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MEMORANDUM

TO: Steven Ross, Project Manager
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DATE: April 4, 2011

SUBJECT: Review of the ""Preliminary Analysis of the Asbestos Exposures Associated with Motorcycle Riding and Hiking in the Clear Creek Management Area (CCMA) San Benito County, California"

PCA: 11050 Site: 101717-00

Document Reviewed

Per your request, the Human and Ecological Risk Office (HERO) has reviewed the "Preliminary Analysis of the Asbestos Exposures Associated with Motorcycle Riding and Hiking in the Clear Creek Management Area (CCMA) San Benito County, California". The document was prepared by the International Environmental Research Foundation, of New York City, NY, on behalf of the Off-Highway Motor Vehicle Recreation Division (OHMVRD) of California State Parks. The report is dated March 8, 2011. HERO received an electronic copy of the report on March 21, 2011.

Scope of Review

HERO has reviewed this document with emphasis on those aspects that affect the risk to human health. Minor grammatical or typographical errors that do not alter the interpretation of the report have not been noted. It is also assumed that sampling, analytical chemistry, quality assurance procedures and statistical analysis of sampling results have or will be reviewed by regional staff as well.

Background

The "International Environmental Research Foundation" (IERF) conducted air sampling at the Clear Creek Management Area (CCMA), San Benito County, CA, on behalf of the Off-Highway Motor Vehicle Recreation Division (OHMVRD) of California State Parks. CCMA is located approximately 60 miles southeast of Hollister, CA in the coastal mountain range. The serpentinite of the New Idria formation contains 50% recoverable chrysotile without veins, hence the historic mining activities for asbestos in this area.

The objective of the study was to characterize the exposures from airborne asbestos; conduct an asbestos-related cancer risk assessment; compare the concentrations and results with previous studies conducted at CCMA. The IERF study conducted sampling on April 22 and 23, 2010 in the western parts of CCMA (San Benito County). According to the report, "*it had rained shortly before, … but not on the sampling days*". The IERF sampled ambient air (2 samples); hiker (2 samples); air sampler mounted to the outside of a pickup truck (1 sample); and 2 motorcyclists (8 samples altogether).

IERF chose motorcycle riding as the activity to monitor, since it was associated with the highest exposure to asbestos in the 1979 Cooper study, which showed the motorcycle riding exposures approximately 10-fold higher than the ATV or motorcycle riding exposures for the 2008 USEPA study. Motorcycle riders were outfitted with air samplers sampling in the breathing zone and were instructed "*to drive in such a way as to avoid or minimize exposure to dust generated by the lead rider*". On day one, a 30 min sample each was collected from two motorcycle riders; on day two, 60 minute, 140 minute and 120 minute samples were collected from two motorcycle riders. Cumulatively, in the eight air samples 24 fibers (> 5 um) were identified in 1869 mL of air (0.013 f/mL).

Fibers:
The fibers longer than 5 um were included in the asbestos count for the risk assessment. Of these fibers, half were chrysotile (13/25; half of them in fiber bundles); and half were needle-like tremolite particles (12/25; acicular particles, no fiber bundles found, which is inconsistent with tremolite asbestos; tremolite was identified based on energy dispersive spectra). The authors conclude that it is unlikely that "*any of the detected tremolite in our air samples is asbestos*". However, for the preliminary risk assessment, the tremolite fragments were assumed to have "*a similar potency to and average asbestos fiber*". In addition to the fibers counted for the health risk assessment (> 5 um length), many more fibers < 5 um length were found: total of 20 tremolite fragments < 5 um length (mean length: 8.2 um and mean width of 0.75 um); and 252 chrysotile fragments < 5 um length.

Concentrations:
Total dust during motorcycle riding was < 0 .07 – 0.35 mg/m^3 (mean: 0.17 mg/m^3); which is consistent with the observation of "no visible dust", even during motorcycle rides.

Ambient background of air borne asbestos at CCMA was measured from IERF to be 0.00137 f/mL (2 samples; 1 fiber detected in 728 mL air). The concentrations are similar to the ones reported from USEPA's 2008 study under "wet" conditions
Motorcyclist: the lead rider in the IERF study had a 36% higher exposure than the trailing rider, and the study averaged the exposures, assuming that riders spent equal time in both positions. This finding is in contrast to both the Cooper Study and the USEPA 2008 study, where the trailing riders had significant higher exposure to asbestos fibers. In the IERF study, the motorcyclists had a 10-fold higher exposure to airborne asbestos compared to ambient background.
Hiker: no fibers found in 2 samples (total of 460 mL).
Outside pickup truck: no fibers found in 85 mL air sample outside of truck (sampling conditions not defined).

Preliminary Risk Assessment
The IERF study used an annual exposure of 8 hours per day, 5 days per year for individual motorcycle riders. Based on the IERF data, the lead and trailing driver had an average exposure of 0.015 f/mL and 0.011 f/mL, respectively. The IERF study used "average carcinogenic potency for all asbestos types", assuming a no-threshold, linear dose-response curve. The authors compare the mean exposure of the motorcycle drivers (0.013 f/mL) to the OSHA PEL (0.1 f/mL). None of the air samples that IERF collected exceeded the OSHA PEL of 0.1 f/cc and "*on average the concentration of asbestos (chrysotile and acicular tremolite)… was more than 10-fold lower than the OSHA asbestos PEL*".
The authors also compare the mean asbestos exposure at CCMA (0.008 f/mL for all air samples) to the Russian Federation asbestos standard for the general public (0.06 f/mL; below which, "*no asbestos-related disease will occur*") and the WHO background concentration in urban air (between < 0.001 and 0.01 f/mL). In addition, the authors used lifetime risk tables from USEPA's "Airborne Asbestos Health Assessment Update" (published in 1986), the lifetime risk for asbestos related cancer would be 0.18E-06. The predicted mesothelioma deaths among CCMA motorcycle riders (male and female) according to the authors is 0.16E-06, "*or 6500-fold lower than the percentage of mesothelioma deaths in the US general population (0.11%)*".

Conclusions
The authors conclude that tremolite fragments were only found in the motorcycle samples and are therefore "*not uniformly distributed*". The "*risk to health from inhaling asbestos from trail riding and hiking at certain times can be very small*". Based on their analysis, under the conditions they "*observed and similar seasonal conditions, OHV enthusiasts would not be exposed to unacceptably high levels of airborne asbestos*". The authors recommend "*...that continuous attention to detailed management may be necessary to keep the level of airborne asbestos similar to what we are reporting*". The "dry" scenario tested from USEPA is not considered representative of the open season at CCMA and *"should not be considered to evaluate keeping CCMA open from mid-*

October to the end or May".
They recommend future studies to determine

- if tremolite asbestos or other amphiboles are present;
- the airborne asbestos concentrations in the day camp areas
- the number of days per year when similar conditions as in the IERF study are present at CCMA
- other CCMA studies in greater detail (including sample analyses) to see if discrepancies can be resolved.

Comments

Concerns regarding Hazard Identification

1. Amphibole Asbestos
   The authors question the presence of amphibole asbestos at CCMA. They found almost 50 % of all fibers to be acicular tremolite fragments (12 out of 25 fibers), but no fiber bundles were found (which is inconsistent with tremolite asbestos). However, tremolite was identified based on energy dispersive spectra and this is consistent with previous analyses of CCMA asbestos types (8% of asbestos fibers in the USEPA 2008 study were amphiboles).

Concerns regarding Exposure Assessment

1. Weather Conditions
   The weather conditions are not representative of regular exposure conditions at CCMA (wet, saturated ground; standing water and surface water run-off on roads visible in Figure 3; rain in the days before)
2. Exposure Scenarios
   only motorcycle, hiking and "pickup truck - outside air" scenario were sampled; (not ATV; or air inside SUV vehicle)
3. Sampling Conditions
   The conditions under which sampling occurred were not well defined (was the pick-up truck standing or moving; how long was the drive or hike). Is a sampling volume of 85 mL for the pickup truck scenario really representative of a regular exposure of a park ranger?
4. Missing Laboratory data
   Quality Assurance and Quality Control data and laboratory reports for the air sampling were not provided: field blanks, laboratory blanks (two control samples are listed in Table 5, but what type of controls is not explained); personal pump calibration; air flow rates; is the total volume sampled identical to the "Milliliters of Air Scanned" in Table 5?

5. Asbestos analysis
   What analytical method was used (Appendix 1 lists the NIOSH 7400 method, but it is not mentioned in the text); fibers "*5 um or longer*" were counted, but it is not clear if that is identical to the PCME count used from EPA; fiber counts of blank filters; fiber density (f/mm^2); Detection Limits; calculations for fiber concentrations in air are not presented

6. Counting method
   HERO is concerned that the counting method used is not fully described, and therefore the concentration of fibers/mL can not be verified. There are conflicting statements as to how the authors arrived at the concentration of fibers/mL: The footnote to Table 4 reads: "*For the motorcycle air samples the total number of fibers counted was divided by the total volume of air sample…*"; on page 18 the authors state: "*We counted the number of fibers that were >= 5 um in a given area of the filter. By proportion we calculated the number of milliliters of air that contained the 24 fibers*". The area (in mm^2) of the filter which was analyzed is not given in the study. The reader cannot relate the number of fibers counted per area with the air volume that went through this area of the filter.

   Fiber Count Example (based on Table 5): in the eight air samples from motorcyclists, a total of 24 fibers (>= 5 um) were identified in a total of 1869 mL of air. If every graticule field of the eight filters was analyzed for fibers, 24 fibers would have been detected in 1869 mL: 24 fibers/filter/1869 mL = 0.0128 f/mL or 0.013 f/mL. This is the concentration given in the IERF report (page 18, section 7). However, based on common analytical practice, it is very unusual to analyze/count every graticule field (0.00785 mm^2) of the 385 mm^2 filters. More commonly, between 20 and 100 graticule fields are counted; the fiber density is calculated (f/mm^2) based on average fiber count and mean field blank count. The laboratory then calculates the fiber concentration in f/mL based on the fiber density, effective collection area and the air volume sampled. Based on Table 5, only the number of fibers detected is given (fibers < 5 um and fibers >=5 um), there is no indication on how many graticule fields were sampled.
   Based on the information given HERO cannot verify the calculation of airborne asbestos concentration (f/mL).

7. children's exposure were not measured
8. Motorcyclists were instructed to adhere to "safe riding practices", to minimize exposure to dust. The distance of the riders was given as "*between 15 to 20 ft feet*"; however, the figures show the distance to be much greater: between 30 and 50 ft, more likely. This riding practice cannot be assumed for regular CCMA visitors
9. report assumes 8 hours/day and 5 days/year exposure for a motorcycle rider, but this may not be typical for CCMA visitors

Concerns regarding Dose Response Assessment

1. HERO questions the validity of "*using the 4.2 multiplier to convert the environmental exposure to occupational exposure*" (168 hours per week / 40 hours per work week = 4.2); when comparing the mean exposure concentration of motorcyclists (0.013 f/mL) to the Russian Federation standard for ambient air (0.06 f/mL) and the WHO background for urban air (<0.001 to 0.01 f/mL).

Concerns regarding Risk Characterization

1. No uncertainty analysis was provided
2. no non-cancer hazard assessment (neither was this provided from USEPA)
3. few samples (8 motorcycle samples) do not allow for statistical analysis (for example 95% UCL on mean)
4. For a comparison to lifetime risk tables (USEPA 1986), the authors use the following exposure assumptions: non-smoking adult; first exposure to begin at age 30, 1 year of continuing exposure to 0.000059 f/mL. This asbestos concentration was derived at by averaging an exposure to 0.013 f/mL (8 hours per day for 5 days per year) over a yearlong exposure time. HERO is not convinced that this method of exposure assessment is valid to derive toxicologic conclusions: short-term exposure to higher concentrations may have different toxicologic effects compared to longer term exposures to lower concentrations. Further, HERO questions if the other exposure assumptions are reflective of the regular users of CCMA: age at onset of exposure is likely to be lower than 30 years; non-smoking status cannot be assumed for all users.

Other concerns:
"Percentage of mesothelioma deaths in the US general population"
The authors cite a reference (Price B, Ware A; 2009, Crit Rev Tox: 39,7; 576-588) that states the percentage of mesothelioma deaths in the US general population to be 0.11%. This number is not supported by the CDC, which gives the mesothelioma mortality rate of the US between 1999 and 2005 as 13.8 per one million population or 0.00138 % (not age-adjusted). In 2007, the Interactive Cancer Atlas of the CDC listed the age-adjusted mortality rate for males and females to be 0.8 per 100,000 (or 8 per million or 0.0008 %).

Conclusion and Recommendations

HERO believes that the study has significant limitations and does not represent a regular exposure scenario at CCMA, and certainly not a "reasonable maximum exposure scenario" as defined by USEPA. In particular, HERO is concerned that the sampling conditions are not representative of regular exposure conditions (wet, saturated ground; standing water on roads, rain in the days before); children's exposure

not measured and only marginally considered; the park ranger scenario appears inadequate; "safe riding practices" for dust exposure minimization cannot be assumed for regular CCMA visitors and a 5 days per year exposure scenario may not be realistic for regular users of the CCMA.

HERO agrees with the conclusion that day use areas should be investigated and the following statements: "*Moisture conditions and riding practices are probably key factors for obtaining the low cumulative asbestos exposures reported...*" and "*... continuous attention to detailed management may be necessary to keep the level of airborne asbestos similar to what we are reporting*".

If you have additional questions please contact me at Tel. 916-255 4332, or email: gwindgas@dtsc.ca.gov

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