	f/ml	
09490	Decon	Reg. Vac	11/02/2004	Air	123	Liters	1.1E-01	f/ml	
09581	Decon	Reg. Vac	11/03/2004	Air	123	Liters	<DL	f/ml	
09491	Decon	Reg. Vac	11/02/2004	Air	49	Liters	NA	f/ml	
09586	Decon	Veh. Hose	11/03/2004	Air	123	Liters	1.9E-02	f/ml	(Highest of 2 counts)
09494	Decon	Veh. Hose	11/02/2004	Air	123	Liters	2.0E-02	f/ml	
09585	Decon	Veh. Hose	11/03/2004	Air	123	Liters	5.3E-01	f/ml	
09495	Decon	Veh. Hose	11/02/2004	Air	123	Liters	NA	f/ml	
09492	Decon	Veh. Power	11/02/2004	Air	123	Liters	9.8E-03	f/ml	
09583	Decon	Veh. Power	11/03/2004	Air	119	Liters	3.0E-02	f/ml	
09584	Decon	Veh. Power	11/03/2004	Air	123	Liters	4.1E-01	f/ml	
09493	Decon	Veh. Power	11/02/2004	Air	121	Liters	NA	f/ml	
09430	Field Blank		11/02/2004	Air	0	Liters	<DL	f/ml	
09570	Field Blank		11/03/2004	Air	0	Liters	<DL	f/ml	
09534	Hiker 1	Adult	11/03/2004	Air	196	Liters	5.0E-03	f/ml	
09538	Hiker 2	Adult	11/03/2004	Air	237	Liters	9.8E-03	f/ml	
09466	Hiker 1	Adult	11/02/2004	Air	242	Liters	1.0E-02	f/ml	
09470	Hiker 2	Adult	11/02/2004	Air	242	Liters	3.1E-02	f/ml	
09469	Hiker 1	Adult	11/02/2004	Air	142	Liters	NA	f/ml	
09535	Hiker 1	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09472	Hiker 2	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09539	Hiker 2	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09467	Hiker 1	Child	11/02/2004	Air	238	Liters	1.5E-02	f/ml	
09540	Hiker 2	Child	11/03/2004	Air	234	Liters	2.0E-02	f/ml	
09536	Hiker 1	Child	11/03/2004	Air	234	Liters	<DL	f/ml	
09468	Hiker 1	Child	11/02/2004	Air	142	Liters	NA	f/ml	
09537	Hiker 1	Child	11/03/2004	Air	120	Liters	NA	f/ml	
09473	Hiker 2	Child	11/02/2004	Air	120	Liters	NA	f/ml	
09541	Hiker 2	Child	11/03/2004	Air	120	Liters	NA	f/ml	

Table A1
Tabulated Results for CCMA Asbestos Air Sampling on November 2 and 3, 2004
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Sample No.	Activity/Location	Receptor/ Modifier	Date Collected	Matrix	Volume	Volume Units	PCMe(asb)	PCMe Units	Notes
09558	Moto Lead	Adult	11/03/2004	Air	160	Liters	2.0E-02	f/ml	
09417	Moto Lead	Adult	11/02/2004	Air	160	Liters	4.0E-02	f/ml	
09449	Moto Lead	Adult	11/02/2004	Air	160	Liters	9.4E-02	f/ml	
09501	Moto Lead	Adult	11/03/2004	Air	160	Liters	<DL	f/ml	
09418	Moto Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09450	Moto Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09502	Moto Lead	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09559	Moto Lead	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09420	Moto Lead	Child	11/02/2004	Air	80	Liters	3.5E-02	f/ml	
09503	Moto Lead	Child	11/03/2004	Air	120	Liters	6.0E-02	f/ml	
09431	Moto Lead	Child	11/02/2004	Air	120	Liters	2.0E-01	f/ml	(Highest of 2 counts)
09560	Moto Lead	Child	11/03/2004	Air	120	Liters	<DL	f/ml	
09432	Moto Lead	Child	11/02/2004	Air	80	Liters	NA	f/ml	
09504	Moto Lead	Child	11/03/2004	Air	80	Liters	NA	f/ml	
09561	Moto Lead	Child	11/03/2004	Air	80	Liters	NA	f/ml	
09433	Moto Mid	Adult	11/02/2004	Air	120	Liters	2.0E-01	f/ml	
09505	Moto Mid	Adult	11/03/2004	Air	120	Liters	2.7E-01	f/ml	
09507	Moto Mid	Adult	11/03/2004	Air	120	Liters	2.9E-01	f/ml	
09422	Moto Mid	Adult	11/02/2004	Air	120	Liters	3.3E-01	f/ml	
09421	Moto Mid	Adult	11/02/2004	Air	116	Liters	4.4E-01	f/ml	
09562	Moto Mid	Adult	11/03/2004	Air	120	Liters	<DL	f/ml	
09435	Moto Mid	Adult	11/02/2004	Air	116	Liters	NA	f/ml	
09506	Moto Mid	Adult	11/03/2004	Air	72	Liters	NA	f/ml	
09563	Moto Mid	Adult	11/03/2004	Air	80	Liters	NA	f/ml	
09565	Moto Mid	Child	11/03/2004	Air	80	Liters	2.0E-02	f/ml	
09424	Moto Mid	Child	11/02/2004	Air	80	Liters	3.8E-01	f/ml	
09425	Moto Mid	Child	11/02/2004	Air	80	Liters	7.1E-01	f/ml	
09434	Moto Mid	Child	11/02/2004	Air	120	Liters	7.5E-01	f/ml	
09436	Moto Mid	Child	11/02/2004	Air	80	Liters	NA	f/ml	
09437	Moto Mid	Child	11/02/2004	Air	80	Liters	NA	f/ml	
09427	Moto Tail	Adult	11/02/2004	Air	120	Liters	1.4E-01	f/ml	
09426	Moto Tail	Adult	11/02/2004	Air	120	Liters	2.3E-01	f/ml	
09566	Moto Tail	Adult	11/03/2004	Air	120	Liters	2.4E-01	f/ml	(Highest of 4 counts)
09438	Moto Tail	Adult	11/02/2004	Air	120	Liters	4.3E-01	f/ml	
09439	Moto Tail	Adult	11/02/2004	Air	120	Liters	4.4E-01	f/ml	
09510	Moto Tail	Adult	11/03/2004	Air	120	Liters	<DL	f/ml	
09511	Moto Tail	Adult	11/03/2004	Air	80	Liters	NA	f/ml	
09568	Moto Tail	Child	11/03/2004	Air	120	Liters	6.5E-02	f/ml	
09512	Moto Tail	Child	11/03/2004	Air	120	Liters	2.2E-01	f/ml	
09429	Moto Tail	Child	11/02/2004	Air	80	Liters	3.0E-01	f/ml	
09428	Moto Tail	Child	11/02/2004	Air	80	Liters	3.6E-01	f/ml	
09440	Moto Tail	Child	11/02/2004	Air	80	Liters	7.6E-01	f/ml	
09451	Moto Tail	Child	11/02/2004	Air	80	Liters	1.1E+00	f/ml	
09513	Moto Tail	Child	11/03/2004	Air	80	Liters	NA	f/ml	
09569	Moto Tail	Child	11/03/2004	Air	80	Liters	NA	f/ml	

Table A1
Tabulated Results for CCMA Asbestos Air Sampling on November 2 and 3, 2004
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Sample No.	Activity/Location	Receptor/ Modifier	Date Collected	Matrix	Volume	Volume Units	PCMe(asb)	PCMe Units	Notes
09464	Oak Flat Ambient A	SKC	11/02/2004	Air	1680	Liters	5.1E-04	f/ml	
09465	Oak Flat Ambient A	Aircon	11/02/2004	Air	4240	Liters	1.5E-03	f/ml	(2 counts, identical)
09571	Oak Flat Ambient A1	Aircon	11/03/2004	Air	2340	Liters	3.9E-03	f/ml	
09572	Oak Flat Ambient A1	SKC	11/03/2004	Air	1303	Liters	NA	f/ml	
09983	Sleeping 2	Adult	11/02/2004	Air	960	Liters	< DL	f/ml	
09984	Sleeping 2	Adult	11/02/2004	Air	960	Liters	< DL	f/ml	
09982	Sleeping 1	Adult	11/02/2004	Air	902	Liters	< DL	f/ml	
09981	Sleeping 1	Adult	11/02/2004	Air	530	Liters	NA	f/ml	
09985	Sleeping 2	Adult	11/02/2004	Air	960	Liters	NA	f/ml	
09986	Sleeping 2	Adult	11/02/2004	Air	960	Liters	NA	f/ml	
09573	Staging Area 2	Aircon	11/03/2004	Air	2690	Liters	5.0E-04	f/ml	
09474	Staging Area 2	SKC	11/02/2004	Air	1638	Liters	5.6E-03	f/ml	
09574	Staging Area 2 Ambient	SKC	11/03/2004	Air	1116	Liters	NA	f/ml	
09575	Staging Area 6 A3	Aircon	11/03/2004	Air	2920	Liters	2.5E-03	f/ml	
09477	Staging Area 6 Ambient 3	Aircon	11/02/2004	Air	3950	Liters	5.2E-03	f/ml	
09576	Staging Area 6 A3	SKC	11/03/2004	Air	1164	Liters	NA	f/ml	
09577	Staging Area 6 A3	SKC	11/03/2004	Air	1164	Liters	NA	f/ml	
09475	Staging Area 6 Ambient 3	SKC	11/02/2004	Air	1592	Liters	NA	f/ml	
09476	Staging Area 6 Ambient 3	SKC	11/02/2004	Air	1537	Liters	NA	f/ml	
09488	Staging Area 8 Ambient 4	Aircon	11/02/2004	Air	4510	Liters	2.4E-03	f/ml	(Highest of 2 counts)
09489	Staging Area 8 Ambient 4	Aircon	11/02/2004	Air	4510	Liters	5.5E-03	f/ml	
09578	Staging Area 8 Ambient 4	Aircon	11/03/2004	Air	3050	Liters	<DL	f/ml	
09579	Staging Area 8 Ambient 4	Aircon	11/03/2004	Air	3050	Liters	<DL	f/ml	
09580	Staging Area 8 Ambient 4	SKC	11/03/2004	Air	1224	Liters	<DL	f/ml	
09487	Staging Area 8 Ambient 4	SKC	11/02/2004	Air	1680	Liters	NA	f/ml	
09526	SUV Lead	Adult	11/03/2004	Air	234	Liters	4.6E-02	f/ml	
09550	SUV Lead	Adult	11/03/2004	Air	240	Liters	8.5E-02	f/ml	
09413	SUV Lead	Adult	11/02/2004	Air	240	Liters	1.2E-01	f/ml	
09441	SUV Lead	Adult	11/02/2004	Air	240	Liters	2.0E-01	f/ml	
09415	SUV Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09443	SUV Lead	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09527	SUV Lead	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09551	SUV Lead	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09552	SUV Lead	Child	11/03/2004	Air	237	Liters	2.2E-02	f/ml	
09528	SUV Lead	Child	11/03/2004	Air	225	Liters	7.1E-02	f/ml	
09414	SUV Lead	Child	11/02/2004	Air	237	Liters	2.0E-01	f/ml	
09442	SUV Lead	Child	11/02/2004	Air	240	Liters	4.2E-01	f/ml	
09416	SUV Lead	Child	11/02/2004	Air	120	Liters	NA	f/ml	
09444	SUV Lead	Child	11/02/2004	Air	120	Liters	NA	f/ml	
09529	SUV Lead	Child	11/03/2004	Air	120	Liters	NA	f/ml	
09553	SUV Lead	Child	11/03/2004	Air	120	Liters	NA	f/ml	
09447	SUV Tail	Adult	11/02/2004	Air	120	Liters	1.4E-01	f/ml	
09554	SUV Tail	Adult	11/03/2004	Air	240	Liters	2.0E-01	f/ml	
09530	SUV Tail	Adult	11/03/2004	Air	240	Liters	5.5E-01	f/ml	
09409	SUV Tail	Adult	11/02/2004	Air	315.4	Liters	6.7E-01	f/ml	
09445	SUV Tail	Adult	11/02/2004	Air	240	Liters	NA	f/ml	

Table A1
Tabulated Results for CCMA Asbestos Air Sampling on November 2 and 3, 2004
Human Health Risk Assessment
CCMA Asbestos Exposures (November 2 and 3, 2004)

Sample No.	Activity/Location	Receptor/ Modifier	Date Collected	Matrix	Volume	Volume Units	PCMe(asb)	PCMe Units	Notes
09411	SUV Tail	Adult	11/02/2004	Air	120	Liters	NA	f/ml	
09531	SUV Tail	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09555	SUV Tail	Adult	11/03/2004	Air	120	Liters	NA	f/ml	
09556	SUV Tail	Child	11/03/2004	Air	234	Liters	4.7E-01	f/ml	
09532	SUV Tail	Child	11/03/2004	Air	234	Liters	7.9E-01	f/ml	
09448	SUV Tail	Child	11/02/2004	Air	120	Liters	9.4E-01	f/ml	
09410	SUV Tail	Child	11/02/2004	Air	240	Liters	NA	f/ml	Overloaded
09446	SUV Tail	Child	11/02/2004	Air	240	Liters	NA	f/ml	Overloaded
09412	SUV Tail	Child	11/02/2004	Air	120	Liters	NA	f/ml	Damaged
09533	SUV Tail	Child	11/03/2004	Air	120	Liters	NA	f/ml	
09557	SUV Tail	Child	11/03/2004	Air	120	Liters	NA	f/ml	

Notes:
PCMe (asb) = Phase Contrast Microscopy equivalent (asbestos)
f/ml = Fibers per milliliter
ATV = All Terrain Vehicle
Camp = Camping Activity
Decon = Vehicle Decontamination Activity
Hepa Vac = HEPA Filter Vacuum Cleaner
Reg. Vac = Standard Vacuum Cleaner
Veh. Hose = Standard Water Hose
Veh. Power = High Pressure Water Hose
Hiker = Hiking Activity
Moto = Motorcycle Activity
Sleeping = Sleeping Activity
SUV = Sports Utility Vehicle
Aircon = Aircon Pump
SKC = SKC Pump
Staging Area = Vehicle Staging Area
Ambient = Ambient Air Sample
Oak Flat = Oak Flat Campground
Lead = Lead vehicle
Middle = Middle vehicle (First Trailing Vehicle)
Tail = Last vehicle (Second Trailing Vehicle)
PCMe (f/ml)= f/cc (fibers/cubic centimeter)
Results for child receptors will be evaluated in a future technical memorandum.