Report on the Workshop to Peer Review EPA's Draft Report: Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings

Cincinnati, OH
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Submitted to:
Office of Research and Development
U.S. Environmental Protection Agency (EPA)
Washington, DC 20460

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Notice

This report was prepared by Eastern Research Group, Inc. (ERG), an EPA contractor, as a general record of discussion during the Workshop to Peer Review EPA's Draft Document *Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings*, held June 20–21, 2007, in Cincinnati, Ohio. This report captures the main points and highlights of the meeting. It is not a complete record of all details discussed, nor does it embellish, interpret, or enlarge upon matters that were incomplete or unclear. Statements represent the individual views of meeting participants.

Contents

1. Introduction

In April 2006, the U.S. Environmental Protection Agency (EPA) conducted a study to compare the effectiveness of the Alternative Asbestos Control Method (AACM) to the current demolition practice under EPA's Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M.

- The Asbestos NESHAP (a work practice standard) requires the removal of most regulated asbestos-containing materials (RACM) prior to the demolition of buildings that fall under the auspices of the NESHAP.
- The AACM allows most of the RACM to remain in the building during demolition and requires pre-wetting of the interior and exterior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste, and the use of respirators and protective garments throughout the entire demolition process.

This research, conducted by EPA's Office of Research and Development (ORD) in partnership with EPA Region 6, compared the relative environmental impacts and costs of the two methods to evaluate the appropriateness of including the alternate method in the current asbestos regulations contained in 40 CFR part 61 subpart M.

The comparison was conducted via a controlled demonstration on two architecturally nearly identical asbestos-containing buildings in a remote location at the Fort Chaffee Redevelopment Authority near Fort Smith, Arkansas. The buildings contained significant quantities of asbestos-containing wall systems and vinyl asbestos floor tile. Before the research began, the project's quality assurance project plan (QAPP), *Evaluation of an Alternative Asbestos Control Method for Building Demolition, March 2006,* was formally peer-reviewed and offered for public comment.

ORD's National Risk Management Research Laboratory in Cincinnati, Ohio, documented the research project and results in the April 17, 2007, draft report *Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings*.

Eastern Research Group, Inc. (ERG), an EPA contractor, organized an independent peer review, of the draft research report. The review was conducted by six nationally recognized experts (Appendix A),:

- Ronald Dodson, Dodson Environmental Consulting, Inc.
- Ron Dokell, Demolition Consultants
- Steve Hays, Gobbell Hays Partners, Inc.
- Tom Laubenthal, The Environmental Institute
- Fredy Polanco, Polanco Enterprises, Inc.

- James Webber (Chair), New York State Department of Health Wadsworth Center, Biggs Laboratory

The reviewers were provided with a charge (Appendix B), which asked for their comments on the executive summary and conclusions, the conduct of the research, data analysis, quality control/quality assurance, as well as any suggestions they had for improving the report. Reviewers were also provided with the project's QAPP and with complete copies of all written comments submitted during the public comment period, which they were asked to consider.

In the first stage of the review, the experts worked individually to prepare written pre-meeting comments (Appendix C), which were then provided to all reviewers and EPA. In the second stage, ERG convened a two-day peer review workshop, on June 20–21, 2007, at EPA's facility in Cincinnati, Ohio. The workshop was attended by 18 observers, including EPA staff and members of the public (Appendix D). Appendix E provides the workshop agenda, which was organized around the Charge Questions. The workshop provided an opportunity for public comment (Appendix F).

This report summarizes the workshop proceedings:

- Section 2 presents the reviewers' final recommendations and conclusions.

- Sections 3 through 9 provide a detailed summary of the entire meeting. Section 3 presents the opening remarks; Sections 4 through 8 summarize the reviewers' discussions organized by Charge Question; and Section 9 presents the reviewers' closing remarks. The discussions summarized in these sections were deliberative, and formed the basis for development of the conclusions and recommendations presented in Section 2. As such, they do not require a response from EPA, but rather are provided as a detailed record of discussion.

- The appendices provide the following materials: a list of peer reviewers (Appendix A); the charge to peer reviewers (Appendix B); reviewer pre-meeting comments (Appendix C); a list of observers (Appendix D); the workshop agenda (Appendix E); and public comment (Appendix F).

2. Recommendations and Conclusions

Peer reviewers at the workshop developed conclusions and recommendations that follow in three parts. Part I (Section 2.1) lists concerns the reviewers had about bias in the report, Part II (Section 2.2) references specific report sections, and Part III (Section 2.3) addresses issues that run through several sections of the report.

2.1 Part I: Indications of Bias in the Draft Report

The peer reviewers were concerned about signs of bias in the draft report that amplify the success of the AACM. Specifically, they were concerned about:

- Overstatement of NESHAP costs (see Section 2.3.6 below)
- Understatement of AACM costs (see Section 2.3.6 below)
- Emphasis on *de minimis* concentrations (see Section 2.2.1 below)
- Failure to mention pre-contaminated soil and its potential impact on conclusions (see Section 2.3.3 below)

2.2 Part II: Reference to Specific Report Items

2.2.1 Executive Summary

Initial Paragraph

The reviewers recommend replacing the initial paragraph of the executive summary with the following:

> The Asbestos NESHAP (National Emission Standard for Hazardous Air Pollutants) requires the removal of all Regulated Asbestos-Containing Materials (RACM) prior to the demolition of the buildings that fall under the auspices of the NESHAP. This removal process can be a costly and time-consuming endeavor and contributes to the growing crisis of abandoned buildings in this country while providing protection to workers and public health in the demolition process. The Alternative Asbestos Control Method (AACM) allows certain asbestos-containing materials to remain in the building during demolition. In addition to leaving the asbestos-containing gypsum board system in the building, the AACM process in this study differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, and disposal of all material as regulated asbestos-containing waste.

De Minimis

The summary devotes considerable text to the issue of *de minimis* airborne asbestos concentrations. This issue is not a stated objective of the research and *de minimis* is not defined by a consensus in the scientific community as it relates to health effects. Health effects and health risk were not part of the research design, and the report offers no support other than the opinion of the authors for declaring the measured concentrations to be *de minimis*. The insertion of a conclusion on a topic not related to a research objective intimates a research bias or hidden agenda. This project's objective was not to assess exposure levels but rather to determine if AACM airborne asbestos concentrations were elevated compared to the established NESHAP method. Thus the reviewers recommend that any discussion of *de minimis* be removed from the report.

Additional Comments

Once EPA has modified the report in response to reviewer recommendations, the executive summary should be adjusted to reflect these changes.

Under "Secondary Objectives" on p. xviii, add this as a non-bulleted prelude: "The most significant secondary findings are:"

Insert as a third paragraph of the executive summary immediately before "Conclusions":

> This is a research project for comparison of AACM and NESHAP demolition processes. The intent is to compare information, and not to provide a different template for future work practices that differ from those that are governed by existing regulation. The EPA does not endorse the use of the AACM as an approved method for demolishing buildings with regulated asbestos-containing materials.

2.2.2 Section 1: Introduction

Replace Footnote 1 on page 1 with the following:

> Under Asbestos NESHAP [61.141], RACM means (a) friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material on the course of demolition or renovation operations regulated by this subpart.

Add the following to Footnote 2:

> Also, under 40 CFR 61.145 (c) ACM has to be removed if: (1) it is Category I nonfriable ACM that is in poor condition and is friable or (c)(1)(iv) it is Category II nonfriable ACM and there is a probability that the materials will become crumbled, pulverized, or

reduced to powder during demolition. (These regulations may be supplanted by more stringent local governmental [state, city, etc.] regulations that govern such activities.)

Make the following changes to the last sentence in the second paragraph on page 1 (underlined text is the proposed added language):

> Section 61.150 of the Asbestos NESHAP requires owners to "discharge no visible emissions to the outside air" during the collection, processing, packaging, or transporting of any asbestos-containing waste material generated by the source.

The first sentence of the fourth full paragraph on page 2 (which currently begins "The RACM is less likely to become friable…") should be changed to read "the RACM is less likely to release fibers to the air when the wetting process and demolition techniques specified in the AACM are used."

Table I of Exhibit 1 (page 6) shows mastic for flooring and window caulking as surfacing materials instead of miscellaneous materials. Under the Asbestos Hazard Emergency Response Act (AHERA) rules, asbestos-containing materials are classified as surfacing, thermal system insulation, and miscellaneous. These materials should be reclassified per AHERA.

2.2.3 Section 3: Site Information

In Section 3.3.1 (page 20), replace the first sentence with these sentences:

> A comprehensive pre-demolition inspection was conducted in accordance with the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR 763) to identify the type, quantity, location, and condition of Asbestos-Containing Materials in the buildings (61.145 (a) (Kominsky 2005; Smith Aug 2005). Under the NESHAP 40 CFR 61.145 (a), not only RACM must be identified prior to demolition or renovation but also Category I and Category II Nonfriable Asbestos-Containing Materials.

2.2.4 Section 6.1.3: Water

Discussion of 10-micron fibers is not relevant to airborne asbestos. Remove the last column in Table 6-9, remove the break-out for 10-micron fibers in Figure 6.8, and remove Figure 6.9 in its entirety. Remove discussion of 10-micron fibers throughout Section 6.1.3.

2.3 Part III: Reference to Integrated Issues

2.3.1 AACM Amended Water Delivery and Collection Issues

Specifications for amended water delivery and mechanical collection: The AACM process described in the report utilizes expensive and seemingly effective equipment for the delivery and collection of amended water. Clear rulemaking and guidance on the performance specifications for amended water delivery equipment, surfactant (including necessity of use), and water collection/filtration/storage equipment will be essential to ensure correct implementation of the

AACM process. Without these measures, demolition contractors may utilize substandard equipment and supplies that are inadequate to safely perform the work and meet expected federal and specification standards.

Space limitations: One of the biggest problems is the collection of water via the construction of berms. In the urban areas alluded to in the first paragraph of the executive summary, the space required by the current AACM specifications would be impractical, if not impossible.

Difficulty of water management and collection: Only a limited number of buildings will allow simple management and collection of the copious amounts of amended water used during the AACM process. Examples of buildings that pose collection challenges include buildings with basements or other spaces beneath the structure that can accumulate significant amounts of water that are not absorbed by the building components. Also, dilapidated structures can pose significant challenges for the collection and filtration of debris and fine particles from water.

Site contamination from water application: Effective application of amended water (as seen in the study) requires significant pressure from the delivery system to ensure that all building components are sufficiently wetted. This delivery force may push water-soaked asbestos-containing material outside the building envelope and past constructed berms. Given this concern, the issue of site contamination from the wetting process should be discussed in more detail.

Water discussion: Discussion of 10-µm-long fibers should be removed from §6.1.3, since this is not a measurement of drinking water. Asbestos fibers of all lengths are important because of the possibility of their re-entrainment and inhalation. Accordingly, Figure 6-9 and the last column of Table 6-9 should be eliminated.

2.3.2 OSHA Issues

The sentence in §4.4.1, second to last paragraph, second line ("No respirators nor protective garments were worn by the workers since this is not required by the NESHAP or the OSHA regulations") is inaccurate. While NESHAP does not address personal protective equipment (PPE) requirements, OSHA does require the use of PPE in the absence of a negative exposure assessment. The authors should delete this section or properly craft the language to ensure that readers understand the OSHA implications for the use of PPE, as this is "Class II asbestos work."

The reviewers also had the following comment regarding the AACM method (Exhibit 1, Section 1 §7.0 Monitoring Requirements [p. 7] and §8.2 PPE [p. 8]): Since this work will always fall under OSHA's 29 CFR 1926.1101 in regards to work practice and controls (training, etc.) and additionally to 29 CFR 1910.134 (respiratory protection standard), §7.0 Monitoring Requirements and §8.2 PPE should properly cite the appropriate regulations in each area. The monitoring section should address OSHA-required personal air monitoring issues, and PPE should address those issues germane to respiratory protection, protective clothing, etc.

2.3.3 Pre-Existing Soil Contamination Issues

Figure 6-11 clearly shows high "background" levels of asbestos in soils, but this is omitted from Section 3.3.3 and Table 3-4. This severely compromised several findings:

- While the level in post-work soil at the AACM site was statistically significantly lower than at the NESHAP site, a logical explanation might simply be that AACM soils were cleaner because the AACM excavation procedure removed pre-contaminated soil that had existed at both sites.
- This also clouded any conclusions about airborne concentrations at either site—did this airborne asbestos come from the pre-existing contamination or from the abatement/demolition processes?
- Furthermore, soil samples should have been taken both pre- and post-abatement at the NESHAP site to compare possible impact of abatement versus demolition.

Immediately before Section 4.4.2.1, the Agency should add a sentence: "However, there was removal of TSI from the crawl spaces beneath the buildings in 1999 that appears to have left some residual ACM."

2.3.4 Statistical Evaluation Issues

As the report discussed, the large number of non-detects (NDs) made statistical evaluation by traditional parametric methods difficult. The method of combining NDs for AACM Days 1 and 2, as outlined in §7.1.1, is not transparent (Table 7-1 provides no numerical detail) and was probably not appropriate; two days of NDs for one sampler ended up with the same value as one day of ND plus one day of one fiber counted for another sampler. While ND (assume zero) is statistically indistinguishable from one in a Poisson sense, an accumulation of one-fiber counts versus an accumulation of NDs can be significant. A more appropriate approach would have been to assign to each sample either the lower Poisson limit (see Table 6-1) for the structure count (0 for 0, 0.025 for 1, etc.) or the upper Poisson limit (3.689 for 0, 5.572 for 1, etc.) and then calculate the airborne concentration on this number. This would have provided some differentiation between NDs and low structure counts.

While the report in §7.1.1 concludes that combined-day AACM airborne asbestos is significantly ($p=0.006$) greater than NESHAP, these data should be evaluated separately for AACM Day 1 and AACM Day 2. The Final QAPP did not prescribe a 90-percent-ND cut-point approach (described in the third bullet point in §7), so the authors should not be restricted from trying to glean additional information from their data.

The conclusion in §7.4 that Secondary Objective 5 is proven (no difference in upwind/downwind airborne concentrations) is incomplete. By combining AACM Days 1 (little emission) and 2 (higher emission), the report may have obfuscated any gradient on either day. The data sets should be separated for AACM Days 1 and 2 and re-analyzed.

For each of the statistical analyses, the report should include a brief table detailing how the ranking calculations determined any statistical significance. See Table 1 ("Asbestos in Settled

Dust") and Table 2 ("Airborne Asbestos") in Webber's pre-meeting comments for an example. These tables can be found on pages C-65 and C-66 of this report.

2.3.5 Phase-Contrast Microscopy (PCM) Issues

Airborne fiber concentrations determined by PCM should be downplayed. These, as the report correctly mentions twice ("PCM analysis is a poor indicator of asbestos concentrations" on page 83 and "It is apparent that PCM measurements have no relationship to the asbestos concentrations"), are unrelated to airborne asbestos concentrations. The report *then* incorrectly states on pages 84, 112, 115, and 127 "…the asbestos fiber (PCM) concentrations…" Remove "asbestos" to leave "…the fiber (PCM) concentrations…" in all of these occurrences. Additionally, PCME concentrations are not relevant to public health because they exclude thin and short asbestos fibers that play a role in toxicity. The report should include a short section detailing the percentage of asbestos fibers detected by TEM that would not have been resolvable by PCM.

2.3.6 Abatement Cost Issues

The abatement cost is overstated and total cost for AACM is understated. Cost analyses are difficult when attempting to draw actual practice conclusions from research cost data. The cost for abatement in the NESHAP building is much too high. A more realistic project time to remove the drywall under abatement conditions is 3 to 4 days. The abatement cost should be about $30,000, or less. Contributing factors to the high cost and excessive time for abatement are numerous and include the following:

- Waste was loaded into metal barrels for disposal. This increased work time and weight of the waste.
- The bidders on this project knew it was a research project and knew there would be much official scrutiny. This increased the cost significantly above actual practice.
- Common practice in the industry is to add a cost increase factor when bidding government work.
- Abatement oversight and air monitoring costs are too high because the abatement took too long.
- See pre-meeting comments by Polanco (first paragraph, starting "I agree" to "specified in the project" [see Appendix C, page C-55] and Hays [Appendix C, pages C-19 and C-20, items 6, 7, and 8]).
- See Giguere, item 20.

The cost for the AACM is underestimated. Additional cost items that should have been included:

- Time and materials cost to wet the berms during excavation (this was not done in the field test).
- Work should have complied with OSHA 1926.1101 for Class II work.
- Construction of berms is not itemized, so whether that cost was included is unknown.

EPA's cost comparison between the NESHAP and wet methods is seriously flawed. The comparison erroneously assumes that "The AACM building at Fort Chaffee did not contain ACM that would require abatement prior to demolition" (report, p. 139). In fact, EPA admitted in its April 6, 2006, comments on the external peer review of the QAPP that "'[o]ld and friable ACM used on heating pipes' has indeed been removed, but this would have been done as part of the AACM anyway" (Summary of External Peer Review, April 6, 2006, p. 2). Therefore, the chart on page 139 of the test report should not list the NESHAP abatement costs for the AACM building as "N/A," but instead include the costs of the pre-demolition NESHAP abatement of friable ACM.[1]

See Table 8-2 (below) in the written public comments submitted by Andrew F. Oberta (see Section 2.3.8 for Oberta's complete written comments).

Docket ID No. EPA–HQ–ORD–2007–0362

Table 8-2. Adjusted costs for AACM

Cost Item	Cost		
	Owner's Representative	Demolition Contractor	Total
Pre-Demolition			
Project Design Survey per ASTM E2356	$3,000		
Asbestos abatement sections of demolition specifications (Preparation and bidding)	$3,500		
Site mobilization and demobilization		$5,000	
Training - OSHA Class II (8 hrs) for 14 workers ($40/hr)	$400	$4,480	
Training - OSHA Class II (12 hrs) for two supervisors ($50/hr)	$200	$1,200	
Sub-total	**$7,100**	**$10,680**	**$17,780**
Building Demolition			
Preparation oversight and monitoring (2 men, 1 day @ $500/man-day)	$1,000		
Demolition oversight and monitoring (2 men, 2 days @ $500/man-day)	$1,000		
Excavation oversight and monitoring (1 man, 1 day @ $500/man-day)	$500		
OSHA compliance monitoring		$1,000	
Excavator		$2,400	
Labor		$10,035	
Wetting surfactant		$2,165	
Foaming equipment rental		$1,000	
Conductivity testing rental		$500	
PPE (respirators and clothing)		$1,000	
Sub-total	**$2,500**	**$18,100**	**$20,600**
Construction Debris T&D (asbestos and non-asbestos)			
T&D oversight (1 day)	$500		
Transportation		$6,143	
Scaffold for lining of trucks and liners		$7,078	
Asbestos waste disposal		$18,660	
Non-asbestos waste disposal		$2,678	
Water collection and disposal		$570	
Close-out documentation	$500		
Sub-total	**$1,000**	**$35,129**	**$36,129**
TOTAL COST	**$10,600**	**$63,909**	**$74,509**

Source: Public comment submitted to EPA by Andrew F. Oberta, The Environmental Consultancy, 107 Route 620 South, Suite 102, MS 35E, Austin, TX 78734 on May 30, 2007. http://www.regulations.gov/fdmspublic/component/main, Document ID: EPA-HQ-ORD-2007-0362

[1] Excerpted from public comment submitted to EPA on June 11, 2007, by Jim Hecker, Environmental Enforcement Director, Public Justice, 1825 K Street, N.W. Suite 200, Washington, D.C. 20006. http://www.regulations.gov/fdmspublic/component/main, Document ID: EPA-HQ-ORD-2007-0362

- Cost for independent third-party oversight should be added to the AACM, as was done for the NESHAP project.
- The crew size was excessive, especially for the length of time.
- The removal was "gold-plated," especially given that the building was going to be demolished. For example, the latex-paint lockdown was not necessary.

Many issues of application in actual practice would influence the cost of the AACM and its comparison to the standard NESHAP method:

- Distance to the landfill.
- The size of the building will have a major impact on how this cost compares to the standard NESHAP approach. The size of the building will determine the volume of construction debris that must go into an asbestos landfill. At some point, the increased landfill costs will cancel any savings afforded by the AACM.
- Union versus non-union labor.
- Geographical region of the country.
- Urban versus non-urban.
- Site size and conditions (e.g., soil composition) that influence the methods to contain water.
- Proximity to other structures.
- Some state and local jurisdictions would require wallboard systems and VAT removal before demolition.
- Decontamination of equipment.
- Decontamination of trucks after each load.
- Extra cost to use asbestos workers.
- Extra cost to monitor.
- Extra cost of amended water.
- Extra cost of pumps.
- If you remove thermal insulation, how much is left?

2.3.7 Implementation Issues

At present, the AACM is a "performance" report with an emphasis on the final product, but little guidance on the specifics of work performance. All subsequent versions of AACM need to amplify specific details of work execution, project oversight, and project completion. In various sections, a more "means-and-methods" approach should be crafted to specifically explain the methods of work execution, the duties of project oversight, and the particular aspects that would define project completion. (For an example of a means-and-methods specification, see the National Institute of Building Sciences' "Guideline Specification for Asbestos Abatement").

Examples of method amplification include:

- ***Berm construction:*** What constitutes a properly constructed berm? Would a 2-foot-tall sand structure be appropriate to contain the water used during the AACM process?

Aspects to consider: height/width, what soils would be allowed for berm construction, physical strength for water containment (as with significant precipitation events).

- ***A specification for amended water application:*** What equipment is appropriate? A garden hose or the Kidde fire equipment demonstrated in the study (preferred!)?
- ***Wetting agent:*** what is an appropriate wetting agent for this process? A performance specification would be appropriate versus proprietary substance.
- ***Project completion:*** What constitutes project completion? Absence of visual debris? Who provides the inspection? What constitutes certification of evidence of completion?
- ***Training:*** A section should be added to ensure that all workers on site have successfully completed appropriate asbestos-related training programs as required by EPA/ASHARA and any OSHA-related issues governed by state or local authorities.

Examples of project-monitoring amplification include:

- Ensure that the required amended water process is applied previous to and continuously during the AACM process.
- Ensure that there are no visible emissions during the AACM process.
- Ensure that all work is performed as specified by the AACM.
- Ensure that no AACM-prohibited activities occur.
- Ensure that waste is properly containerized and disposed of in an appropriate landfill.
- Provide visual inspection during and at the completion of the AACM.

2.3.8 Public Comments

The comments submitted by Andrew F. Oberta (see the boxed section beginning on the next page) are thorough and well articulated. We believe that the EPA should consider Mr. Oberta's submission a base document for public comments and review and respond to all of his comments.

Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings

Summary of Comments by Andrew F. Oberta, MPH, CIH
The Environmental Consultancy

Mr. Oberta is an asbestos consultant with over 25 years of experience in the field. He submitted comments to the docket on May 30, 2007 and posted an illustrated and annotated version on his website at www.asbestosguru-oberta.com. The following is a summary of his comments.

****

If someone ground up twenty square feet of asbestos floor tile and spread the pieces over a quarter-acre of land, we would agree that they have contaminated the soil. That is exactly what EPA did in the Fort Chaffee AACM project – not one, but twice.

The results of the soil analyses demonstrated that the long-standing EPA policy of permitting flooring materials to remain in a building that is demolished may not have been a wise decision. It should be re-examined at least and perhaps rescinded.

Another unintended consequence of leaving 3,992 ft^2 of asbestos-containing floor tile and mastic plus 252 ft^2 of linoleum with friable asbestos-containing backing in the buildings is the introduction of a variable not discussed in the report. These materials represent a source of airborne fiber release that could have affected the air sampling results. The implied assumption that no such fiber release occurred or that it affected the results for both tests equally is not defensible.

The amount of asbestos present in these flooring materials would far exceed that in the wallboard joint compound in the AACM building if the compound was limited to the spaces between the wallboard panels. However, the photos in the Draft Report and the EEG inspection report suggest that the walls were covered with a homogeneous surfacing material of constant thickness – perhaps plaster --without other discernable materials in the immediate area of the joint. We are left unsure of how much ACM was associated with the wallboard.

The air sampling results used to compare the two methods were inconclusive, primarily due to the large percentage of samples with zero structure counts. If anything, the results faintly suggest that the AACM creates higher airborne asbestos concentrations than the NESHAP method. No effort was made to compare these concentrations during either demolition to background levels or prevailing urban ambient concentrations.

The AACM demolition was preceded by saturating the wallboard with water containing a foaming agent, which was also sprayed on the building as it was demolished. Whether a contractor demolishing a building for low bid would spend the time and money to use this method properly, or would be able to operate the spray equipment and calibrate the mixture, is very doubtful based on my experience with asbestos abatement. To ask such a contractor to measure and adjust the conductivity of the mixture for proper foaming properties when they have trouble maintaining paint sprayers in working condition is unreasonable. What happens when the nozzle gets dropped in the dirt and plugged up?

The purported cost savings of 47% for the AACM compared to the NESHAP method are reduced to 31% when expenses for project design and oversight by the owner's representative and training of the contractor's workers are included. Unless the contractor is regularly engaged in asbestos abatement as well as demolition, their general liability insurance will exclude the work required by the AACM. Firms

without asbestos coverage, which the owner would be foolish not to require, would not bid and the pool of potential contractors would be reduced. The biggest and most unpredictable cost variable, as acknowledged in the report, is the competitive nature of bidding for demolition work.

There are numerous technical errors, inconsistencies and questionable items in the report. ASTM and ISO methods for sampling and analysis are misrepresented. Prevailing industry practices described in ASTM asbestos control standards are not recognized.

The following statement appears on page 1 of the Introduction: "These data may be used to help EPA determine whether it is appropriate to include an alternative method in the current asbestos regulations contained in 40 CFR Part 61 Subpart M." If this statement signals EPA's intentions to amend the NESHAP to allow use of the AACM, it would be a serious mistake and compromise the protection of health and the environment. Exhibit 1 appears to represent a potential draft of the regulatory language that would describe how the AACM is to be used. This Exhibit has serious flaws, the foremost of which is allowing several asbestos-containing materials that should be removed to remain in the building during demolition. An equally serious omission from the exhibit is any consideration of vacating or protecting nearby residences and businesses, and measures to assure occupants of the safety of moving back into them.

I cannot endorse the AACM on the basis of this report any more than I could before the tests were conducted.

Andrew F. Oberta, MPH, CIH,
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Oberta's Written Comments Submitted to EPA During the Public Comment Period

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Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings
Comments by Andrew F. Oberta, MPH, CIH
The Environmental Consultancy
May 30, 2007

INTRODUCTION AND SUMMARY
The findings of my review are summarized below and explained in detail in the body of this submittal.

• Two 4,500 ft² buildings, each containing 3,992 ft² of asbestos-containing floor tile and mastic plus 252 ft² of linoleum with friable asbestos-containing backing, were demolished in a demonstration at Fort Chaffee, AR. The first building demolished had 20,700 ft² of asbestos-containing wallboard removed immediately before the demolition, which was performed essentially dry. The wallboard was not removed from the second building but was saturated before demolition. A foaming agent was added to the water for dust suppression during the second demolition.

• Soil samples collected after demolition of both buildings contained a substantial amount of asbestos containing debris from the floor tile, linoleum and possibly previously-removed pipe insulation. The samples from the first building demolished (the "NESHAP" building) had more debris than those from the second ("AACM") building. These results suggest that asbestos-containing flooring materials should be removed before demolition of a building, particularly if the minimal amount of water used for dust suppression during the NESHAP demolition represents customary practices.

• Leaving the flooring materials in the buildings introduced a variable not discussed in the report. These materials represent a source of airborne fiber release that could have affected the air sampling results. The implied assumption that no such fiber release occurred or that it affected the results for both tests equally is not defensible.

• The air sampling results used to compare the two methods were inconclusive, primarily due to the large percentage of samples with zero structure counts. If anything, the results faintly suggest that the AACM creates higher airborne asbestos concentrations than the NESHAP method. No effort was made to compare the airborne asbestos concentrations during either demolition to background levels or prevailing urban ambient concentrations.

• The AACM demolition was preceded by saturating the wallboard with water containing a foaming agent, which was also sprayed on the building as it was demolished. Whether a contractor demolishing a building for low bid would spend the time and money to use this method properly, or would be able to maintain the spray equipment and calibrate the mixture, is very doubtful based on my experience on asbestos abatement projects.

• The purported cost savings of 47% for the AACM compared to the NESHAP method are reduced to 31% when expenses for necessary preparation and oversight by the owner's representative and training of the contractor's workers are included. The biggest and most unpredictable cost variable, as acknowledged in the report, is the competitive nature of bidding for demolition work.

• There are numerous technical errors, inconsistencies and questionable items in the report. ASTM and ISO methods for sampling and analysis are misrepresented. Prevailing industry practices described in

ASTM asbestos control standards are not recognized.

The following statement appears on page 1 of the Introduction: "These data may be used to help EPA determine whether it is appropriate to include an alternative method in the current asbestos regulations contained in 40 CFR Part 61 Subpart M." If this statement signals EPA's intentions to amend the NESHAP to allow use of the AACM, it would be a serious mistake and compromise the protection of health and the environment. Exhibit 1 appears to represent a potential draft of the regulatory language that would describe how the AACM is to be used. This Exhibit has serious flaws, the foremost of which is allowing several asbestos-containing materials (ACM) to remain in the building during demolition that should be removed. An equally serious omission from the exhibit is any consideration of vacating or protecting nearby residences and businesses, and measures to assure occupants of the safety of moving back into them.

I cannot endorse the AACM on the basis of this report any more than I could before the tests were conducted. If the NESHAP is amended to allow its use, my recommendation to building owners would be to follow the advice of a qualified asbestos professional who has inspected the building according to ASTM E2356 Standard Practice for Comprehensive Building Asbestos Surveys (1) and made an informed decision as to whether any asbestos-containing materials can remain in place during the demolition. The project should be conducted in the same stringent manner as any other abatement project, which is what the AACM amounts to. This includes a project design and proper oversight by the owner's representative and compliance with applicable state and local asbestos regulations. This is the only way that health and the environment can be adequately protected and that the owner can avoid possible liability including citations from regulatory authorities.

(1) All ASTM standards cited in these comments are available from www.astm.org or ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

DISCUSSION

Section 1 Introduction – A schedule showing the activities performed each day would help greatly in understanding the sequence and timing of events. Currently, this information has to be dug out of the text.

Exhibit 1, 2.0 Applicability – Is there a limit on the size of a building (floor space) other than the height and number of stories? It is conceivable that a 100,000 ft^2 single-story building could be demolished under these requirements.

Exhibit 1, 3.0 Building Inspection/Asbestos Assessment -- An "AHERA" inspection is not "comprehensive" because it allows exclusions for sampling and assessment based on friability and location of suspect materials. Exterior materials that are required to be sampled are specifically enumerated and non-friable materials are not assessed. Inspections for pre-demolition abatement projects should be done according to ASTM E2356 Standard Practice for Comprehensive Building Asbestos Surveys as Project Design Surveys, which requires all ACM regardless of friability and location to be identified.

Exhibit 1, 5.2 Wetting Process – Even amended water will not penetrate non-friable materials such as floor tile and asbestos-cement roofing or siding that the AACM allows to be left in place. A surfactant will, at best, allow the water to spread over the surface and contribute to the control of dust. However, the product used in this demonstration in no way resembles the amended water commonly used by abatement contractors.

This procedure assumes the existence of an attic, which I take to include a plenum above a lay-in or solid ceiling. Is the procedure modified if there is no attic or plenum?

Exhibit 1, Table 1 – ASTM E2356 discusses some of these materials in Appendix X1. SAMPLING TECHNIQUES AND EQUIPMENT in ways that suggest they should be removed prior to demolition rather than left in place according to Table 1.

Spray-applied surface coatings (popcorn ceiling) are covered in E2356 under X1.3.2.3 *Textured Finishes* and **Spray applied acoustical or decorative surfacing** is covered under *X1.3.2.2 Plaster* as friable materials. The ability to wet these inherently-dusty materials sufficiently to minimize the release of airborne fibers and debris with the AACM was not demonstrated. They should be removed before demolition.

Troweled-on crows foot texture, splatter texture, and joint compound combines very dissimilar materials. Joint compound is covered under *X1.3.3.3 Wallboard Systems* as a friable miscellaneous material along with texturizer, or skim coat, and the tape covering the joint. OSHA posted an interpretation on May 14, 1998 titled "Asbestos standard: Joint compound is not a surfacing material." A decision on whether these materials must be removed before demolition should be made by the project designer on the basis of multi-layer sampling and analysis.

Vibration-dampening cloths are covered under X1.3.3.5 *Vibration Dampeners* as a friable material. These items are woven from almost-pure chrysotile fiber and should be removed before demolition.

Linoleum or other floor tile are distinctly different materials. Linoleum is covered under X1.3.3.4 *Sheet Vinyl Flooring* containing a woven or matted backing with a high chrysotile content that is very friable. If this backing is present the flooring should be removed before demolition as the amended water will not penetrate the vinyl facing.

Ceiling tile is covered under *X1.3.3.1 Acoustical Ceiling Tiles* as a friable material, as are X1.3.3.2 *Glued-on Tiles*. The former often contain amosite and the latter may be attached to the deck or ceiling with asbestos-containing mastic. These tiles should be removed before demolition as the ability of the AACM wetting agent to penetrate to the substrate has not been demonstrated.

The decision whether to remove any ACM or leave it in place during demolition should be left to the project designer with a default to removal if the possibility exists of generating debris or releasing fibers.

Exhibit 1, 5.3 Demolition Process and 5.4 Visible Emissions – It may be naïve to expect the demolition contractor to "minimize breakage of asbestos-containing materials" and to expect the demolition contractor's NESHAP-trained individual "to stop work if visible emissions are observed." The AACM process suffers from the same lack of independent oversight by the owner's representative as the current NESHAP. Fortunately, such oversight is required by some state regulations as well as consensus standards such as ASTM E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects.

2.1 Primary Objectives – Primary Objective 2 states: "The AACM requires soil excavation following demolition and the NESHAP Method does not." Why not? As seen later, the soil around the NESHAP building was just as contaminated after demolition as the soil around the AACM building.
Primary Objective 4 should be to compare airborne asbestos (TEM) concentrations during the NESHAP and AACM demolitions to the background TEM concentrations and to prevailing urban ambient concentrations.

2.2.3 Worker -- Objective 9a should be to determine whether worker exposure using the AACM can be statistically shown to comply with the OSHA Permissible Exposure Limits of 0.1 f/cc for an 8-hr TWA and 1.0 f/cc for the 30-minute excursion level. Comparisons are made later in the report (4.1.3.3.3 and 6.1.5.1) but no statistical analysis was performed.

3.2 Site Description – Most buildings that the AACM appears intended for will not have had the benefit of previous asbestos abatement. They may also have been subject to maintenance, vandalism, neglect and other activities that result in disturbance of asbestos-containing materials and the presence of debris that would need to be cleaned up before an AACM demolition began.

3.3.1 Asbestos Inspection of Buildings – Reference has previously been made to the limitations of an "AHERA" inspection and to ASTM E2356 Standard Practice for Comprehensive Building Asbestos Surveys. Figure 3-5 in the Draft Report has been cropped horizontally from Figure 1 in the EEG inspection report, which shows a section approximately 3.5" wide. As the EEG report states on page 9 that 2" and 3" hole saws were used to obtain the samples, the question is whether this picture is on a section through a joint that was not a sample but obtained separately.

What is labeled "joint compound" in the EEG Figure 1 is ~1/8" thick at the edges of the picture and does not appear to decrease in thickness. This suggests it may be a layer of plaster and not joint compound, which would make it surfacing material. Were any samples taken of this material between the joints? The answer affects the relative contributions of this layer and the flooring materials. If 20,700 ft² of wallboard is covered with 1/8" of plaster containing 10 – 19% asbestos, the amount of asbestos available for release from this plaster is roughly five times that in the 4,244 ft² of floor tile and linoleum backing of equal thickness with 10 - 25% asbestos. If, however, only the joint compound itself – between the wallboard sheets at four foot intervals – contains asbestos, the flooring materials constitute a much larger, even a predominant, amount of potential fiber release.

The EEG report also states "In the laboratory the full-depth core sample was separated into its discrete layers (***Figure 1***) for analysis." Was this done using the dimension d2 in Figure 3-5 of the Draft Report? What is the basis for the width of the seam in the absence of joint tape or other defining components of the wallboard system? The "Joint Interval Composite" percents in Table 3-1 calculated from these dimensions should not depend on an arbitrary reference point.

Table 3-1 has a single line for mastic in each building, whereas the lab reports (EEG pages 110 – 115 of PDF file) show brown/tan for the linoleum and black for the tile. The latter was not gravimetrically analyzed as a separate layer, even though it qualifies as a non-friable organically bound (NOB) and has a high probability of containing asbestos.

The lab reports also list a white tape as part of the joint sample, which is not listed in Table 3-1 or in the body of the EEG report and is not apparent in the photos.

3.3.3 Concentrations of Asbestos in Soil – When were these (nine) samples taken? They do not appear to be the same (ten) samples for each building that appear in the remainder of the report.

4.1.3.1 Background Air Monitoring – Are these the samples in Table A-4 that were taken on January 11, 2006? Where were these samplers in relation to those shown in Figure 4-1? The report states that these samples were taken "to collect data necessary for potential comparison of air concentrations of asbestos and total fibers during demolition." However, it is not clear what comparison is meant here, and the concentrations during the demolitions were not compared to background levels.

4.1.3.2 Perimeter Air Asbestos, Total Fibers, Settled Dust, and Particulate Sampling During Demolition – Page 30, 5th paragraph: The pumps shown are capable of pulling more than 4 lpm. Although the 1920 – 2400 L volumes exceed that for ambient samples at many abatement sites, higher volumes would have increased the number of samples with one or more structures counted. Once it became apparent that filter over-loading was not a problem, was any consideration given to increasing the flow rate and thus the sample volumes?

4.1.3.3.1 Discharge Air Sampling During Asbestos Abatement of NESHAP Building – In response to an inquiry, EPA informed me that the isokinetic sampling was done according to the following reference: Quantitative Evaluation of HEPA Filtration Systems at Asbestos Abatement Sites, Roger C. Wilmoth et al. *Environmental Choices Technical Supplement*, Vol. 2, No. 1, Fall 1993. Environmental Information Association, Chevy Chase, MD. This article describes a series of tests where samples were taken in ducts attached to HEPA-filtration units. To achieve isokinetic velocity, the cap was left on the 25mm cassettes, which presumably faced into the airstream, the plug removed and a tube inserted into the hole. The filters were analyzed by TEM with indirect preparation to overcome the problem (not discussed in the article) of uneven fiber distribution on the filter. This methodology is not described in this Draft Report and without information on the air flow rates through the HEPA-filtration units and the sampling cassettes, and the diameter of the inlet tube, the existence of isokineticity cannot be confirmed.

One learns from Table 4-1 that these filters were analyzed by TEM but Tables 5-1 and 5-2 do not mention them. However, Table 6-16 also gives results for PCM analysis in f/cm^3, which raises the question of how fiber counts were done on asymmetrically-loaded filters that were also indirectlyprepped for TEM analysis. It is implied that ISO 10312 was used but that is a direct prep method.

4.1.3.3.2 Personal Breathing Zone Sampling During Abatement -- With ~81 man-days of abatement, why were only six personal samples collected for worker exposure? On which day out of the nine during which abatement was conducted were these samples taken?

4.1.3.3.3 Personal Breathing Zone Sampling During Demolition – I believe the text should read: “For each of the two building demolitions, samples were collected during the sampling *demolition* periods to calculate the time-weighted average (TWA) concentration for comparison to the OSHA Permissible Exposure Limit for Asbestos (29 CFR §1926.1101)..” However, Objectives 8 and 9 refer to comparing concentrations between the NESHAP and AACM methods – comparison to the OSHA PELs would be an additional objective, which is identified in my comment on 2.2.3.

No personal samples were taken during pre-wetting of the AACM building on the day before it was demolished. During this time the workers were dragging hoses through the building, moving ladders and doing other things that could have released airborne fibers from the asbestos-containing wallboard joint compound. Their exposure should have been monitored.

APPENDIX C Procedures for Visual Inspection and Clearance of Project Sequence of the EEG SPECIFICATIONS & DRAWINGS FOR ASBESTOS ABATEMENT PROJECT requires a visual inspection that closely follows the sequence in ASTM E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects and clearance by air sampling with PCM analysis. Other than a statement here that “The EPA and contractor staff inspected the abated area following acceptance …” and another in Section 8 about “… clearance testing by a licensed asbestos consultant;” there is no mention in this Draft Report that the visual inspection and clearance procedures in the specification were carried out. There are no air sample results for the clearance testing.

4.3.3 Cross-contamination control – Imagine yourself living in a house across the street from one being

demolished by the AACM. You would ask the following questions: "Will my family be re-located during the work and at whose expense? Will my house and yard be covered with plastic as in Figure 4-16? Will my house and yard be inspected and cleaned if necessary so it is safe to move back in?" These questions may not have arisen in the context of this demonstration project but will undoubtedly be asked if an AACM demolition is proposed.

4.4.2.1 Amended Water System – Page 49: The Kidde Fire Fighting NF-3000 Class "A" Foam Concentrate is a respiratory, eye and skin irritant according to the MSDS and handling it requires appropriate PPE. Figure 4-25 shows a worker wearing a full-facepiece negative pressure respirator with P100 cartridges during application of the foam, but would a demolition contractor have the necessary PPE for the workers who are handling the concentrate?

Page 50, 1st paragraph: What would the cost be for such a system if a contractor had to buy or rent it? The remainder of page 50, Table 4-4 and Figure 4-22 describe conductivity measurements to calibrate the foam concentration. Is it realistic to expect a contractor to do this on an actual project under time and cost constraints?

4.4.2.2 AACM Pre-Wetting – Would ordinary amended or just soapy water have saturated the walls and ceilings equally as well as the foam? Is the foam necessary to penetrating the wallboard or does it just sit on the surface?

4.4.2.3 AACM Demolition Phase – Page 52, last paragraph, describes problems with the foaming nozzles, which appear related to the footnotes to Table 4-4 about "non-foam proportioning." Even the simple spray equipment used at abatement sites frequently malfunctions and workers are continually cleaning, adjusting and repairing the spray nozzles and pumps. If the AACM depends on using a complicated foaming device as was done on this project, contractors will not spend the time to keep it operating properly. They will just spray the building with amended (or plain) water, which may be adequate for the purpose intended, but this project did not show that to be the case.

5.2.4.1 Soil Preparation – Under what magnification was the soil examined for the presence of building debris? Was the mass of the debris pieces determined by weighing them or by inference from the PLM visual estimate?

5.2.4.2 Soil Analysis (TEM and PLM) – The pieces of debris that were picked out of the soil don't seem to have been subjected to the same gravimetric and point-counting procedures as the soil, which included the pieces of debris that were not removed.

5.2.5 Settled Dust Samples (TEM) – The reference to ASTM D5755 in this paragraph and Tables 5-1 and 5-2 is inappropriate. These samples were not collected, prepared or analyzed according to either D5755 or D1739 (referenced in 5.1.6) but a combination of methods loosely resembling both.

• D1739 requires gravimetric analysis, not TEM. It is meant to measure particulate fallout, not fibers or structures.

• D5755 requires microvacuum sampling of surfaces. There is no apparent reason why this could not have been done.

• The fallout container had a volume of 5555 cm^3, a surface area of 1642 cm^2 and was rinsed with 300 ml of solution. The cassette used in the D5755 method has a volume of 25 cm^3 and a surface area of 47 cm^2; it is filled with 10 ml of rinse solution and shaken, then this solution is added to 75 ml used to further rinse the cassette.

• D5755 uses an indirect preparation method for TEM analysis of aliquots from the rinse solution that are filtered; the cassette filter is not analyzed. ISO 10312 is a direct preparation method where the filter in the cassette is analyzed by TEM.

• D5755 and ISO 10312 have different grid opening requirements and stopping rules (Tables 5-1 and 5-2).

The settled dust (mud?) results are of little consequence to this study and the method certainly would not be used on an actual project. However, the deviations from the referenced ASTM and ISO methods should have been more fully explained.

Section 6 RESULTS – Due to the large number of non-detects, the conclusions are based more on the absence of asbestos structures in the samples than on their presence. The statement at the top of page 74 may be more candid and revealing than the authors intended: "…any conclusions that are based upon counts less than four, as almost all the ones in this study were, should be used with some caution."

6.1.2.1.2 Demolition Air – The highest recorded concentrations are 0.0015 s/cm³ for the NESHAP building and 0.0019 f/cm³ for the AACM building. These are compared – favorably – on page 80 to various clearance limits in the US. Other countries have stricter limits, e.g. the guidance limit in Israel for asbestos in ambient air is 0.0014 f/cm³ measured by SEM. Moreover, the limits in the penultimate paragraph on page 80 are not directly comparable: the AHERA limit is based on analytical sensitivity and not a health-based standard; the AHERA, Katrina and WTC limits are for re-occupancy of indoor environments, not outdoor exposures. The last paragraph admits that the AACM demolition concentrations were statistically higher than the NESHAP values.

6.1.2.2 Asbestos in Settled Dust – A footnote to Table A-7 gives a surface area of 181.5 cm² that was presumably used to calculate the surface loading (not concentration as in the titles of Table 6-4 and Figure 6-6). This is the area of the bottom of the can. How were the bottoms of the cans rinsed without also rinsing the sides? It is hard to believe that all of the dust particles, water droplets and floating fibers fell straight down into the can without touching and sticking to the sides. If the sides were also rinsed, the total area of 1642 cm² should have been used in the calculations, which would reduce the surface loadings by almost an order of magnitude. This would place even the highest loadings below the WTC and Libby criteria, for what that is worth.

6.1.2.2.1.1 Background Air -- Table 6-5 is titled in part "…total fibers (PCM) prior to demolition…" and the units are f/cm³. However, Table A-4 lists five samples analyzed by TEM and none by PCM. No structures were counted on any of the filters, a fact not mentioned here. Nor is it stated that the samples were taken four months before the demolitions and not immediately preceding the work.
6.1.4.2.1 Soil Fraction – Table 6-11 summarizes the analyses of the soil fraction (Fraction 01) from which rocks/organics (Fraction 02) and building debris (Fraction 03) had been removed. Thus, the soil in Fraction 01 was at least "visibly clean" and, if examined under magnification, even cleaner. Fraction 01 was then separated into sub-fractions for analysis by TEM and point-counting (1000 points) by PLM. The sub-fractions were gravimetrically reduced by ashing and acid-rinsing before the analyses.

The text on page 90 doesn't mention the two pre-demolition AACM samples (9 and 10) with 0.11% and 0.33% asbestos by PLM/point-counting. The latter represents 34 gm – over an ounce – of asbestos and if it consisted of one fragment of debris, or even a few fragments, it may have been visible debris that was not extracted from the sample before splitting it into the three fractions. Perhaps this material belongs in Fraction 03.

The conclusion that the pre-demolition debris came from pipe insulation is logical, as pipes ran in the crawl spaces under buildings such as these. This does not account for pre-demolition NESHAP sample 9, however, which was identified as VAT. The next italicized paragraph addresses Primary Objective 2, comparing post-excavation AACM soil to post-demolition NESHAP soil. First, I consider this a meaningless comparison. The comparison should have been to the post-demolition soil for both buildings.

Second, if post-demolition NESHAP sample 7 – which contained the equivalent of 32 gm of asbestos – was a debris fragment (or fragments) that should have been extracted and put in Fraction 03, that would have changed the results in Table 6-11 and perhaps the conclusion for Primary Objective 2. This suggests that removing the building debris not only biased the analyses of Fraction 01 toward the low side but that it may have been done inconsistently. Needless to say, Fraction 03 was affected as well. There is a very poor correlation between the PLM point-counting results and the TEM results for the two samples just discussed when one calculates the mass of asbestos on the filters. For post-demolition NESHAP sample 7, the 0.34% asbestos by PLM translates to 4.42E-07 gm while the 110 structures by TEM in the same sample gives 7.33E-08 gm, a 6x difference. For pre-demolition AACM sample 10, 0.33% by PLM gives 3.63E-07 gm vs 1.18E-08 gm for the 136 structures by TEM, a 30x difference. Are such variations typical when comparing PLM point-counting and TEM results from similar samples?

6.1.4.2.3 Building Debris Fraction -- What method was used to visually estimate the asbestos content of Fraction 03 by PLM to two decimal places? Were the debris fragments gravimetrically reduced or was a stratified point-count method used, or both? If the asbestos content could be visually estimated to two decimal places, why are some shown as "<1" percent? If these were visually estimated between 0,01% and 0,99% they should be shown as such. If no asbestos fibers were found, they are "ND" or 0%. The <1% regulatory definition of ACM has no meaning here.

The text on pages 93 and 94 attributes nearly all of the soil contamination to the VAT. Table A-13, which is not discussed in the text, shows this to be an exaggeration for the NESHAP building. Dividing sums of the VAT and "other" ACM weights by the sum of the weights of all the original samples gives 90% for the VAT and 10% for the "other," not 98% and 2%. The "other" could have come from the backing on the linoleum or pipe insulation removed in 1999.

If the percents of building debris in Table 6-12 were determined by visual estimation and those in Table 6-13 by weighing the VAT fragments, the numbers are not directly comparable. If they were, one might conclude that the 0.28% mean weight of building debris in the NESHAP soil samples consisted of 0.07% VAT and 0.21% "other" debris. For the AACM samples it would be 0.07% VAT out of 0.87%, with 0.80% being "other" debris. This is not consistent with Table A-13.
Accepting the figures in Table 6-13, rough calculations show that the mean of 0.07% by weight of VAT fragments in the ½" deep post-demolition NESHAP soil samples is the equivalent of 18 ft^2 of VAT, or 0.46% of the total in the building. The AACM amount would be slightly higher. There would also be mastic associated with this debris. *This would seem to be an unacceptable degree of soil contamination regardless of the abatement and demolitions methods used.*

The post-excavation AACM data in Table 6-13 and Figure 6-12 do not match the figures in Table A-13. The latter are identical to those for the post-demolition AACM samples immediately above, except for the number of decimal places. This appears to be an editorial mistake, but it renders comparison of these samples to any other sample set – for what it's worth – difficult.

6.1.5.1.1 Demolition and Abatement Workers -- To compare the entire sequence of both methods,

Table 6-16 should show the exposure of the workers who pre-wet the AACM building. Unfortunately, no worker monitoring was performed during pre-wetting. Therefore, the conclusions at the end of this section are based on an incomplete data set.

6.1.5.1.3 The statement in the second paragraph refers only to the TEM samples. Figure 6-15 is missing exposure data for AACM workers during pre-wetting and the conclusions in the last paragraph reflect this omission.

SECTION 7 STATISTICAL ANALYSES – One of the primary objectives should have been to compare the airborne asbestos TEM concentrations during both demolitions to the background airborne asbestos TEM concentrations and to prevailing urban ambient air levels. Data for the background comparison, shown in Tables 6-5 and A-4, are unfortunately limited in number and all yielded zero structure counts. Still, the null hypothesis that the demolition did not raise airborne asbestos TEM concentrations above background should have been tested separately for both methods. *Rejecting the null hypothesis casts doubt on the advisability of leaving floor tile and linoleum in a building during demolition.*

Data on asbestos TEM concentrations in urban air have been published for many years, including a compilation in the HEI-AR report of 1991. More recent compilations are no doubt available. A statistical comparison of published ambient concentrations to the levels measured during demolition of the buildings would be of interest.

7.1 Primary Objective 1 – This objective compares airborne asbestos contamination during demolition of two buildings with 3,992 ft^2 of non-friable floor tile and its underlying mastic plus 252 ft^2 of linoleum with friable backing. The fact that the 20,700 ft^2 of wallboard in the NESHAP building had been "meticulously removed" had no bearing on contamination levels during demolition, assuming that the abatement, visual inspection and clearance testing were done according to the EEG specification. The wallboard remained in the AACM building but, unlike the NESHAP building, it was saturated and foamed during the demolition. Thus, the variables are the absence of the wallboard during essentially dry demolition (NESHAP) and presence of the wallboard during wet demolition (AACM) with the presence of floor tile, mastic and linoleum common to both.

The statistical analysis dealt largely with the handling of the non-detects -- zero structure counts -- due to the small number of positive samples where at least (and usually) one structure was detected. Thus, the conclusions are based more on what was not found on the filters than what was (barely) found. For no reason other than referencing the QAPP, data from Ring 2 were not used in this analysis, so a value of 0.0015 s/cm^3 during the NESHAP demolition was ignored. The conclusion from the statistical analysis was that the airborne asbestos contamination generated during the AACM demolition was higher than during the NESHAP contamination. *This does not argue well for acceptance of the AACM.* How much the floor tile, fragments of which were found in the soil after demolition, and the linoleum backing contributed to the airborne concentrations is not known but could be significant as it may have affected the results of both demolitions differently. Was the assumption that the floor tile and linoleum would not contribute to the contamination levels, or that it would be the same for both buildings? Either would be a dangerous assumption.

7.2 Primary Objective 2 – The post-demolition NESHAP soil results for Fraction 01 on which this objective depends were questioned in my comments on 6.1.4.2.1. The other pertinent results are the post-excavation AACM Fraction 1 soil results. Table 7-3 shows the soil to be clean by the TEM results, but do the PLM results agree?

The data for Fraction 03 for post-demolition AACM soil and post-excavation AACM soil do indicate a

difference in the average asbestos content by PLM visual estimation: 0.87% for the former vs 0.32% for the latter. (The "<1" values were changed to 0.01 for this calculation.) However, the distributions overlap. In a practical sense, could two inches of depth be expected to have much effect on samples of soil that has been run over by a tracked vehicle?

7.7 Secondary Objective 8 – Table 7-19 does not include samples during pre-wetting of the AACM building because none were taken. Using data from Table A-9, a comparison of the samples during demolition only (without the walkers) affirms that the exposure during the AACM demolition (mean = 0.0098 f/cm³; 95% UCL = 0.0180 f/cm³) is much less than during the NESHAP demolition (mean = 0.0351 f/cm³; 95% UCL = 0.0781 f/cm³). Considering that a wet demolition is being compared to a dry one, this should surprise no one.

The abatement samples should not be included in the comparison. In Table A-10, the "ND" entries for the NESHAP abatement are <0.0017 f/cm³ and <0.0032 f/cm³ with both equal to the limit of detection. Excluding the sample for Worker 5 (<0.0032 f/cm³) because of its very short duration (possibly a pump failure) gives a mean concentration of 0.0621 f/cm³ and a 95% UCL of 0.1424 f/cm³. Although comparison to the OSHA PEL is not an objective, this result suggests that the wallboard may not have been "adequately wet" before removal.

The duration of sampling is unclear. For the NESHAP abatement, an 8 to 10 hr work shift is mentioned in 4.1.1.3.1 and the flow rate for personal samples is given in 5.1.2 as "either one or two liters per minute. An air volume of approximately 480 to 960 liters was targeted for these samples." The data in Table A-10 suggest that the samples were taken during a 10-hr work day. Because these workers had exposure for an entire 8-hr shift and then some, there is no "zero exposure time" by which to adjust their exposure. Based on the sample volumes, ASB-2, 3, 4 and 6 were apparently taken at 2 lpm and ASB-1 at 1 lpm; the 60-L ASB-5 could have been either and probably represents a pump failure. It is unclear from Table A-9 whether the AACM demolition took twice as long as the NESHAP demolition or whether the former samples were taken at 2 lpm and the latter at 1 lpm.

Although "All field blanks had non-detected asbestos concentrations at <7 s/mm," (9.3.1.2) there is no record of blanks for the personal samples taken for worker monitoring having been analyzed by PCM as required by 29CFR1926.1101 Appendix A or by NIOSH Method 7400.

The personal sample results have implications for respiratory protection requirements under OSHA's revisions to 29CFR1926.1101(h)(3)(iv) on August 24, 2006. Demolition of a building with asbestos containing
wallboard is OSHA Class II work. It is Class I if friable materials such as "popcorn
ceilings" are left in the building as contemplated in Exhibit 1, Table 1. In the latter case, the OSHA standard would require the demolition workers to use powered air-purifying respirators until exposure monitoring showed that the PELs were not likely to be exceeded.

7.12 Additional Secondary Objective – There is room in Table 7-15 to add columns for the VAT and other debris before the column "%ACM BY WEIGHT," which I assume includes both. My calculations for the average %ACM (including VAT and other) using data in Table A-13 are reasonably close to the values in Table 7-15 for the post-demolition NESHAP soil: 0.075% vs 0.086%. The data for the post-excavation AACM soil, however, are not in Table A-13, nor are the soil sample weights or VAT/other debris weights (see comment on 6.1.4.2.3). If the lower half of Table 7-15 is correct, the average asbestos content of 0.014% is, in fact, lower than for the post-demolition NESHAP samples. These distributions do not overlap. The question remains, however, whether this is a meaningful comparison. Also, if the post-excavation AACM debris consists entirely of VAT fragments, it constitutes an additional 0.09% of the installed VAT in the building, for a total of 0.61%

that found its way into the soil underneath and around the building. (See comments on 6.1.4.2.3)

SECTION 8 COST COMPARISON – This section documents substantial savings for the AACM demolition over the NESHAP abatement and demolition. These savings were realized with the demolition contractor working under intensive scrutiny by EPA and their designees in the context of a research project. Absent such oversight and with the emphasis on productivity and cost control common to a competitive bidding environment, further savings could undoubtedly be achieved. The costs in Table 8-1 are well-documented in the text and mostly reflect actual or pro-rated charges. I do not challenge them *insofar as they pertain to this specific demonstration*. Table 8-2 on the following page, however, presents my estimate of what it would cost to demolish the AACM building under "real world" conditions.

This table breaks out costs for an owner's representative and a demolition contractor. The Draft Report emphasizes the demolition aspects of taking down the AACM building while down-playing the fact that this work includes removal of ACM from the building and its disposal, making the job an abatement project subject to not only EPA but OSHA and state regulations. Most states that regulate asbestos abatement will require that it be done under the cognizance of an owner's representative independent of the demolition contractor and that plans and specifications be prepared for the work. Some may require the work to be done by a licensed asbestos abatement contractor, an assumption that Table 8-2 does not make. Participation by an owner's representative in the capacity of a consultant and project monitor is required by ASTM E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects as well as the National Institute of Building Sciences *Asbestos Abatement and Management in Buildings: Model Guide Specification.*

Pre-demolition
The NESHAP does not define a "thorough inspection" before a renovation or demolition. The industry standard for such an inspection is not an "AHERA survey" but a Project Design Survey according to ASTM E2356 Standard Practice for Comprehensive Building Asbestos Surveys. The cost of this survey in Table 8-2 has been increased to $3,000 to allow for collection of information to prepare the plans and specifications in addition to collecting and analyzing bulk samples

If and only if the Project Design Survey determines that no ACM needs to be removed by an abatement contractor and an accredited project designer so attests (which could be challenged and subject him to a citation and other liabilities) should demolition by the AACM proceed.

Plans and specifications need to be prepared by the accredited project designer because ACM will be disturbed and removed in the course of demolishing the building. The procedures for pre-wetting the ACM, wetting it during demolition, loading the trucks, disposal at the landfill and all associated cleanup must be described. The cost of preparing the plans and specifications is reduced from the NESHAP figure to $3,500 in recognition that certain activities and requirements for conventional abatement need not be described.

Site mobilization by the contractor has been increased to $5,000 to allow for construction and operation of decontamination facilities for personnel.

OSHA would consider this Class II work under 29CFR1926.1101 and require that the workers receive 8 hours of training and the supervisors an additional 4 hours. This training can be provided by the owner's on-site representative (project monitor), for which a daily rate of $400 reflects the absence of air monitoring services on days while training is being conducted. The contractor's labor rates for 14 workers and two supervisors approximate the $45/hr average in paragraph 8.2.5. The demolition crew will need to be fit-tested for respirators and there are other costs to the employer such as medical

examinations and training associated with a respiratory protection program.

Table 8-2. Adjusted costs for AACM

Cost Item	Cost		
	Owner's Representative	Demolition Contractor	Total
Pre-Demolition			
Project Design Survey per ASTM E2356	$3,000		
Asbestos abatement sections of demolition specifications (Preparation and bidding)	$3,500		
Site mobilization and demobilization		$5,000	
Training - OSHA Class II (8 hrs) for 14 workers ($40/hr)	$400	$4,480	
Training - OSHA Class II (12 hrs) for two supervisors ($50/hr)	$200	$1,200	
Sub-total	**$7,100**	**$10,680**	**$17,780**
Building Demolition			
Preparation oversight and monitoring (2 men, 1 day @ $500/man-day)	$1,000		
Demolition oversight and monitoring (2 men, 2 days @ $500/man-day)	$1,000		
Excavation oversight and monitoring (1 man, 1 day @ $500/man-day)	$500		
OSHA compliance monitoring		$1,000	
Excavator		$2,400	
Labor		$10,035	
Wetting surfactant		$2,165	
Foaming equipment rental		$1,000	
Conductivity testing rental		$500	
PPE (respirators and clothing)		$1,000	
Sub-total	**$2,500**	**$18,100**	**$20,600**
Construction Debris T&D (asbestos and non-asbestos)			
T&D oversight (1 day)	$500		
Transportation		$6,143	
Scaffold for lining of trucks and liners		$7,078	
Asbestos waste disposal		$18,660	
Non-asbestos waste disposal		$2,678	
Water collection and disposal		$570	
Close-out documentation	$500		
Sub-total	**$1,000**	**$35,129**	**$36,129**
TOTAL COST	**$10,600**	**$63,909**	**$74,509**

Building Demolition

Coverage by two on-site project monitors for the first three days of demolition, including air monitoring for the owner's purposes, is shown. This would not be nearly as extensive as during the demonstration and analysis of samples by PCM would be expected. Coverage by one project monitor

during excavation on the fourth day is shown.

The contractor's costs are taken for excavation, labor and wetting surfactant directly from Table 8-1. OSHA compliance monitoring is reduced to $1,000 by eliminating lead – assuming the contractor actually gets it done by a third party (not the project monitor). As it is unlikely the local fire company will send a foaming truck, $1,000 is shown to rent this equipment. The necessary equipment for conductivity testing will have to be rented and this cost is shown as $500.

Construction Debris T&D
One day of project monitor oversight and final close-out documentation are the only costs for the owner's representative, shown as $500 each. The costs for the contractor are taken directly from Table 8-1. Not to dispute that the contractor spent $7,078 on scaffolding during the demonstration for lining the trucks, I question whether they would go to that effort and expense were they not under the watchful eye of the federal government.

Summary of costs
The total cost for the owner's representative is $10,600 and for the contractor is $63,909, for an overall total of $74,509. Instead of the $50,967 (47%) difference between the NESHAP and AACM costs in Table 8-1, the difference in Table 8-2 is $33,822 (31%). The 4,500 ft² floor space is not necessarily the most appropriate basis for calculating unit costs: they could also be figured on the basis of the 20,700 ft² of wallboard or the combined 4,244 ft² of floor tile and linoleum.

Other costs
Two costs of potentially major significance are not shown in either table. It may be necessary, for community relations purposes if no other reason, to temporarily re-locate occupants of buildings in the vicinity of the one(s) being demolished. The size of such a "buffer zone" will depend on many intangibles and affect the costs accordingly. Business interruption and temporary lodging of residents are two of the costs. Also, it may be necessary (or at least prudent) to cover buildings with plastic as shown in Figure 4-16, and to inspect the buildings after the demolition is complete, in a manner that will convince occupants it is "safe" to move back in.

This section concludes by recognizing the competitive factors in the construction industry – including abatement and demolition – that could drive the costs for either approach up or down. A major cost that is not shown as a direct expense in either table is the contractor's general liability insurance. Unless the firm is regularly engaged in asbestos abatement as well as demolition, its insurance will exclude the work required by the AACM. Firms without asbestos coverage, which the owner would be foolish not to require, would not bid and the pool of potential contractors would be reduced.

CONCLUSIONS
The demonstration project did not provide conclusive evidence that the AACM is comparable to current NESHAP methods insofar as the most important metric of airborne fiber concentrations is concerned; in fact, the statistical analysis shows it to be slightly inferior. A major deficiency was the failure to compare fiber concentrations during the demolitions to previously-measured background levels or to prevailing urban concentrations.

To achieve even this level of fiber control required using a foaming method that is beyond the capabilities or inclinations of the contractors who would be doing this work. The "cost savings" are substantially reduced when the expense of adequate preparation, oversight and training are considered. If anything, the demonstration showed that leaving asbestos flooring materials in a building while it is demolished is not advisable, as high concentrations of debris were found in the soil after the both buildings were demolished. The extent to which the presence of these materials in both buildings

affected the airborne fiber levels on which the primary objectives depended cannot be known.

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Mr. Oberta has over 25 years of experience as an asbestos consultant. His work has been internationally-recognized and extensively published and presented. He chairs the ASTM Task Group on Asbestos Management and is the author of the ASTM Manual on Asbestos Control: Surveys, Removal and Management.

The opinions expressed herein are entirely his own and these comments were prepared without financial or other support by, or in collaboration with, any individual or organization. A version of these comments has been posted on his website at www.asbestosguru-oberta.com/aacm.htm.

2.3.9 Needed Research

If EPA plans another AACM research attempt, they should apply lessons learned in their first project:

- Prove that the method works for all materials intended to be left in place during demolition, especially the spray-applied and textured products.
- Prove that the method works for the ACMs to be left in place in all intended building types, e.g., wood frame, steel frame, concrete frame, etc.
- How is release impacted by improper wetting?
- Does this process work for amphiboles?
- Prove that typical asbestos amended water systems work (versus the fire fighting foam systems used in this test).
- How much soil needs to be excavated (3 inches, 6 inches)? How will this depth be accurately measured, given the type of equipment being used?
- Follow all OSHA and local regulations and cite these precisely in the report.
- To get realistic NESHAP costs, put a NESHAP project out to bid initially as a (blind) non-research/oversight project.
- Include costs for bid preparation and site monitoring (non-research) in the AACM budget.
- During site-selection phase, check the soils (TEM structures per gram) to avoid using a site with pre-existing asbestos contamination.
- Focus on TEM analysis of total airborne asbestos concentrations.
- Increase air-monitor flow rates to increase sensitivity and reduce NDs.
- Ensure that the AACM site is kept wet during excavation!
- Costs can be reduced by:
  - Limiting air monitors to a single ring as close as practical to the site.
  - Omitting asbestos air sampling within NESHAP abatement barriers[2].
  - Omitting total particulate measurement.

2.3.10 Considerations for Future Research Methodology

EPA should consider the following with respect to methodology of future research on the AACM method:

- Consider how the outdoor air monitoring should be modified for other geographical/meteorological locations? Should the modeling be adjusted or further tested?
- Recognize the limitations of this research project and consider those in planning future research. This project has proven the AACM effective for drywall systems in one-story wood frame barracks construction.
- Improve the dust fall collection methodology.

[2] In a post-meeting comment, Tom Laubenthal wrote: In Section 2.3.9, the panel suggested omitting asbestos air sampling within NESHAP abatement barriers. It is important to understand that this suggestion does not include omitting OSHA-required personal air sampling.

- Recognize that there is no consensus threshold of exposure for asbestos.
- Test variables (e.g., product types) one at a time so action and response can be completely understood.
- Conduct soil sampling on the NESHAP building both pre- and post-abatement.
- In Section 9 of this report, which notes deviations from the QAPP, provide justification for all deviations, along with a discussion of the impact on research results. Lessons learned should be carried forward to the next research effort.
- Reconsider integrated air sampling. Sampling discrete activities may provide useful information.
- Report abatement clearance samples.
- Specify what measurement criteria will determine "environmentally acceptable."
- Use an AACM-allowable ACM other than wallboard.
- Use a building type other than a small all-wood building. For example, use a building that has:
    - Two stories.
    - A footprint larger than 5,000 square feet.
    - A partial or full basement.

2.3.11 Execution

With respect to future execution of the AACM, EPA should consider and address the following:

- What activities are prohibited (e.g., driving vehicles over ACM)? Develop a list of these activities.
- Given that wetting of the berms was omitted in this research under high scrutiny, what will happen in actual practice?
- Will enforcement be effective? How?
- In the AACM description, address responses to variables that cannot be controlled (e.g., weather; failures, such as breach of the containment berm).

2.3.12 Potential Problems for Real-World Application of AACM

The research report does not address several areas that may restrict use of the AACM, such as:

- Requirement for adequate space (about 25 feet) around the building to contain all the necessary equipment required for this method.
- Buildings nearby protected from fugitive dust.
- Buildings protected from water spray that might contain asbestos.
- Berm: is there space to construct?
- What is berm material to be constructed of and where do you get it?
- How do you remove the berm?
- Is the berm contaminated?
- Poly that covers the berm is contaminated.
- What about the availability of a water source?
- What about space for tank and pump systems for amended water?

- The need for transportation offsite of filtered water when no sewers are present.
- Replacement of topsoil.
- Basements that remain.
- Hard debris cannot be used as basement backfill, a common practice on normal demolitions.
- Metals cannot be salvaged for recycling.
- Hand cleanup of post-excavation debris.
- Difficulty of pre-wetting (e.g., type/condition of asbestos-containing material, type of asbestos, etc.).
- Complications caused by snow or rain.
- For buildings on sites with major elevation changes, berms would be a problem.
- Site closure: determination of project completion.

3. Opening Remarks

Jan Connery (ERG) opened the workshop by welcoming the reviewers (Appendix A) and observers (Appendix D), who included the EPA report authors, other EPA staff, and interested members of the public. Connery asked the reviewers and observers to introduce themselves. Peer reviewers provided background on their areas of expertise and stated that they had no conflict of interest in reviewing the report. Peer reviewer biographies can be found in the pre-meeting comments (Appendix C).

Connery reviewed the meeting agenda (Appendix E). She noted that the pre-meeting comments (Appendix C) were developed by reviewers working individually prior to the workshop. Connery clarified that all workshop discussions would be conducted by the peer reviewers, who would develop conclusions and recommendations as appropriate in areas where their individual opinions were in agreement. Reviewers could request, and observers could offer, clarifications where necessary and relevant. She emphasized that this was a peer review meeting and not a Federal Advisory Committee meeting.

Connery noted that an ERG technical writer was taking detailed notes and would be preparing a summary report of the workshop. ERG would send a draft of this report to all reviewers to check for accuracy and completeness. After incorporating reviewer comment, ERG would finalize the summary report and send it to EPA, who would make it available to the public.

Connery then introduced Sally Gutierrez, Director of the National Risk Management Research Laboratory (NRMRL) under EPA's Office of Research and Development (ORD).

3.1 EPA Remarks

Sally Gutierrez provided the peer reviewers with background on the project. NRMRL's mission is to conduct technology-related research to protect public health and the environment from hazards. NRMRL conducts performance studies of various environmental technologies and attempts to advance the state of the art. The AACM research project is one such project. NRMRL conducted the AACM research project in partnership with EPA Region 6.

Gutierrez thanked the peer reviewers for their participation. She stressed the importance of their input in the development of sound science and welcomed the comments they would provide at the workshop. Gutierrez also thanked her colleagues in R6, other involved parties, and the EPA document authors.

Gutierrez reminded the group that the purpose of the review was to evaluate this particular stand-alone, site-specific (Fort Chaffee) study. She clarified that the study is not an Agency rule-making action, but expressed hope that the Agency will take it to the next level and utilize the research. If EPA decides to move forward and propose a rule-making, NRMRL may contact the reviewers for additional feedback, and will conduct additional research as needed.

Webber asked Gutierrez to clarify whether EPA's intention in conducting the AACM research was to set the groundwork for a future rule-making. Gutierrez responded that the potential rulemaking would need a sound science basis and the AACM report was a component of this basis. Roger Wilmoth (the principal EPA author of the report being reviewed) explained that any rule-making would not be based on this study alone.

A reviewer asked about the role of public comments. Gutierrez responded that EPA will consider the public comments. Wilmoth clarified that the peer reviewers should factor into their review any public comments they think EPA should address.

3.2 Observer Comment

Connery opened the meeting to observer comments. None of the observers at the meeting wished to make oral comments. Andrew Oberta, an asbestos consultant for 25 years, could not attend the workshop in person and had provided comments that Connery read on his behalf. Oberta stated that he could not endorse the AACM. Appendix F provides the full text of Oberta's oral comments.

Connery then turned the meeting over to Jim Webber, the panel chair, to begin the reviewer discussions. Webber informed the attendees that because of the limited time available, the Charge Questions would not be taken in chronological order. The questions that had generated the least pre-workshop comment (Charge Questions 3 and 4) would be handled first because discussion should be relatively straightforward. The bulk of the time (the remainder of afternoon and the next morning) would be devoted to Charge Question 2 because of its extensive responses. Charge Questions 1 and 5 could then be answered on the basis of discussion of previous Charge Questions.

3.3 Reviewer Discussions

Connery then turned the meeting over to Jim Webber, the panel chair, to begin the reviewer discussions. Sections 4 through 8 of this report summarize those discussions, organized by Charge Question. Section 9 presents the closing remarks, in which each reviewer provided his final overarching comments on the review document.

4. Charge Question 4: QA/QC

Was the QA/QC discussion adequate and appropriate? If not, why?

One reviewer expressed concern that the document's consideration of the method's impact seemed to focus on cost-efficiency, rather than public health and worker safety. He was also concerned about the implications of this document for other activities, particularly scenarios in which gravel, chrysotile, and amphiboles are present in the structures.

Another reviewer thought that the QA/QC discussion was appropriate for the study and that the analytic quality was good.

One reviewer questioned whether EPA had addressed all the peer review and public comments on the QAPP. Wilmoth responded that the Agency had received over 100 comments for the QAPP and attempted to address all of them. The Agency posted their response to these comments on EPA's Web site. Agency response for this peer review will also be made available to the public via EPA's Web site.

A reviewer stated that the document was adequate in the area of QA/QC, but expressed concern about the possible implications of moving forward with rule-making based on the study. Since some of the report's end-users would not have a technical background, he recommended that EPA provide further explanation of some elements of the report, particularly the statistics since scientific decisions within this report were made based on statistical analysis.

The reviewers had no further questions or comments concerning Charge Question 4.

5. Charge Question 3: Data Analysis

Were the data analysis procedures adequate and appropriate? Is the statistical methodology and discussion appropriate? If not, why? Make recommendations for improvement.

This discussion began with a reviewer expressing concern about the report's statistical analysis of the airborne asbestos, particularly how the non-detects were handled. He found the presentation to be not sufficiently transparent and wondered how EPA arrived at the non-detects. He also expressed concern that EPA had not looked at the data for separate days and had made the assumption that 0 = 1 in their calculations. He recommended that EPA run the data with either an upper or lower Poisson limit to eliminate 0 = 1 in order to show whether there was a difference. This should allow the Agency to glean more from the results and develop a more conclusive decision. He also recommended that EPA look at the AACM data as separate for two days and compare them. *These comments and recommendations are detailed in the pre-workshop comments* (please refer to page C-63 in Appendix C). The other reviewers concurred with these recommendations. Webber offered to develop a written summary of the above recommendations.

Hays offered to summarize public comments on Charge Question 3 that the panel may want to consider and bring this summary for discussion the next day.

A reviewer expressed concern that the data presented were too complicated for readers to understand, and suggested that EPA develop tables that show the data sets used to draw conclusions (e.g., how the Agency developed the p-value).

Another reviewer asked how the data on the asbestos fiber diameters were presented. Wilmoth replied that EPA has data on this, but did not include them in the report because of the difficulty of extracting the data from the laboratory sheets.

A reviewer noted that fiber diameters can be estimated by subtracting Phase Contrast Microscope Equivalent (PCME) from the total asbestos. According to his calculations, more than half the total asbestos was not PCME, which meant that the fibers were less than 0.2 microns in diameter. He suggested that EPA add one more column describing the asbestos structure diameters and how they relate to microscopy detectability.

A reviewer asked EPA what was the maximum number of structures found in a single sample. Wilmoth responded that four was the maximum, but a few were made up of clusters. He said that EPA referred to International Standards Organization (ISO) 10312 for the reporting convention to use for the asbestos structure counts observed in the air samples. ISO 10312 is a very complex process. Based on this convention, a variety of asbestos fibers were counted as one structure. He acknowledged that EPA is not sure how to represent this and is open to any recommendations.

Webber asked Wilmoth to clarify the ISO rules for complex isostructures, specifically, if under the ISO convention, three fibers are coded as three fibers or one fiber. Wilmoth replied that EPA followed the ISO convention of one fiber. Lauren Drees (EPA), one of the report authors, added

that some fibers cannot be differentiated and, therefore, must be counted as one; in other cases, the individual observed fibers can be counted.

Webber expressed his appreciation of the reviewers' interest in the transmission electron microscopy (TEM) and toxicology factors of the fibers. However, he felt that presenting such information (e.g., listing four structures and the diameters of those structures) would be too complex for the reader. Another reviewer concurred. This reviewer expressed concern about references to Phase Contrast Microscopy (PCM). Webber pointed out that several reviewers had, in their pre-meeting responses to Charge Question 2, pointed out text inaccuracies or confusion concerning references to PCM. He suggested the reviewers discuss these later under Charge Question 2.

A reviewer questioned how the diameter issue would be resolved. Webber responded that, in his opinion, including diameter data would add complexity to the report. Further, the fiber population would be so small that plotting it could result in a potentially inaccurate number of distributions and, therefore, would not be representative of the population. Webber said he would go along with what other reviewers decided (e.g., include a third column that shows the diameter of each fiber seen on each filter).

One reviewer questioned what structures, given the limited number, would be detected by PCM. Webber responded that the panel could recommend that EPA add a few sentences to the text to clarify what percentage of the asbestos structures seen by TEM would have been resolvable by PCM.

A reviewer recommended that EPA not compare the asbestos contamination in soil samples with the definition of asbestos-containing material (ACM) during data analysis. He directed the panel to page 90 of the report and emphasized that ACM is not directly applicable to soil. Webber responded that this issue falls under Charge Question 2 and would be discussed later.

6. Charge Question 2: Conduct of the Research

Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures? Was the research adequately performed and documented?

Because of the complexity and magnitude of Charge Question 2, Webber asked each reviewer to recommend one or two critical issues under this topic for reviewers to address. Discussion began by going around the table to elicit the list of critical issues from each reviewer and note them on a flip chart.

The first reviewer suggested the issue of asbestos removal that occurs prior to implementing the NESHAP method. This was noted as "NESHAP asbestos abatement/removal" on the flip chart.

The second reviewer requested that EPA properly define the NESHAP method, since the research project compared two different methods. This was noted as "Definition of NESHAP standard."

The third reviewer expressed concern about the study design and site selection. He understood the concept of using two identical buildings, but not in the woods of Arkansas. He believed that the scenario was not realistic, since the setting was not in an urban area; therefore, the data cannot be extrapolated to a city scenario. He also expressed concern that the study was not repeatable. This issue was listed as "Test set up not applicable to real world scenario."

The fourth reviewer suggested that the report's cost analysis be closely evaluated. He said the report seriously overestimated the cost of abatement, which affects the cost comparison between the two methods. This issue was listed as "Abatement cost is way overstated." He also expressed concern about the uncontrolled variables in the study, such as drywall, floor tile, and soil. He recommended that the study consider what differences a variable would make. This issue was listed as "Issue of multiple uncontrolled variables."

The fifth reviewer was concerned about the pre-existing concentrations in soil, which was noted as "Concern about pre-existing soil contamination." on the flip chart.

The sixth reviewer recommended that the report provide references for federal documents and include a list of bibliographies, where applicable. He recommended that EPA provide more extensive resource documentation. This issue was listed as "References for particular applications." He also expressed concern about work practices issues, some of which were raised by public commenters. This issue was listed as "Work practices within document, particularly as relevant to OSHA guidance." He was also concerned about research application and EPA's recommendation of the ISO method in characterizing chrysotile fibers. This was listed as "Chrysotile project in the woods."

Webber then opened up the floor for additional issues. The first reviewer suggested the issue, "AACM application of amended water and collection of amended water during process." He also expressed concern that the project's air sampling activities focused on fugitive emissions. In

normal asbestos abatement, air sampling is performed in a completely different manner, which was not discussed in the report. This issue was listed as "Pre-demolition air sampling."

The third reviewer expressed concern about the quantities created during demolition that would now be considered ACM, and requested that the reviewers address cost comparison issues associated with transport to and disposal in a landfill. The panel identified this issue as "Cost of total disposal: primary two costs: trucking and disposal; small cost: getting building ready for trucking and disposal."

Reviewers added two issues "Complexity of monitoring for real world AACM since going toward rulemaking" and "Comparison of how air levels compared to historic ambient air levels *(de minimis)*." A reviewer noted that the *de minimis* issue was previously discussed.

Webber noted that reviewers had identified 14 issues to discuss under Charge Question 2. Reviewers then ranked items according to importance. The following three issues were ranked most important:

- Concern about pre-existing soil contamination.
- AACM application of amended water and collection of amended water during process.
- Abatement cost is way overstated.

These three issues were discussed first. At the end of each issue discussion, one or two reviewers were asked to prepare straw written conclusions and recommendations based on the discussion. These would be discussed, modified, and finalized by reviewers on the second day of the workshop.

6.1 Concern About Pre-Existing Soil Contamination

Webber began the discussion on this issue by referring to his pre-meeting comments (Appendix C, pages C-62 and C-64):

> Page C-62: The Report concludes that TEM concentrations of asbestos in soil from the post-excavation AACM site were significantly lower than for the NESHAP post-demolition site. While this is the case, the existence of pre-contaminated soils clouds any conclusions about the effectiveness of the AACM versus NESHAP. In fact, a logical explanation is that AACM soils were cleaner because its excavation procedure simply removed pre-contaminated soil that had existed at both sites.
>
> Page C-64: Figure 6-11 clearly shows high "background" levels of asbestos in soils, which complicates any evaluation of post-work asbestos-in-soil concentrations. In fact, the preexistence of asbestos in soil enhanced AACM because the pre-contaminated soil was left at the NESHAP site. *This pre-existing contamination is not discussed in §3.3.3 and is omitted from Table 3-4.*

One reviewer questioned the source of the contamination. John Kominsky (EPA) responded that the contamination resulted from pipe removal, specifically from the thermal insulation of the

piping (amosite was in the elbows). The soil was excavated down to about six inches, and the area under the building was thought to be clean. This was not mentioned in the report because the information was provided by a contractor and therefore viewed as speculative.

A second reviewer expressed concern that EPA is basing its knowledge on speculation and did not know exactly what was in the soil. Kominsky responded that the Agency does know that the soil was excavated to a level of cleanliness that was acceptable by the military. He clarified that no floor tiles were found in the excavated soil.

Another reviewer questioned the choice of buildings used in the study. Kominsky explained that Fort Chaffee was chosen because of the isolated location and because the buildings met the following minimal criteria: they were 1,000 feet from the closest occupied building; the buildings and their interiors were identical; and the same meteorological factors affected both buildings.

A fourth reviewer noted that the issue of pre-existing soil contamination is a primary concern because it prevents any real conclusions from being determined about what is left in the soil after either method.

Another reviewer raised the question of whether excavating two to three inches of soil was adequate for the AACM method. He thought the Agency had not characterized the soil sufficiently beforehand.

Webber referred to his pre-meeting comments (Appendix C, page C-64). He pointed out that the soil conditions were hardly discussed in the report. Because of this, the Agency cannot accurately address issues regarding percolation, penetration of fibers, etc. He emphasized that the pre-existing contamination clouds any conclusions of efficacy.

A reviewer pointed out that not adding amended water during excavation introduced another confounder. As a result, the Agency does not know how much asbestos was in the soil and where it came from exactly. The fibers that became airborne during the excavation just add to the confusion.

Webber asked when EPA knew about the soil contamination. Wilmoth informed the reviewers that the Agency learned about the soil contamination prior to the research effort. Each sampling event included taking 300 samples and then compositing those 300 samples into ten samples to characterize the soil. Wilmoth noted that EPA is receptive to any recommendations for a better way to conduct the sampling, given that EPA was not completely satisfied with the sampling process either. He clarified that EPA did sampling for the AACM both after demolition and excavation; for NESHAP soil sampling, however, EPA considered abatement and demolition as part of the NESHAP process.

A reviewer expressed concern that if an abatement was poorly done, then EPA could not separate that contamination from what was added during the demolition. Wilmoth responded that, in this instance, the debris was all floor tile and, therefore, was from the demolition and not the abatement, since it was not there before.

A reviewer asked why, although EPA had many staff monitoring this project, no one had noticed that amended water was not used (as required in the QAPP) during excavation on the third day. Kominsky explained that it rained considerably on Day 1 and the soil was reaching saturation point. On Day 2, the soil was completely saturated, and by end of Day 2, the soil was "soup." Therefore, EPA decided not to add amended water. Wilmoth added that that, ultimately, the contamination came from removing the berm, which had begun to dry up toward the end of Day 2, and not from removing the saturated "mucky" soil.

Another reviewer noted that this demonstration was a research project and, therefore, was closely scrutinized. He questioned what would happen in the real world with less scrutiny. The real issue is applying resources in the real world. Wilmoth agreed that there is always that risk, and provided an example of a worker not using a respirator in an abatement situation.

Webber noted that the critical difference between the respirator and berm scenarios is that the worker without the respirator is only risking his own health. Webber recommended that reviewers save the discussion on implications for real-world application until later. Webber offered to develop a summary of the discussion that will include the conclusion that EPA improperly addressed pre-existing soil contamination, resulting in an unknown impact on the positive results of the AACM versus the NESHAP methods.

6.2 AACM Application of Amended Water and Collection of Amended Water During the Process

Webber initiated discussion of this topic by saying that it was inappropriate of EPA to discuss the drinking water standard of 10-micron fibers, because the 10-micron length was based on studies of rodents that drank long-fibered asbestos and developed nonmalignant polyps in the colon. No one on the job site would be drinking any asbestos-containing water. The real issue is the airborne entrainment of any asbestos that is left in soil after a job is done; a 10-micron cut-point is irrelevant to airborne asbestos regulations. Webber recommended that 10 microns be deleted from the report. The panel concurred. This recommendation can be found in Section 2.2.4.

A peer reviewer said that the biggest problem with the amended water system is finding buildings in the real world that have sufficient area around them to build a berm, collect the water, drain the water, and ensure that the water is clean before dumping it somewhere. Realistically, if the site is in, for example, downtown Philadelphia where the next building is within arm's reach, the question arises of how to set up the berm and keep the water contained. Without a space to operate, the contractor is going to use the old method of using minimal water.

Another reviewer discussed how AACM was executed in the report and noted the excellent quality of the equipment (e.g., Kidde fire-fighting equipment was used) and foaming agents, and the extensive and comprehensive wetting process. However, in the real world, this process would not be used correctly unless a well-written regulation was in place, guidance documents and training programs were available, and an enforcement program was implemented. In a low-bid situation, the Agency would need a requirement that is extremely explicit, since most contractors

would not have the resources to purchase and maintain the AACM utilized equipment. This reviewer was very concerned that workers could be exposed during the process if the wetting procedures were not utilized as demonstrated by this study.

Another reviewer expressed concern that the Agency did not specify what kind of contractor should do this job, specifically whether the job should be performed by a demolition contractor or a certified asbestos worker. Since these two types of contractors are in two separate unions, this would not work in the real world. However, the reviewer added, the biggest issue is that collecting amended water would not work in most urban environments.

A reviewer discussed the issues associated with using the amended water system at home sites, particularly water accumulation in the basements. Contractors would have to implement certain pumping techniques and handle contamination resulting from the demolition process. In other words, contractors would be responsible for removing all the water, cleaning up the dirt, concrete, and stone, and managing the runoff, while contending with the additional complication of substructures. The reviewer questioned how thorough a cleanup would be for such a complex scenario, especially in a low-bid situation.

One reviewer noted that some places allow the practice of using backfill to fill the basement areas. However, in this scenario, backfill could not be used because it is contaminated. The average contractor may then decide that it is more economical not to use the water system and choose to remove and handle the asbestos according to standard demolition practices.

Another reviewer remarked that there are two issues of concern: 1) collecting the water and 2) how the water would add to the soil burden (one could not determine how much water added to the soil burden in this study because of pre-existing soil conditions). When berms contain water, the questions arise of how much asbestos burden the water is adding to the soil after it evaporates and how much soil should be excavated.

A reviewer brought up splashing as another issue. Since splashing increases dust levels, the reviewer suggested making the berms even wider to ensure that all the water is collected. However, he acknowledged that space constraints, as previously noted, could make this difficult. Splatters could also hit the house or building next door, which could be an even bigger problem if the windows were open. The reviewer expressed concern that the water system would require more room than is available, which leads to the question of how EPA would manage the spread of water. Wilmoth responded that, for this demonstration, water was pumped out of collection area using sump pumps, put through a filter, and then collected in a large tank. This entire process took place in an onsite area, since the Agency's goal was for the water to never leave the site.

One reviewer reiterated that an urban environment would need enough space to set up the water program, and expressed concern that if a contractor could not get the water sufficiently clean to discharge it into the sewer line, they would need to dispose of the contaminated water (e.g., put the water into barrels and take it to a suitable disposal site). Wilmoth responded that no regulations exist on disposing asbestos-containing water, so a contractor would have to filter the contaminated water (i.e., no regulations exist other than a filtration requirement). Wilmoth

stressed that EPA does not intend for AACM to take the place of the NESHAP method; in some scenarios, contractors would preferentially use NESHAP due to certain constraints. In response, one reviewer discussed a narrow buildings scenario in which a scaffold frame could be erected and polyethylene could be used to protect the adjacent buildings. A contractor would probably not choose AACM in this situation. Wilmoth reiterated that EPA intended AACM to supplement, not replace, the existing NESHAP method.

Kominsky clarified that splashing occurred mostly in one place, the truck loading area where canisters were loaded within two feet. Wilmoth remarked that the splashing led the Agency to believe they needed more room. Originally, the Agency tried to keep the monitors as close to the demolition as possible, but they ended up being a little too close. Kominsky explained that the Agency had used a dispersion model to determine the monitoring location that would provide the maximum measurement of concentration. He added that EPA had to find a balance between being sufficiently close to monitor effectively, yet far enough away so as not to affect the monitoring equipment, including the practical consideration of knocking the equipment over.

One reviewer questioned the wetting agent foam that the Agency selected to use in the research project. Wilmoth responded that EPA chose a wetting agent that is widely used in the fire-fighting industry. Since the Agency is not an expert in this area, they deferred to the fire-fighting industry's choice of wetting agent. Wilmoth clarified that EPA used certain materials for research that would never be used in a real-world application. For example, the Agency used a pump for this demonstration, but a contractor would use an eductor in a real-world situation. Also, a contractor does not need to guarantee concentrations as accurately as EPA does. For research purposes, the Agency was looking to guarantee a 1 percent mixture of the wetting agent; the goal was to guarantee, rather than optimize, the concentration.

The reviewer asked what would happen if plain water were used instead of a surfactant. Wilmoth responded that EPA would like to think it would make a difference, but he did not know for sure. Tests on amended water have indicated lower levels of asbestos in the work area; therefore, using amended water through the abatement process would result in less asbestos concentrations in the workplace. EPA would be hard pressed to find the mixture called for in the guidance, so they chose a wetting agent they knew would work.

Another reviewer questioned EPA's use of materials different from those used in real-world application, and asked if AACM would work to control releases. Wilmoth responded that EPA would need to conduct another test using real-world conditions. This research project was the first time the Agency conducted a study like this; the goal was to see if the method would work (i.e., proof of concept). The Agency conducted the study in the "middle of nowhere," so no one would be harmed. Since the Agency has determined that the method works, they can now conduct a study in a more "real" environment.

Webber asked Laubenthal and Dokell to summarize the reviewers' recommended criteria for amended water, including criteria on water collection and soil penetration, and a statement that the drinking water standard of 10 microns is irrelevant.

6.3 Abatement Cost Is Way Overstated

Regarding this issue, a reviewer remarked that the consensus within his company and with two external colleagues, both of whom have background in this area, is that this nine-day project is actually a three- to four-day project in the real world. The process should not take so long or cost so much. He expressed concern that the scrutiny that this demonstration was given because it was a research project resulted in changes to normal contractor behavior. Therefore, the Agency should not directly compare this demonstration with a real-world application, and should not conclude that AACM has half the cost of the NESHAP method.

Webber asked Wilmoth to clarify whether the Agency informed the contractors that this was a research project when they put out for low-bid. Wilmoth clarified that the contractors knew that EPA would be "looking over their shoulder," but the nine-day schedule was from the low-bid (for $65,000).

One reviewer asked whether an abatement contractor bidding blind (not knowing it was an EPA research project) would be alarmed when driving up to the site and seeing EPA monitoring personnel. Another reviewer responded that it would be no problem since most contractors had a reverse gear in their trucks.

Wilmoth asked the above commenter what would be a reasonable timeline and cost. The reviewer responded that, for identical conditions, he estimated three to four days (less if not under research scrutiny) and about $30,000. A second reviewer concurred, stating that it also depends on union versus nonunion situations. The second reviewer thought the work could be done for less than $30,000 ($20,000 in some areas).

Another reviewer pointed out that the size of the building could influence cost in the real world (e.g., it would increase monitoring efforts, etc). As the building gets bigger, the cost of the two methods becomes closer; AACM could be 80 to 100 percent of the NESHAP cost.

Webber summarized that abatement costs in the report are overstated, and the AACM costs are understated.

A reviewer stated that the abatement costs normally include disposal and removal. AACM would require disposal of the entire building because all the materials would be contaminated. Disposal costs are 300 to 3,000 percent of abatement costs; therefore, although AACM abatement costs are lower, there would be additional disposal costs later.

One reviewer asked EPA if the abatement debris was put in metal drums for disposal. Wilmoth responded that the abatement contractor did use metal drums, but clarified that the Agency did not specify what disposal techniques were required. The reviewer requested that EPA clarify in the report that bids were taken and that drum usage could increase costs. Webber requested that the reviewer prepare a written summary of these issues.

Another reviewer asked the Agency to clarify who the project designer and overseer would be for the private sector. Kominsky responded that EPA used an Arkansas consultant and had a

licensed contractor supervisor who was separate from the project designer. Kominsky acted as the project overseer.

One reviewer expressed further concern about the cost of the work practices, such as removing drywall. He noted that the Fort Chaffee contractors chose practices, such as drums for disposal and latex paint as an encapsulant, that were not common practices and went far beyond what was necessary. This artificially prolonged the process and inflated costs and should be reflected in the report. Webber added that EPA should also include costs that were not reflected in the AACM evaluation (i.e., not included in the cost estimate table), such as oversight of these practices.

Webber asked Laubenthal to develop a short list of work practices that would influence cost, and Hays and Polanco to develop a write-up on cost differential.

One reviewer added that cost estimations could be skewed, given the area in which this research project was conducted. The Agency took three bids in rural Arkansas, where contractors do not have extensive expertise in asbestos removal. Bids taken in areas with more expertise could affect costs.

Wilmoth questioned Webber's comment on requiring oversight of the project and its work practices. On page 139 of the report, "Asbestos abatement oversight and monitoring" is considered "not applicable" for AACM. A reviewer responded that a disinterested third party should be present at any job site where ACM is being disturbed, and that EPA guidance, standards, and training programs recommend third-party oversight and visual inspections. He believed that EPA did not include this provision for AACM in order to avoid some costs. However, state specifications would insist on this oversight and the associated additional costs.

A reviewer asked what constitutes completion of cleanup, which requires third-party oversight, since the potential for abuse is substantial. Another reviewer said that the NESHAP method included oversight and monitoring, per general industry practice.

A reviewer asked if EPA was on site at all times. He noted that one of the costs under the NESHAP method was eight laborers, and questioned what these eight laborers did. Kominsky replied that they were hose operators, truck drivers, etc. The reviewer asked how far the landfill was from the site. Wilmoth responded that the landfill was between 5 and 10 miles from the site. The reviewer replied that a landfill is usually 30 miles away. Webber requested that Hays consider distance of landfill in his write-up.

Webber noted that reviewers had discussed the three issues they had ranked as most important, so they would now begin discussion of the remaining issues.

6.4 Work Practices Within the Document, Particularly as Relevant to OSHA Guidance

Regarding this issue, a reviewer stated that NESHAP demolition of a building with ACM is regulated by OSHA. Floor tiles are considered Class II asbestos work and require the use of respiratory protection. However, on page 46 of the report, the Agency states:

> No respirators nor protective garments were worn by the workers since this is not required by the NESHAP or the OSHA regulations.

The reviewer noted that this statement is completely wrong, and referred to one of his pre-meeting comments (Appendix C, page C-54):

> Apparently there is a belief that in the NESHAP demolition method, where the facility to be demolished may contain asbestos-containing floor tile, the exposure to asbestos is unlikely since no respiratory protection nor protective garments were used as stated in the third paragraph of page 46 and shown in figures 4-17 through figure 4-20. See attached document from OSHA.

Wilmoth clarified that the Agency had not known this.

A second reviewer responded that, although NESHAP regulations do not require the use of respiratory protection, OSHA has regulations requiring the use of personal protective equipment (PPE) when ACM is disturbed. In the absence of a negative exposure assessment, PPE (including appropriate respiratory protection) would be required. To show that respiratory protection is not required, the contractor needs to provide historical data or extensive air sampling data, or show that asbestos levels are below the permissible exposure limit (PEL). The reviewer did not want the statement in the report to be misconstrued by the end-user, and recommended that EPA clarify the language so that it clearly stated that the NESHAP requirements do not undermine the OSHA requirements.

A third reviewer requested that EPA define by reference the regulations under which they expect these methods be performed. He noted that the photos of respirator use provided in the report were inconsistent and incorrect. Wilmoth responded that OSHA representatives were invited to the site but did not show up. Another reviewer added that Arkansas is not an OSHA state, but is under the state Department of Environmental Quality.

Webber confirmed that workers will have to wear personal protection equipment (PPE) at an AACM site if ACM is still there. He recommended that the statement be clarified and also requested that the panel consider what cost implications this would have for AACM. A reviewer responded that most likely it will increase the cost. The reviewer reiterated that EPA needs to clarify the sentence and referred the reviewers to Table 1 on page 6 of the report, which lists the materials that must be removed prior to demolition. ACM can still become friable, even if wet. If there is no negative exposure assessment based on days of sampling and if workers do not wear PPE, then they have violated OSHA standards. Wilmoth emphasized that AACM requires that all workers wear PPE.

Another reviewer stressed that the worker protection rule, which includes respirator protection, applies to all government (federal, state, county, city) employees. All workers are covered either directly under OSHA or by reference to OSHA under the EPA worker protection rule, so they must wear PPE.

Webber noted that the outcome of this discussion would be a rewording of the respirator statement on page 46. A reviewer added that the wording in Exhibit 1, Sections 7.0 (Monitoring Requirements) and 8.2 (PPE) (on pages 7 and 8 of the report) is too broad for the requirements to be understood. He stressed that this is really an OSHA issue rather than an EPA issue, but recommended that EPA be more explicit in those sections (i.e., provide more step-by-step guidance). Wilmoth responded that EPA is very receptive to suggestions for changing language. Laubenthal volunteered to write up recommendations for the statement on page 46, Table 1, and the OSHA references.

6.5 NESHAP Asbestos Removal Abatement

Webber pointed out that discussion on the issue of "NESHAP asbestos removal abatement" had already taken place as part of the discussion of "Abatement cost is way overstated" (see Section 6.3, above).

6.6 Definition of NESHAP Standard

Polanco began this discussion by referring the panel to recommendations he had made for the report's executive summary. These recommendations can be found in the pre-meeting comment booklet (see Appendix C, page C-53):

> I would suggest the first paragraph of the Executive Summary be modified to read as follows (underlined are suggested changes): The Asbestos NESHAP (National Emission Standard for Hazardous Air Pollutants) requires the removal of All Regulated Asbestos-Containing Materials (RACM) prior to the demolition of the buildings that fall under the auspices of the NESHAP. This removal process is a costly and time-consuming endeavor and contributes to the growing crisis of abandoned buildings in this country <u>while providing protection to workers and public health in the demolition process</u>. The Alternative Asbestos Control Method (AACM) allows Asbestos-Containing <u>Gypsum wallboard</u> to remain in the building during demolition. In addition to leaving the <u>Asbestos Containing Gypsum board</u> in the building, the AACM process differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste.
>
> The last sentence of the first paragraph should be deleted because the use of respiratory protection and protective garments would be required also in a NESHAP demolition project in the presents of Asbestos-Containing Floor Tile "category I non-friable ACM" in accordance with the "Occupational Safety and Health Administration" Construction Industry Standard 29 CFR 1926.1101 (Class II Asbestos Worker).

Since these changes concerned the executive summary, Webber suggested that reviewers address them on the second day of the workshop when they discussed Charge Question 1. Polanco expressed concern that the report creates confusion about what NESHAP and AACM are.

A reviewer recommended that the panel use Polanco's suggested language to correct places in the body of the report where inaccuracies occur. For example, in Section 1 of the report, page 1, footnote 1, which reads:

> Under Asbestos NESHAP[§61.141], RACM means friable asbestos material, Category I non-friable ACM that has become friable, or Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by forces expected to act on the material in the course of demolition.

…should be replaced with:

> Under Asbestos NESHAP [61.141], RACM means (a) friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material on the course of demolition or renovation operations regulated by this subpart.

Polanco noted that the Agency omitted "sanding, grinding, cutting, or abrading" from the definition of Category I. Wilmoth replied that this omission was a typographic error.

Polanco continued that the second footnote, which reads:

> Asbestos NESHAP [§61.145(a)] requires that if the following amounts of RACM are present in a facility, these materials must be removed prior to demolition: (1) At least 260 linear feet on pipes, or (2) at least 160 square feet on other facility components, or (3) where the amount of RACM on pipes or other components could not be measured before stripping, a total of at least 35 cubic feet from all facility components in a facility being demolished.

…should have the following added to it:

> Also, under 40 CFR 61.145 (c) ACM has to be removed if: (1) it is Category I nonfriable ACM that is in poor condition and is friable or (2) it is Category II nonfriable ACM and the probability is high that the materials will become crumbled, pulverized, or reduced to powder during demolition. (These regulations may be supplanted by more stringent local governmental [state, city, etc.] regulations that govern such activities.)

A reviewer said that should this research project be used toward rulemaking, the Agency would need to use accurate NESHAP language. The reviewer emphasized that EPA would really need to enforce NESHAP, and make certain that the entire report is accurate and consistent with existing regulations. For example, EPA would need to define Category I and Category II, and ensure that "RACM" is used in the correct context. The Agency would need to address removing linoleum and floor tile prior to demolition since most states require that practice. For this research project, the Agency would need to clarify that floor tile may be left in the building in Arkansas, while other states consider this a violation of their regulations. If the EPA elected to

leave these materials in place for the AACM, they should explicitly explain that this was their choice for the purposes of the study.

Webber requested that Polanco and Dodson review these issues and prepare a write-up. Dodson questioned using the state requirements, since some cities (e.g., New York City) have stricter guidelines. He recommended developing a comment that required using the most stringent regulations, whether they are state, city, etc. He noted that all Category 1 materials need to be removed.

6.7 Test Setup Not Applicable to the Real World

Webber began discussion on the issue by stating that panel dialogue had already given some indications of how the Fort Chaffee test setup is not applicable to the real world, specifically the limited area available in urban environments to set up an amended water system. He asked the panel to describe other situations of concern.

A reviewer responded that EPA recommended that a berm be set up at least 25 feet from the building. This would not be realistic in major cities, since that much space is often unavailable.

Another reviewer commented on the difficulty of applying research activities to the real world. Webber replied that research applicability would be addressed separately.

A third reviewer remarked that the size of the footprint of the site and building versus the volume of debris would be a cost-controlling factor. Cost would depend on how much debris the contractor needed to haul to the asbestos landfill. This would be a practical limitation from a cost standpoint that is related to the volume of debris (the larger the building, the more debris) that needs to go to the landfill. Another reviewer agreed, stating that, if faced with the option of hauling one truckload of asbestos that was removed prior to demolition (NESHAP) versus 59 truckloads of asbestos-containing debris (AACM), 59 truckloads would not be cost-effective. The third reviewer added that this issue falls under the real-world application issue, and expressed concern that if mistakes were made under the “research bubble,” then the extent of mistakes would only worsen in a real-world situation.

A reviewer remarked that there are some situations where AACM would be a good system. He referred to a public comment received from the Houston Independent School District. Most school buildings have a lot of asbestos and average one to two stories high. Most school buildings also have room for berms, and so could easily handle an amended water system. As long the building is not too big and the landfill is not too distant, AACM would economically work for this scenario. The reviewer recommended that the demolition contractor develop two internal bids, one for NESHAP and one for AACM, to determine which method would be more economical. Another reviewer replied that he believes that schools would not solicit two bids; they would choose AACM because that method appears easier. The other reviewer replied that the contractor would do the cost comparison internally, even if it were not solicited by the school.

A reviewer remarked that EPA needs to address the issue of public health and environmental outcomes, specifically protection of the surrounding properties. The Agency has only tested AACM (i.e., leaving ACM in a structure) in a one-story building in the woods. This is a real-world applicability problem.

Webber noted that many variables exist in each category, and asked each reviewer to identify a few applicability issues. The reviewers would then pool these issues together on the second day of the workshop.

6.8 References for Particular Applications

On this issue, a reviewer recommended that EPA expand the use of references in the report. The Agency should reference all federal documents, cross-reference any regulations, and include laboratory credentials. For example, when the report discusses using respirators as approved under worker practices, the Agency should reference the specific OSHA regulation. The Agency should also provide references for models and methods when including them in a research project (e.g., TEM Specimen Preparation). Another reviewer suggested that they could also include academic documents. The first reviewer added that expanding the use of references would support the project conclusions and strengthen the report.

Webber questioned the appropriateness of including the cost of the research in the report—not in terms of the AACM versus NESHAP budget, but rather what it cost the EPA to conduct the study. He decided this issue was not worth pursuing.

6.9 Chrysotile Project in the Woods

A reviewer expressed concern that the study was conducted on small wooden buildings that contain chrysotile in an isolated location in the woods. This raises all types of variables that the panel had already discussed (i.e., friable materials, amphibole-containing materials). The reviewer referred to a previous reviewer's comment on a school situation in which the building was constructed of brick. The previous reviewer replied that many schools are constructed of brick, while newer schools are often constructed of materials such as board and aluminum. He proposed using a brick school scenario, such as the Houston Independent School District, to perform a side-by-side comparison, since that situation would better represent a real-world situation.

6.10 Pre-Demolition Air Sampling

A reviewer expressed concern about the sampling rings. In most asbestos abatement, industry standards call for air sampling immediately adjacent at any opening to the work area. The report did not provide evidence of work practices during air sampling or indicate whether air samples were above "normal" (e.g., above clearance levels or the PEL) at waste load-out areas, decontamination areas, or areas immediately adjacent to containment, where concentrations are typically higher. The reviewer said that EPA will not get accurate readings of actual air concentrations if samples are not taken in these areas. Webber responded that the report focused on a completely different goal for AACM. The Agency focused on environmental sampling (e.g.,

those who live next door), and not worker exposure. Therefore, the sampling rings were appropriate.

Wilmoth added that extensive worker monitoring was involved (e.g., drivers). The reviewer responded that the workers were under-sampled from an OSHA compliance perspective, in terms of number of days, etc. Wilmoth replied that the Agency only did the monitoring that was listed under their quality assurance plan, and that the contractor did conduct additional OSHA monitoring and then analyzed the data on site for their own purposes. However, EPA did not use the OSHA data, since they could not verify the accuracy of the numbers as they were not involved with this sampling. The reviewer recommended that the report include a sentence stating that additional OSHA compliance monitoring was conducted but not included in the report.

Another reviewer expressed concern that pre-sampling was not done close enough in time to the actual methods prior to conducting the abatement and/or demolition. He thought it would have been helpful to have a significant number of air samples before the demolition (e.g., to see what the ambient background air levels were). Drees (EPA) emphasized that the background samples were taken the day before the methods were conducted (six samples) and also in January. The reviewer replied that the weather was bad the day before, and that pre-sampling before this disruption (e.g., three to four days before) would have been better. He also noted that pre-sampling in January was too far in advance. Wilmoth responded that nothing was detected at any point in the pre-sampling. The Agency used multiple rings and multiple heights for sampling, and the gross majority were still non-detects. Webber disagreed with the reviewer regarding the extra background sampling, since the study focused on comparing emissions between AACM and the NESHAP, and not the two methods with the background.

Reviewers briefly discussed potential airborne releases from the NESHAP method before Webber closed the background level issue for discussion.

6.11 Cost of Total Disposal: Primary Two Costs: Trucking and Disposal; Small Cost: Getting Building Ready for Trucking and Disposal

Webber pointed out that discussion on this issue had already occurred under “Abatement cost is way overstated” (see 6.3, above).

6.12 Complexity of Monitoring for Real-World AACM Since Going Toward Rulemaking

A reviewer began this discussion by saying that he was surprised no one chose this issue as a discussion priority. He believes this is a main concern, since the issues that have to be considered in monitoring to ensure compliance with such tight regulations would be exhaustive and expensive to address. These issues include identifying what safeguards are in place to ensure that contractors do not take any shortcuts. This requires independent third-party oversight, as well as determining certain specifications for the method (e.g., How wet is wet? Is the material sufficiently saturated? Is removing three inches of soil enough? Did the contractor not see the visible emissions?). He said that the AACM allows for too many variables, and that NESHAP is more specific and easier to monitor (i.e., contractors must construct barriers, remove the ACM,

conduct air sampling, deconstruct barriers, etc.). AACM allows for many potential shortcuts (e.g., inadequately watering down the interior, not using amended water, breaching the berm, hose breaking, truck tires inadequately washed off, poly containers improperly sealed).

Another reviewer said that AACM depends primarily on water suppressant of dust (i.e., how the water is controlled and contained). The question is how to monitor this method in varying site conditions, and how to ensure that this method is done properly.

A third reviewer stressed that AACM cannot be done properly without oversight. He noted that the original concept was to apply AACM to a house; now the concept seems to have evolved to applying the method to a strip mall or old hotel. He expressed concern whether contractors would be wetting every square inch of those larger buildings before demolition. He asked what constitutes clean work and who makes this determination. Another reviewer followed up with the question of how to evaluate completion. A reviewer responded that completion has three elements: 1) proper execution (that was based on a properly written work methodology), 2) best execution under unusual conditions (i.e., proper handling of any problems), and 3) determining that the project is done (i.e., how do we know when the site is clean).

A reviewer noted that currently Class 1 and Class 2 asbestos work is left to qualitative determination (e.g., white glove test). This creates an issue of how to accurately describe what is qualitative (e.g., stipulate no vinyl floor clumps?). He asked if a quantitative determination should be developed.

Another reviewer responded that the only quantitative way to determine site cleanliness is ambient air monitoring (all the ACM gets hauled away in a truck). A reviewer added that this monitoring would be reactive and not proactive. If the contractor conducts ambient air monitoring (TEM), the process would take at least six hours, at which point neighbors would have already been exposed if the levels were high.

Webber asked the panel how they wanted to proceed with this issue. Wilmoth responded that this issue was not something the Agency had asked the panel to address, though the Agency appreciates the panel's input. He wanted to ensure that discussion of this issue did not detract from discussion of areas delineated in the charge. He asked if the panel would focus first on the research issues, rather than the methodology. Webber responded that the reviewers found this issue important, and recommended that EPA consider the panel's input in this area, particularly in relation to any future rulemaking.

A reviewer pointed out that the issue of complexities of monitoring for real-world AACM is related to other issues and would be covered in other discussions.

Regarding the standard of completion, Gustavo Delgado (Forensic Analytical) hoped that reviewers would not focus only on AACM, since NESHAP is not doing a good job in this area either.

6.13 Issue of Multiple Uncontrolled Variables

This issue was discussed under "Complexity of monitoring for real world AACM since going toward rulemaking."

6.14 Transition to Second Day of the Workshop

Toward the end of the first day of the workshop, Webber ended the discussions and asked reviewers to spend some time working in small groups to create summaries of the day's discussions, including straw conclusions and recommendations for discussion on the second day of the workshop. Webber began the second day of the workshop by asking the reviewers if they had any discussion issues they wished to add.

A reviewer asked that the *de minimis* issue be discussed. Webber replied that his understanding of the study's intention was to compare the two methods rather than make comparisons with *de minimis* concentrations, so discussion of *de minimis* in the report was not appropriate. A reviewer remarked that if EPA keeps the *de minimis* discussion in the report, then *"de minimis"* needs to be defined. If EPA is not willing to include a definition, then the *de minimis* discussion should be removed. Two other reviewers concurred. Webber emphasized that the report should focus on comparing the NESHAP and AACM site airborne concentrations. He volunteered to develop a straw recommendation on this point for subsequent review by the panel.

Webber asked if EPA has discussed any future studies, and expressed concern that this report addressed only one scenario that worked with a narrow set of variables. A reviewer responded that a list of issues from this study would help develop future studies.

Webber then chaired a series of discussions where panelists reviewed, refined, and finalized the straw written materials developed at the end of the first day of the workshop.

6.15 NESHAP Definitions

The changes recommended by Polanco and Dodson to the NESHAP definitions in the footnotes on page 1 of the report were presented to the reviewers. Webber asked if the panel agreed with these changes. All reviewers concurred. These recommendations are presented in Section 2.2.2 of this report.

6.16 Pre-Existing Soil Contamination

Webber presented his straw conclusions regarding soil contamination. He suggested an editorial change (i.e., add "es" to the word "process" in number 2 to make it "processes"). The panel had no comments on and concurred with the conclusions regarding soil contamination. These conclusions are presented in Section 2.3.3 of this report.

6.17 Statistical Evaluations

Webber then presented his summary on statistical evaluations, which included several recommendations: 1) EPA should go further with the data and use a different approach when evaluating non-detect data (Section 7.1.1); 2) EPA should garner more from the data, since the QAPP did not specify a 90-percent, non-detect cut-point approach (Section 7.1.1); 3) EPA should glean more from the data by comparing Day 1 and Day 2 data instead of combining them for analysis (Section 7.4); and 4) for each statistical analysis, the Agency should provide a summary table for nonparametric analysis data (i.e., a brief table detailing how the ranking calculations determined any statistical significance) (see Table 1 [Asbestos in Settled Dust] and Table 2 [Airborne Asbestos] in Webber's pre-meeting comments for an example. (These tables can be found on pages C-65 and C-66 of this report.) The reviewers concurred with these recommendations, which are presented in Section 2.3.4 of this report.

6.18 Phase-Contrast Microscopy (PCM)

Webber presented his summaries on fiber diameters and PCM, and recommended that these two comments be combined into one bullet point since they were both closely related. All peer reviewers discussed and approved these recommendations, which are presented in Section 2.3.5 of this report.

One reviewer stated that Table 5-2 on page 69 of the report includes a typographic error. For PCM (NIOSH 7400) Perimeter air, "but not less than 10 fields must be counted" should instead read "but not less than 20 fields must be counted." Reviewers agreed to recommend this change.

6.19 Abatement Cost Is Overstated

Hays summarized this issue in four parts, as documented below. The final conclusions and recommendations for this issue are presented in Section 2.3.6, "Abatement Cost Issues."

Cost analyses are difficult

Webber presented Hays' summary on "Abatement cost is overstated" and began discussion on his first topic, "Cost analyses are difficult."

Hays clarified that he also referred to a public comment that discussed this issue (Giguere, item 20). Polanco requested that his pre-meeting comment be included (on page C-55 of the pre-meeting comments, Appendix C):

> I agree that the cost for the demolition of these two buildings are very site specific and may vary at other sites (Section 8.4 page 139). The cost associated with asbestos abatement in the NESHAP Building #3602 does not reflect the real cost of the national asbestos abatement industry including excessive cost for abatement specifications, asbestos abatement by a licensed contractor as well as asbestos abatement oversight and monitoring. The cost of the AACM demolition should be about 75 to 80 percent of the

cost of the of the NESHAP demolition for a 4,500 sq. ft. building under the conditions specified in the project.

Hays also requested that his pre-meeting comments be added (items 6, 7, and 8 on pages C-19 and C-20 of the pre-meeting comments in Appendix C):

> 6. Cost analyses are difficult at best when attempting to draw actual practice conclusions from research data. Human behavior changes when "under the microscope." This affects test results and cost estimates. What would have been the difference in costs if this work had been competitively bid in actual practice rather than as part of a research project?
>
> 7. In the cost analysis for the AACM method, were appropriate charges added for time and materials to wet the soil before excavation, even thought this was inadvertently omitted from the test?
>
> 8. It is intuitive to me that the NESHAP building abatement took much too long. This raises the question of whether the abatement was overkill in design. Similarly, if the design was appropriate, was the execution gold plated? This would affect cost, and may have affected sample results.

Webber had one concern regarding this item of Hays' list: "All bidders undoubtedly added a 'US Government' factor to their bids." Webber requested that the panel bolster that statement with the clause, "which is common practice to all bidders" to make it more diplomatic. Hays added "Common practice in the industry is to add a cost increase factor when bidding government work" to the beginning of the statement.

All the peer reviewers approved the recommendations under "Cost analyses are difficult" as revised by the discussion. These recommendations are included in Section 2.3.6 of this report.

The cost for the AACM is underestimated

Webber began panel discussion on the next issue, "The cost for the AACM is underestimated," with this item on Hays' list: "See Herker, Item 8." Webber clarified that this item referred to a public comment that stated that EPA's cost comparison of the NESHAP versus wet methods was seriously flawed, since the comparison was based on the erroneous assumption that the AACM building did not include ACM that would require abatement prior to demolition.

Webber agreed with Herker that the table should not list the NESHAP abatement costs for the AACM building as "not applicable" but should instead include the cost of the pre-demolition NESHAP abatement of friable ACMs. Webber said that these costs should have been a factor because the ACM had been pre-abated. Hays added that although the amount of ACM pre-abated for each method was underdetermined, this item was still a cost that was not accounted for.

A reviewer commented that although the cost of berm construction was not itemized, this cost was probably included within the cost of equipment and man-power labor. Hays replied that EPA should confirm whether this was so.

Reviewers approved the recommendations, which are presented in Section 2.3.6 of this report.

Hays mentioned that Oberta rewrote Table 8-2 (included in Section 2.3.6 of this report) to indicate what the costs should have been. The panel agreed with Oberta's changes and recommended that the Agency consider all of Oberta's comments (as stated in Section 2.3.8 of this report).

Many issues of application in actual practice would influence the cost of the AACM

Webber began discussion on Hays' issue on "Many issues of application in actual practice would influence the cost of the AACM." Webber suggested an editorial change (i.e., change the word "huge" to "major"). Webber requested that Hays change a sentence to read, "At some point, the increased landfill costs *likely will* cancel the other savings afforded by the AACM," since the panel cannot predict what is probable.

A reviewer replied that landfill costs will eventually cancel out the savings of AACM if the truckloads of debris for disposal reach a certain amount. Hays replied that this is one of the most important cost considerations of AACM. As a building gets bigger, disposal costs increase as the amount of debris and truckloads increase. Another reviewer agreed that the sentence should read "will," not "will likely." Webber stated that he would agree to whatever the other reviewers recommended, and suggested that "other savings" be changed to "any savings." The reviewers agreed to the following sentence: "At some point, the increased landfill costs will cancel any savings afforded by the AACM."

Webber asked that the recommendations include an item on soil conditions because the contractor may deal with unknown soil conditions, such as a clay or sand situation (e.g., the contractor may need extra plastic if the site is on sand). Hays suggested adding "(e.g., soil composition)" to the item "Site size and conditions which influence the methods to contain water," making it read: "Site size and conditions (e.g., soil composition) which influence the methods to contain water."

Hays asked the panel if the term "composition" should be added instead of "conditions." Webber replied that "composition" should not be used in this context since "composition" implies conditions that are unchangeable.

One reviewer commented that the panel could go further with the recommendation on VAT removal, since some states specifically regulate the removal of VAT and asbestos-containing drywall systems. The reviewer suggested adding "all ACMs" or "Category I or Category II materials." Webber responded that this study specifically discussed wallboard and VAT so his suggestion would be to add "wallboard" to the sentence. Webber informed reviewers that they can address the broad context of Category I and II materials later. The reviewers decided to add "wallboard systems" to the sentence so that it read: "Some state and local jurisdictions would require wallboard systems and VAT removal before demolition."

All peer reviewers approved Hays' recommendations and the discussed changes on "Many issues of application in actual practice would influence the cost of the AACM," which are presented in Section 2.3.6 of this report.

Additional items that added unnecessary costs to the NESHAP abatement

Webber recommended that the items under "Additional items that added unnecessary costs to the NESHAP abatement" be incorporated into the section "The cost for the AACM is underestimated." Webber also suggested that the last sentence on Oberta's comments ("Comments by other selected public reviewers which are not addressed by Mr. Oberta should also be given responses."), should be deleted since any issues that were included will be addressed. All peer reviewers approved these changes.

6.20 AACM Amended Water Delivery and Collection Issues

Webber presented Laubenthal's summary on "AACM Amended Water Delivery and Collection Issues." One reviewer commented that the summary needs wordsmithing. Editorial suggestions included:

- Under "Space limitations," replace the word "erection" with "construction" when describing berms.
- Under "Space limitations," replace "problem" with "one of the biggest problems."

All reviewer approved Laubenthal's summary on "AACM Amended Water Delivery and Collection Issues" and the discussed changes. The final text, as amended by the discussion, is presented in Section 2.3.1 of this report.

6.21 AACM OSHA Issues

Webber presented Laubenthal's summary on "AACM OSHA issues." The panel recommended the following changes:

- Edit the first paragraph (e.g., remove the "a" before "Class II asbestos work," put "Class II asbestos work" in quotes, change "may want to delete" to "should delete").
- Edit the second paragraph (e.g., replace "very careful to properly cite" with "should properly cite," change "address required OSHA-required" to "address OSHA-required")

Webber asked Laubenthal to verify that Section 4.4.1 was the correct section number for this topic. Laubenthal referred the panel to page 46 of the report for confirmation.

Laubenthal asked if training should also be mentioned with work practices under OSHA's 29 CFR 1926.1101, since citing the particular OSHA requirement has the implication of the training requirements. He recommended that the statement be changed to include training. The panel discussed the best way to address this and agreed to add "and controls (training, etc.)" after "work practices."

All reviewers approved Laubenthal's recommendations on "AACM OSHA issues" and the discussed changes. The final recommendations are presented in Section 2.3.2 of this report.

6.22 Potential Problems for Real-World Application of AACM

Webber presented Dokell's recommendations on "Real-World Applicability" and recommended that the title be changed to "Potential Problems for Real-World Application of AACM."

Webber requested that the wording be changed for the first item, and suggested changing "around building" to "building's entire perimeter." Dokell disagreed with this suggestion because buildings are rarely set back 25 feet. He said that the perimeter on the sides of the building often accounts for the 25 feet. Webber expressed concern about space for berm construction. Dokell replied that the perimeter requirement is not so much for the berm construction but more to ensure that all the equipment operates within the designated space. Webber recommended deleting "very little chance of space availability" from the end of the sentence, since it is implied in the first part, and adding "Requirement for" to the beginning of the sentence. Dokell agreed with his suggestions. The reworded sentence reads: "Requirement for 25 feet of space around the building."

Dokell added that berm construction for most city applications would require the contractor to purchase berm material and then bring it back to the site. Hauling the material 10 to 15 miles would be very expensive. Once the material was brought back to the site, a contractor would need to construct the berm and then remove the berm after the demolition was over. Removing and disposing of a contaminated berm would be an additional expense. Dokell continued discussing his list and agreed with the following suggestions that were made by other reviewers:

- Change "Poly that covers the berm: Is it contaminated?" to "Poly that covers the berm is contaminated."
- Change "What about water source?" to "What about the availability of water source?"

Dokell stated that the average contractor would have issues with obtaining water for use in the AACM, and would decide to remove the ACM using the NESHAP method. Wilmoth responded that the contractor would still have to wet the ACM if they used the NESHAP method. Dokell replied that it would not be to the same extent. One reviewer questioned Dokell's item on amended water, and Dokell clarified that the contractor would have to bring in the amended water and the pumps and find a place to put them. The process would require constructing scaffolding to fill up the trucks. In a real-world situation, there would be no place to build the scaffolding, and the process to fill the trucks would result in worker exposure.

One reviewer recommended combining the bullets on water into one bullet. Webber recommended that the two bullets on amended water and erecting water pumps (i.e., "What about amended materials location?" and "Is there space to erect pumps?") be combined to create one bullet: "What about space for tank and pump systems for amended water?" Webber recommended that the bullet on water disposal include a statement that takes into account sewer availability (i.e., If no sewer is available, where would a contractor dispose of water containing short [5-micron] asbestos?). One reviewer noted the absence of a sewer would cause logistic

difficulties and drums would have to be used. Webber remarked that a contractor would need to use a septic truck. Dokell replied that regulations exist on using a septic system in this capacity, so logistical issues would be involved for this disposal method as well. Application and disposal issues would make AACM impractical in most inner-city situations.

Webber recommended that the bullet be changed from "Disposal of water: where?" to "Need to collect and transport water off site if no sewer is available."

One reviewer suggested specifying "sanitary sewer" to prevent confusion with "storm sewers." Another reviewer questioned the existence of regulations on asbestos discharge, specifically if asbestos discharge was covered under the Clean Water Act. Wilmoth replied that, to the best of his knowledge, no regulations exist on the discharge of asbestos in water. Webber said that, regardless of any regulations, the filtered water may not be dumped on land because the water still contains some asbestos. Regulations for sewer disposal are not known, but dumping on land is not allowed and would cause a reentrainment problem. One reviewer added that that no property owner is going to want to dump the water on the land. Webber recommended that the bullet emphasize the sewer situation and suggested this wording: "The need for transportation offsite of filtered water when no sewers are present."

EPA requested that reviewers refer to the specific data when discussing comments. Webber replied that this would be unnecessary, since the panel's focus is potential problems.

Webber questioned the listed item on dirt disposal. Dokell replied that 6 inches of dirt were removed. He expressed concern that the depth of 6 inches was arbitrarily picked and that the removed dirt would need to be replaced. Webber remarked that 3 inches of soil is the minimum for removal, and that 3 to 6 inches would not have a significant impact. Dokell pointed out that normal demolition does not require dirt removal. Webber responded that this activity was already factored into the AACM and included in the bid; therefore, this point is unnecessary.

A reviewer posed a question on site fill, asking if the contractor is required to grade the site flat. Dokell responded that, under the NESHAP method, the lot must be graded off. Under the AACM, replacing dirt would be expensive. The contractor would need to replace 3 inches of top soil, which would increase costs. Webber suggested that the bullet "Disposal of dirt under and around the building" be changed to "Replacement of top soil."

Webber asked Dokell to clarify what kind of material he is referring to in this bullet: "Material airborne at site." Dokell responded that the hoses force materials off the site. A reviewer pointed out that this was included in a previous bullet, so Dokell suggested that his bullet be deleted.

Webber questioned whether Dokell's bullets on amended water issues should be left in his recommendations, since Laubenthal already discussed amended water issues in his recommendations. A reviewer recommended keeping them, but suggested broadening them by just stating "Basements that remain" so that the issue covers water, debris, etc. Webber concurred.

A reviewer questioned what “hard debris” means in the bullet “Separation of hard debris not possible.” Dokell explained that contractors often take the concrete and brick after the demolition to fill in a basement. Prior to filling the basement with the hard debris, contractors break the basement floor so that it drains. The contractor would need to take the asbestos out of the basement so that it would not leach out. Significant costs would be associated with removing the asbestos-containing hard debris and then bringing in other backfill. Reviewers suggested that the bullet be changed to “Hard debris cannot be used as basement backfill.”

Webber asked Dokell about this item: “What about pipes?” Dokell explained that metals cannot be salvaged for recycling. A reviewer responded that the pipes could be salvaged before demolition in AACM. Dokell replied that the contractor would need to use the NESHAP method to salvage the pipes.

Webber suggested combining the two bullets on metal (“What about pipes?” and “What about metal ferrous or non-ferrous?”) into one bullet: “Metals cannot be salvaged for recycling.”

Webber asked Dokell if his bullet on “Loading of debris: space to wrap? Must be on site to contain” was redundant. Dokell replied that he had discussed this issue in the context of disposal. Webber suggested deleting the bullet.

Webber asked Dokell to clarify his bullet on “Hand cleanup of asbestos.” Dokell explained that contractors need to pick up small pieces by hand; those performing the task are no longer labor workers but asbestos workers. Webber clarified that all materials would be considered contaminated and, therefore, would need to be removed. A reviewer added that workers doing this task must be trained. Wilmoth said the site would be unlikely to have any remaining materials to clean up by hand. Webber asked about the floor tile that was left at the AACM site, and said it was probably demolition residue.

A reviewer pointed out that, in the state of Georgia, regulatory personnel routinely walked demolition sites to look for evidence of debris that had been left behind. Leaving floor tile behind is considered a visible emission and illegal dumping in the state of Georgia. This relates to the issue of what constitutes completion.

Wilmoth clarified that only a small amount of debris was left behind at the NESHAP site and even less at the AACM site. The debris was in the form of tiny fragments, so it was not possible to pick them up by hand.

Dokell said that slabs of concrete would require hand cleanup, either by a small Bobcat-type loader or by hand.

Webber summarized that reviewers concur that an inspection should done at the end of any demolition to ensure that no debris is left behind. He suggested changing the bullet to “Hand cleanup of post-excavation debris.”

Dokell discussed the item he had listed concerning decontamination of equipment. In normal demolition situations, contractors would not have to decontaminate their equipment; however, in an AACM situation, this would be required at an additional cost.

A reviewer responded that Dokell's list should not compare the two methods but only present potential problems. Webber suggested removing this item and adding it to Hays' list of additional costs. Webber also suggested removing his items on truck decontamination, basement backfill costs, and landfill distance, since they have already been discussed. Dokell remarked that a long haul to the landfill will result in a big cost difference. Webber questioned if this should be considered a cost issue. Webber suggested including a clarifying sentence at the top of Dokell's list that says, "Report research does not address several areas that may restrict use of the AACM, such as:" Hays noted that the issue of landfill distance was already addressed on his list.

Webber noted that truck decontamination is already included in the AACM. Dokell responded that a site is not going to have enough physical space (i.e., not going to have 25 feet) to include all the required equipment for demolition and decontamination. The contractor would need to use part of the street, and this would require permission from city, resulting in the contractor reverting back to normal demolition methods. Webber pointed out that the first item covers this issue.

A reviewer questioned whether truck decontamination was another variable in the adequate space issue. Webber recommended that the first item include both variables: 25 feet for the truck and 25 feet for the equipment and decontamination. Another reviewer remarked that the recommendation does not need to dwell on "25 feet." Dokell recommended using the term "adequate space." Webber therefore recommended that first item be changed to "Requirement for adequate space (~25') around the building to contain all the necessary equipment required for this method."

Webber recommended moving the bullets on decontamination of equipment and trucks after loading to Hays' list.

A reviewer stated that the item on "Extra cost to use asbestos worker" is not an issue. Another reviewer questioned whether obtaining asbestos workers would be an issue. Dokell replied that using asbestos workers increases costs, not because they remove the asbestos, but because they do spraying and cleanup. Another reviewer responded that training costs should not be a factor because NESHAP workers are already trained to use asbestos. Dokell responded that the cost increase is a payroll issue, not a training expense issue. A reviewer explained that, under NESHAP, asbestos workers are only involved in the abatement process and the demolition is performed by demolition workers. AACM, on the other hand, uses asbestos workers during demolition, resulting in additional costs.

Webber reiterated that these recommendations should not focus on costs and recommended that the four bullets on cost (i.e., asbestos worker, monitoring, amended water, pumps) be moved to Hays' list. Dokell noted that availability of asbestos workers is not an issue.

One reviewer commented on Dokell's bullet regarding the difficulty of pre-wetting. He noted that this becomes a major issue in the presence of amphiboles and, therefore, suggested adding "(e.g., type/condition of asbestos-containing material, type of asbestos, etc.)" to this item.

A reviewer questioned Dokell's item: "If you remove thermal insulation: how much is left?" Dokell explained that once thermal insulation is removed, not much ACM remains. Contractors would most likely remove the small amount of remaining ACM (e.g., floor tile), instead of going through the effort of using the AACM. The reviewer responded that this is a cost issue. Webber recommended that this item be moved to Hays' list.

A reviewer questioned Dokell's item: "Snow or rain." Dokell responded that snow or rain complicate the process, since they would add more water to a contaminated area and the contractor would be required to handle additional contaminated water. Webber suggested that the item be changed to "Complications caused by snow or rain."

Webber recommended that the item "Extra PPE" be deleted since it is related to cost.

Webber suggested that "Site closure" be changed to "Site closure: determination of project completion."

Dokell noted his item, "Worker decontamination: needs space." One reviewer responded that this list already has a bulleted item regarding a space issue. Webber remarked that worker decontamination is a small issue compared to the space issue for trucks, berms, and other equipment, which is already covered in the first bullet. Webber recommended the item for deletion.

Dokell emphasized that berms would be a problem on sites with elevation changes. Webber agreed.

One reviewer stated these issues are potential real-world problems. Enforcement is going to be a problem for government agencies. Webber replied that government issues constitute a different list of recommendations that would contain two items: 1) writing regulations so that they are specific enough and (2) enforcement.

The panel approved Dokell's summary on "Potential Problems for Real-World Application of AACM" and the discussed changes. The final version is presented in Section 2.3.12 of this report.

7. Charge Question 1: Executive Summary/Conclusions

Do the executive summary and conclusion adequately reflect the findings of the research for the subject buildings and are they supported by the data in the report? Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions? If appropriate, please make suggestions on how the summary/conclusions may be improved.

Webber read Charge Question 1 on the executive summary and conclusions, and requested that the peer reviewers begin the discussion. One reviewer expressed concern on a NESHAP issue, which he had addressed in his pre-meeting comments. He requested that this comment be addressed in the executive summary. Another reviewer had similar comments.

Polanco referred the panel to one of his pre-meeting comments (see Appendix C, page C-53) and to the executive summary on page 17 of the report. He recommended adding the underlined text in his pre-meeting comments to the executive summary, as follows:

> The Asbestos NESHAP (National Emission Standard for Hazardous Air Pollutants) requires the removal of <u>All</u> Regulated Asbestos-Containing Materials (RACM) prior to the demolition of the buildings that fall under the auspices of the NESHAP. This removal process is a costly and time-consuming endeavor and contributes to the growing crisis of abandoned buildings in this country <u>while providing protection to workers and public health in the demolition process</u>. The Alternative Asbestos Control Method (AACM) allows Asbestos-Containing <u>Gypsum wallboard</u> to remain in the building during demolition. In addition to leaving the <u>Asbestos Containing Gypsum board in the building</u>, the AACM process differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste.

Polanco added that this recommendation correctly addresses the requirements under NESHAP. He also suggested deleting the last sentence of the first paragraph of the executive summary, because the use of respiratory protection and protective garments would also be required in the NESHAP project. Webber clarified that the sentence states that AACM requires a list of things during the demolition process, including respiratory equipment.

The reviewer responded that NESHAP requires that all RACM, not most, be removed, and that, for this project, AACM allows gypsum wallboard to remain in the building during demolition.

Another reviewer remarked that the report should not specifically mention gypsum wallboard because other materials are also listed under NESHAP. The original reviewer responded that the executive summary should be specific to this project and that specifically mentioning gypsum wallboard is necessary. Webber suggested changing the sentence to clarify that "gypsum wallboard" is referring to this research project only (e.g., replace "the AACM project" with "*this* AACM project"). However, Webber stated that the intention of the authors seems to be that AACM allows materials other than gypsum wallboard and referred the panel to the list of

materials in Table 1, “Asbestos Removal Requirements of AACM.” Wilmoth provided “pipe wrap” as an example.

One reviewer said that if the material becomes friable, then it should be taken out, according to the federal definition. The original reviewer emphasized that his intention for this change was based on this particular research, which specifically left gypsum wallboard in the building. A reviewer suggested changing the term “gypsum wallboard” to “gypsum wallboard system” to be inclusive of the joint compounds, since the wallboard itself is usually not asbestos-containing.

Webber asked the reviewers if they approved the insertions requested in the first suggestion. One reviewer expressed concern that the wording before the insertion is actually the issue since it is also an insertion and requested that issue be dealt with first.

Another reviewer questioned the documentation for “this growing crises of abandoned buildings,” specifically if the documentation is anecdotal. He recommended that the Agency support that statement with documentation based on data. Webber recommended that the Agency provide a reference (e.g., a statistics report) for this statement.

The reviewer further emphasized that the executive summary should be specific to the research project and not be a general comparison of the two methods. Webber suggested including a statement after the first AACM sentence—“The Alternative Asbestos Control Method (AACM) allows most of the RACM to remain in the building during demolition”—that explains that in this particular research project, the gypsum wallboard system was left in place. Webber stated that including “gypsum wallboard” in the first AACM sentence would limit the executive summary and that the second sentence can be specific to this demonstration project. Therefore, Webber recommended changing the original comment:

> The Alternative Asbestos Control Method (AACM) allows Asbestos-Containing <u>Gypsum wallboard</u> to remain in the building during demolition. In addition to leaving the <u>Asbestos Containing Gypsum board in the building</u>, the AACM process differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste.

to the following:

> The Alternative Asbestos Control Method (AACM) allows *certain asbestos-containing materials* to remain in the building during demolition. In addition to leaving the Asbestos Containing Gypsum wallboard *system* in the building, the AACM process *in this study* differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste.

Two reviewers questioned if the term “allows” is appropriate in regard to AACM since the study is testing the method. Webber responded that the use of “allows” is appropriate.

The original reviewer then commented that respiratory protection does not differ between the two methods. Webber agreed and suggested that the last clause on the use of respiratory protection be removed. The other reviewers concurred.

One reviewer recommended changing “the removal process *is* a costly and time-consuming” to “the removal process *can be* a costly and time-consuming” and used a debris scenario as an example (i.e., removing some floor tile can be inexpensive versus hauling off numerous loads of debris). Webber agreed and suggested that the Agency make the change.

Another reviewer concurred that debris often becomes a major issue, and provided a small building scenario as an example. Demolition of a small building results in a small number of debris loads. A contractor is then faced with either spending one day removing and taking the debris to any landfill or hauling the debris to a special landfill and paying extra for disposal there.

Another reviewed clarified that “all” should be included before “Regulated Asbestos-Containing Materials” in the first sentence, but not capitalized.

Webber constructed an opening statement for the peer reviewer recommendations for Charge Question 1 (i.e., “The panel recommends replacing the initial paragraph of the executive summary with the following:”)

Hays requested that the panel discuss the *de minimis* issue further. The panel had previously recommended removing the *de minimis* discussion from the report. Wilmoth said that the Agency would find further discussion on this topic useful. Hays pointed out that the research project focused on the NESHAP and AACM methods; in order for EPA to discuss and declare *de minimis,* they should be required to define *de minimis* and discuss background levels on a national level. The tone of the *de minimis* discussion in the report seems to portray that although statistically the AACM level was slightly higher than the NESHAP level, this difference is acceptable because both concentrations are very low. He did not believe there is enough consensus on a “no risk threshold,” which is related to *de minimis* (which he believes is more of a legal term than a scientific term). He requested that the panel refer to his pre-meeting comments for his recommendation (Appendix C, page C-20):

> The summary spends considerable text on the issue of *de minimis* concentrations. This question is not a stated objective of the research. What is *de minimis* is not defined by a consensus in the scientific community as it relates to health effects and is the topic of much continuing debate. Health effects and health risk are not part of this research project, and the report offers no support other than the opinion of the authors for declaring the concentrations to be *de minimis*. The insertion of a conclusion on a topic which was not a research objective gives grounds to question whether a research bias or hidden agenda exists. I am not suggesting that bias or a hidden agenda exists, but in the interest of factual scientific reporting, I recommend that this discussion be removed.

Webber suggested that the panel wordsmith the *de minimis* discussion. A reviewer suggested evaluating under what context *de minimis* was being used in the report. The author of the above comment expressed concern that no basis was given and stated that the Agency needs precision. Without it, the *de minimis* language the Agency used appears to establish something that was not established.

Webber suggested incorporating his pre-meeting comments with the above comment by Hays. Hays requested that his statement on removing the discussion be deleted.

Another reviewer was concerned that the research project tests two different models and that any suggestion of all-inclusive conclusions based on this project may result in controversy. The reviewer stressed that the Agency should emphasize that the report only contains findings specific to this research project.

One reviewer reiterated that no consensus of a *de minimis* definition has been established in the "asbestos" world. In response, Wilmoth suggested that the panel provide a definition. Webber suggested that the *de minimis* discussion seems to be out of place in the executive summary, but may be appropriate later in the document. Two reviewers responded that the *de minimis* discussion would be out of place in any part of the report. Webber proposed that the panel recommend that any discussion of *de minimis* be removed from the report. The other reviewers concurred.

One reviewer questioned what should replace the *de minimis* discussion. Another reviewer recommended including a discussion that compared the levels with the literature-based range for ambient levels. A third reviewer supported this recommendation and remarked that such a discussion will have higher value and applicability in the model.

Webber asked the panel if they had any other issues and provided a recap of what the panel had discussed under this Charge Question (PCM, statistical analysis, cost, and *de minimis*).

One reviewer expressed concern about the clarity of the report, since the report has 25 objectives but only a few are discussed in the executive summary. He recommended that the report note that the objectives discussed in the executive summary are the most important objectives. He suggested replacing "Secondary Objectives" on page xviii of the report with the statement, "The most significant secondary objectives are," to inform the reader that there are other objectives in the report that are not discussed in the executive summary.

Webber confirmed with the peer reviewers that they had no more issues for discussion under Charge Question 1. He closed the discussion on Charge Question 1 by recommending that after the Agency modifies the report in response to panel comments, they change the executive summary accordingly. The final recommended changes under Charge Question 1 for the executive summary are presented in Section 2.2.1 of this report.

8. Charge Question 5: Other Comments

For each question, provide your reasoning for agreeing or not. Provide any other comments that serve to improve the document:
a) Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?
b) Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

Webber began the discussion on this Charge Question by posing three questions for the panel's consideration:

1) What type of rulemaking will result from this research project?
2) What type of regulatory oversight and monitoring will be required?
3) If another demonstration is performed, what has the Agency learned from this demonstration and what advice can the peer reviewers add to it?

A reviewer added that these questions have two subparts: 1) methodology (i.e., How could the research method of the next demonstration be improved?) and 2) agenda (i.e., What other variables could be researched?). After some discussion, the reviewers agreed to form two subgroups to discuss: 1) suggestions for future AACM research and 2) methodology.

Regarding monitoring, one reviewer suggested that completion criteria should be developed that include, among other things, more work practice monitoring to maintain project integrity and to ensure, for example, that the contractors are wetting everything that needs to be wet and collecting the appropriate depth of soil.

Another reviewer remarked that the panel's general message on the research method is that the project needs more specificity on how to perform the work and how to know when it is complete. The peer reviewers concurred that the report should be amended to add more means and methods and other details (including prohibitive actions), whether for the next research project or any subsequent rulemaking.

One reviewer questioned how to ensure regulatory provisions. Another expressed concern that the provisions would be further complicated by state requirements.

A reviewer pointed out that visible emissions will occur no matter what practices are used; what matters is *what* you are seeing (e.g., the emissions could just be sheetrock dust). The only way to monitor emissions is to set up a monitoring system around the site to capture and then analyze particles.

Webber assigned three peer reviewers (Webber, Dodson, and Dokell) to the future research subgroup and the remaining reviewers (Hays, Laubenthal, and Polanco) to the methodology subgroup. The panel then broke into these subgroups for about 30 minutes, after which they reconvened to review the straw recommendations each group had developed. These recommendations were displayed on screen during the discussions and modified based on

reviewer comment and areas of agreement. The final conclusions and recommendations are presented in Section 2 of this report.

8.1 Executive Summary

Webber initiated the discussion by recommending that the Agency include a statement in the executive summary to prevent the report from being construed as a model for future AACM work. A reviewer suggested that this statement assert that the demonstration is a research project for a certain methodology and therefore should not serve as a template for future demolition activities. Another reviewer concurred, adding that EPA should clarify that the report is not a guidance document.

Webber suggested that the panel craft a sentence to recommend to the Agency. A reviewer emphasized that the research project should be used for providing additional information for future assessments and should not be used as a model for methodologies. He suggested the following sentence:

> This is a research project for comparison of AACM and NESHAP demolition processes. The intent is to compare information; not to provide a different template for future work practices that differ from those that are governed by existing regulation. The EPA does not endorse the use of the AACM as an approved method for demolishing buildings with regulated asbestos-containing materials.

The other reviewers approved this statement and recommended that it be inserted at the end of the second paragraph of the executive summary. (See Section 8.4, below, for further discussion on this recommendation.)

8.2 Suggestions for Future AACM Research Projects

Webber asked the panel to review the straw recommendations developed by the subgroup on suggestions for future AACM research. (These recommendations, as modified and finalized based on the discussions below, are presented in Sections 2.3.9 [Needed Research], 2.3.10 [Considerations for Future Research Methodology], and 2.3.6 [Abatement Cost Issues] of this report.) Webber recommended including a disclaimer with these recommendations stating that they were not all-inclusive.

Webber asked panelists to review the variables the subgroup on future research had listed and provide any additional ideas. Regarding air monitoring, Wilmoth expressed concern about a subgroup recommendation to elevate volumes and asked how much lower the panel recommended going, given that the analytical sensitivity was already down to 0.0005 asbestos structures per cubic centimeter of air (s/cm^3). Webber responded that the panel suggests going as low as necessary until the Agency can eliminate more of the non-detects.

One reviewer explained that in the monitoring process, increasing the air volume will increase sample loading. Another reviewer explained that this is the easiest way to increase analytical fastidiousness and remarked that the process involves common sense, specifically that different

scenarios would have different needs (e.g., an urban environment would not call for pulling up 5 L/minute of air, but a rural scenario would). He noted that the analytical process goes very fast if all the grid openings are blank.

Wilmoth expressed concern that the finite demolition time constrains the volume of air that can be analyzed. The only way to meet the recommended levels in a finite demolition time would be to grossly enlarge the number of grid openings counted. Webber clarified that the panel is recommending that the Agency maximize the flow rate of the pumps as much as possible. Wilmoth requested that the panel reword their suggestion to reflect that request. Webber referred Wilmoth to the draft recommendation which stated: "Increase air-monitor flow rates to increase sensitivity and reduce non-detects."

The peer reviewers discussed flow rate restrictions. Filter distribution degradation occurs at higher flow rates and, therefore, the flow rate should not be increased over 10 L/min. Wilmoth pointed out that the Agency is faced with some practical constraints: The largest flow rate the Agency can use with the 0.45-micron filters is 8-9 L/min, as the pump cannot go much higher than that. Wilmoth also explained that the Agency does not want to go to filters with a pore size of 0.8 microns because data show that counting errors would result for the smaller fibers.

Webber recommended that EPA increase the flow rate to 8 L/min to improve sensitivity. He noted that the reviewers are offering these recommendations, based on what they have observed in the field, to help EPA produce a more definitive answer. Wilmoth explained that EPA viewed anything lower than 0.0005 asbestos structures per cubic centimeter of air as inconsequential. Given that view, Webber responded, the panel recommends not using the term "*de minimis.*"

Webber asked the reviewers to suggest any other systems or ACMs that EPA should consider. One reviewer suggested textured ceilings and concrete, which can cause significant challenges. Another reviewer suggested that the Agency work on a different type of building.

A third reviewer emphasized the importance of the following research:

- Spray-applied and textured products.
- Improper wetting (i.e., what happens if the contractor cannot get everything wet, since that is the whole premise of AACM).
- Show that the process works for amphiboles.
- Show that amended water system works (as opposed to fire fighter foam system).
- Soil excavation.

He also emphasized the following considerations for future research methodology:

- Air monitoring (i.e., should modeling be adjusted or further tested?).
- Limitations of this project (i.e., data are great for this particular building type but not for others).
- Improve dust fall collection.
- No consensus threshold of exposure for asbestos.
- Test the important variables one at a time.

- Soil sampling on NESHAP building both pre- and post-abatement.
- section 9 notes deviations from QAPP (need justifications for deviations).
- Integrated air sampling (e.g., may want to sample discreet activities).
- Clearance samples should be reported.
- Determine measurement criteria.

He also recommended that the report include a list of prohibited activities. A reviewer responded that a list of prohibited activities (e.g., driving vehicles over ACM) could possibly be more helpful than describing allowed activities.

One reviewer noted the unavoidable issue of loading trucks, which crush the material underneath. Heavy hydraulic equipment can also break underlying material, releasing asbestos. Another reviewer noted that driving back and forth over the material further exacerbates the problem.

Panelists agreed to combine the list of research recommendations developed by the breakout group with the above lists. The resulting consolidated lists, with the modifications discussed in this section, can be found in Sections 2.3.9 (Needed Research), Section 2.3.10 (Considerations for Future Research Methodology), and 2.3.11 (Execution) of this report.

Wilmoth questioned whether the Agency should eliminate phase contrast microscopy (PCM) analyses from future research. The Agency performed PCM in the research project to demonstrate that any released fibers could be collected. A reviewer responded that he found no use for PCM, but EPA could include it if they are willing to bear the expense.

Wilmoth also expressed concern over running soil composites through an elutriator as the best indicator of potentially entrainable asbestos. He did not have the same confidence in this analytical method, and the Agency was dissatisfied with the results they observed.

Webber responded that he was very interested in the potential of reentrainment for soil but would defer to the rest of the group whether they found it unnecessary. He acknowledged that entrainment was highly variable and expensive. Wilmoth added that entrainment takes months to do. The panel agreed to remove the entrainment item from the research list.

Reviewers then discussed the subgroup's recommendations regarding NESHAP costs. One reviewer was concerned about the cost of total particulate measurement. Webber responded that the particulate measurement is not really a health-related expense and is irrelevant to the focus of the project, which is to compare asbestos in air using the NESHAP method versus AACM. Omitting this measurement would be one way to reduce costs. Wilmoth acknowledged that the particulate measurement was not particularly useful for this study but that EPA was attempting to be as encompassing as possible.

A reviewer requested that that the panel drop the recommendation to omit PCM sampling and analysis. Another reviewer concurred that PCM sampling and analysis should be kept in future research projects, stating that PCM sampling and analysis is the least costly and could establish a baseline for future AACM work. The panel agreed to delete "Omit PCM sampling and analysis"

from the list. The final cost recommendations are included in Section 2.3.6 (Abatement Cost Issues).

8.3 Methodology Discussion

The group then discussed the straw conclusions and recommendations developed by the methodology subgroup. The final version, as modified by the discussion below, is presented in Section 2.3.7 (Implementation Issues) of this report.

A reviewer suggested that the word "final" be added before "AACM" in the first sentence of the draft. A second reviewer disagreed, since this version may not be the final version. A third reviewer suggested that "all subsequent versions of" be added before "AACM" instead. Another reviewer also recommended that the word "method" that follows AACM in the first sentence be deleted. The panel agreed to these changes.

One reviewer questioned the statement, "little guidance to specifics of work performance," in the second sentence of the draft, since he felt the research project included sufficient guidance for work practices.

The panel then discussed the subgroup's suggestions for further method development. One reviewer presented the subgroup's first suggestion on berm construction, specifically, what type of material would be satisfactory for a berm. A second reviewer explained that not every aspect need be identified, but certain critical things should be specified. Another reviewer mentioned that the National Institute of Building Sciences' "Guideline Specification for Asbestos Abatement" provided a good example of a means-and-methods specification.

Wilmoth replied that the Agency felt it was counterproductive to use language that was too definitive in that it was the Agency's intent to not inhibit innovation on the part of the demolition contractors. A reviewer responded that EPA should provide certain details because some contractors are not familiar with berm construction. A second reviewer suggested the Agency not specify how wide or high the berm should be, since this would depend on site conditions, but rather provide sufficient specifications to ensure that the berm adequately contains water.

Another reviewer strongly concurred that the Agency should specify critical aspects, since there is no way to enforce correct berm construction if it is not defined. Some contractors might not understand what a berm is. Further, the report does not include a stipulation that an inspector must be present to ensure berm adequacy.

Wilmoth noted that one lesson learned from the research project was the importance of building a berm that does not leak (e.g., line the berm with plastic). He emphasized that the QAPP was extensively peer-reviewed and that the project involved about 25 asbestos experts from EPA, contractors, and the state Department of Environmental Quality.

A reviewer presented the subgroup's examples on amended water application and wetting agent. The Agency needs to specify what kind of hose should be used (e.g., a garden hose should not be used for a three-story building); what would be sufficient equipment for wetting; and what type

of wetting agent should be used (e.g., use “foam” instead of “wetting agent” since the latter term leaves too much room for interpretation). Wilmoth responded that the term “foam” could be problematic because people would question why EPA did not test all available kinds of foam, etc. The reviewer responded that this type of issue elicits the question of what should be considered “sufficient.”

The reviewer also described the subgroup’s two remaining recommendations on training and project completion: 1) that the method require that workers have appropriate asbestos training and 2) that there be a more formal process for project completion, with a definition of what constitutes certifiable evidence of completion, without which a project could go on indefinitely.

The reviewer also presented the subgroup’s recommendations for project monitoring: specifically that monitoring is conducted to ensure that: 1) the amended water process is applied, 2) there are no visible emissions, 3) the AACM method is used, 4) no AACM prohibited activities occur, 5) waste is properly handled, and 6) a visual inspection is provided.

One reviewer questioned these recommendations, stating that many are standard regulations already (e.g., no visible emissions, properly handled waste). A second reviewer replied that the true focus of the methodology issue is whether to have disinterested third-party oversight or to specifically stipulate contractor requirements. The first reviewer expressed concern that having third-party oversight could result in impossible standards that the contractor would be unwilling to meet. Two reviewers disagreed, stating that the contractors would not be asked to meet unreasonable standards. One of these reviewers stressed that these recommendations are essential if a method is going to allow ACM to remain in the building.

Webber asked the panel if this is an “either/or” issue, specifically, whether the methodology should include very specific guidelines with prescriptive language (e.g., specify what kind of surfactants are allowed, how to build the berm, etc.) or whether the methodology should be performance-based (e.g., require that no leaks or visible emissions occur, everything must be wetted down, etc.), with a caveat that disinterested third party monitoring is required.

A reviewer responded, emphasizing that these things need to be monitored. A second reviewer suggested that the contractor be their own monitor (which Webber suggested would be a severe conflict of interest) and expressed concern that contractors would not want to use the AACM if the process is made more difficult than NESHAP. Several reviewers disagreed and defended the recommendations. Specifically, one reviewer reiterated that the intent of these recommendations is not to complicate the process but rather to define a few critical issues and provide some guidance on how to address them. Other reviewers concurred and added that these recommendations would ensure that the contractors perform the process properly (i.e., they might cut corners if left to their own devices); they would also help avoid unnecessary letters of interpretation by addressing the critical issues from the beginning.

A reviewer stressed that real-world aspects have to be considered, and that the peer reviewers have been using real-world experience from performing OSHA Class I-, II-, and III-type work to suggest a minimum list of recommendations.

Webber closed the methodology discussion by stating that he thought the suggested items were reasonable and common sense, and addressed the concern of exposure to the public. The final recommendations resulting from this discussion are presented in Section 2.3.7 of this report. Webber confirmed that panelists did not have any other issues they wanted to discuss under Charge Question 5.

8.4 Executive Summary Statement Revisited

Webber then recommended that the panel wordsmith the statement they had previously constructed that clarifies that this research report should not be construed as a rulemaking document:

> This is a research project for comparison of AACM and NESHAP processes. The intent is to compare information; not to provide a different template for future work practices that differ from those that are governed by existing regulation.

A reviewer suggested adding the word "demolition" to make the statement item-specific. Laubenthal offered one of his pre-meeting comments (see Appendix C, page C-30, "The asbestos control industry…") for additional wording:

> The asbestos control industry (including related demolition contractors) is in great anticipation for agency conclusions and potential rulemaking activity pursuant to the AACM process. Even though this is purely a research document there will be many looking for any possibility that this constitutes an EPA endorsement of the AACM process. I think that it is imperative that a statement be developed within the Executive Summary that clearly defines that the purpose of this study was not to constitute rulemaking or a regulatory endorsement of the AACM process. There are many practitioners that do not truly understand the nature of the research/rulemaking process. With the final publication of this document, all efforts should be made to ensure that it is not perceived in a manner other than its intended purpose. A comment that this does not constitute rulemaking or an EPA endorsement should be added before "Conclusions" or at the end of the text on page xix.

Webber noted that the above pre-meeting comment addressed the issue of implied endorsement by the EPA. AACM has not been endorsed by EPA and is still in the research stage. Wilmoth concurred that the project was a research project.

Laubenthal recommended that the statement include a disclaimer regarding the endorsement issue; the rest of the panel agreed. Webber noted that many EPA studies have a disclaimer stating that the report does not constitute an endorsement by the EPA and asked if the Agency had a standard boilerplate disclaimer to include with this report. Wilmoth replied that this report does contain a statement (on page iv) saying that the document is a draft and should not be endorsed by the Agency as policy. Webber questioned whether the document would be considered endorsed once it became final. Wilmoth explained that the report will be endorsed as a formal research report but that would not imply that EPA endorses the method for use. Webber

recommended that the report include Wilmoth's explanation in a statement, so that no one can infer otherwise.

The panel discussed and added the following endorsement disclaimer to the prior statement:

> This is a research project for comparison of AACM and NESHAP demolition processes. The intent is to compare information; not to provide a different template for future work practices that differ from those that are governed by existing regulation. The EPA does not endorse the use of the AACM as an approved method for demolishing buildings with regulated asbestos-containing materials.

The panel recommended that this statement be added at the end of the second paragraph of the executive summary. The endorsement statement can be found in Section 2.2.1 of this report.

9. Closing Remarks

At the end of the meeting, Webber asked each reviewer to provide closing comments.

9.1 First Reviewer

This test provided good results. I am pleased with the low air counts from the test and the method, as long as EPA does not refer to them as *de minimis*. The reviewers have had many suggestions for improving the research methodology and the AACM itself. Nevertheless, the test results are good, interesting, and certainly worth proceeding with. I am not endorsing the method because I am not convinced it is endorsable at this point. However, the study has provided good data and we should recognize that. The results are good.

I am going to reference the December 19th, 2003, Office of Inspector General (OIG), Environmental Protection Agency, Significant Modifications Needed to Ensure Success of Fort Worth Asbestos Demolition Method. This started the ball rolling toward where we are today. OIG asked three questions:

> 1) Is the design and methodology of the Fort Worth Method - Phase II adequate to demonstrate protection of human health and the environment?

The answer was “no.”

> 2) Does the Fort Worth Method - Phase II meet EPA's key Project XL criteria, including superior environmental performance, regulatory flexibility, adequate stakeholder involvement, and transferability to other asbestos demolition projects?

The answer was “no.”

> 3) Has EPA's oversight to date ensured that the Fort Worth - Phase II project will allow EPA to reach valid conclusions on the effectiveness of such demolition techniques for each type of asbestos?

The answer was “no.”

Things have changed since then. The Agency has looked at the procedures, changed them, and run other tests. These three fundamental questions are still good guiding principles to future research, and the comments we have made at this workshop have largely fallen within these three categories. Our comments have largely addressed these good guiding principles, and I hope that they will be helpful to the Agency.

9.2 Second Reviewer

I agree. At this stage, the work is not “a be all and end all” or ready to serve as the basis to issue instructions for people to work by. However, with the type of input we have provided, it is

definitely worth continuing to experiment on the system. Once the system is sufficiently refined to work right, it likely will have value and could be used in many places, particularly if the rules are not so rigid that they preclude improvisation.

Berms are one example. Do we tell people how high the berm should be and what it should be made of? How would that be handled in a major city where you cannot dig a berm? Supposing a berm is made out of rubber pieces that are assembled in 10-foot strips and covered with poly. When the job is over, if the berm was properly covered with poly, the contractor could pick up the rubber components and use them on the next project. This approach would work if the requirements specify that the berm must contain the water, but not how to build the berm.

More work should be done to develop the method because there will be places it can be used, save money, and not create pollution problems for either workers or the public.

9.3 Third Reviewer

I would like to provide a few specific comments I have not brought up yet. On page 2 (Introduction) of the report, 4th full paragraph, first sentence, it says: "The RACM is less likely to become friable when the wetting process…" I recommend this be changed to say: "The RACM is less likely to become airborne when the wetting process…" because friability is not the condition of the material. The RACM is less likely to become "airborne" instead of "friable."[3]

Concerning classification of materials in Table 1 of Exhibit 1 on page 6 of the report, the table classifies different materials according to the AHERA (Asbestos Hazard and Emergency Response Act) classification. Under AHERA, "mastic for flooring" and "window caulking" are not "surfacing materials" and should be moved to the "miscellaneous" category.[4]

"Vermiculite insulation," now under "miscellaneous material" should be under "thermal system."[5]

On page 20, Section 3.3.1, EPA uses "RACM" when they should be using "ACM." EPA should replace the first sentence…:

> "A comprehensive pre-demolition inspection was conducted in accordance with the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR §763) to identify the type, quantity, location, and condition of RACM in the buildings [§61.145(a)] (Kominsky 2005; Smith Aug 2005)."

[3] Other reviewers commented on this recommendation. A reviewer pointed out that RACM is not going to become airborne. Another reviewer agreed that RACM is less likely to release fibers and suggested the statement be changed to say: "the RACM is less likely to release fibers to the air when the wetting…"

[4] Webber confirmed this recommendation with the panel.

[5] Two reviewers disagreed, stating that "vermiculate insulation" is really a stand-alone item and does not fit there; it is found in free form in the wall cabinets and is not a thermal system.

….with these sentences:

> "A comprehensive pre-demolition inspection was conducted in accordance with the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR 763) to identify the type, quantity, location and condition of Asbestos-Containing Materials [instead of only RACM] in the buildings (61.145 (a)). Under the EPA-NESHAP 40 CFR 61.145 (a) not only RACM must be identified prior to demolition or renovation but also Category I and Category II Nonfriable Asbestos-Containing Materials."
>
> Webber clarified that the sentence, "The inspection was conducted by a State of Arkansas Department of Environmental Quality (ADEQ) licensed Asbestos Abatement Consultant" should be left in.

These recommendations are presented in Sections 2.2.3 and 2.2.3 of this report.

9.4 Fourth Reviewer

In the report, page 49, under AACM demolition and disposal, it says: "Prior to demolition of the AACM building (#3607), no asbestos-containing materials were removed." Actually, they were. TSI (Thermal System Insulation) was removed under the building. I think the intention there was to remove it before the AACM. This is said other places in the report, and worth clarifying and restating here.[6]

I think that the comments heard here are representative of what constitutes what we call the asbestos control industry consultants, contractors, and the like. We would be foolish not to always look at possible new "mouse traps" with a fair and scientific eye when they come along. However, the history of this industry suggests that, even with the best-laid plans and very professional people putting together well thought-out regulations and guidance documents, we still have an industry fraught with fraud and with people that seem to make sport of finding what they can get away to achieve a better bottom line in their business. If we are going to relax our work practices to allow additional techniques like the AACM, we need to be very careful to craft both the method itself and any other regulation-changing guidance documents, so that we know what we should expect from people when they use this method. Otherwise, we could simply create a bigger compliance problem that could affect public and worker safety, and have environmental impacts. For example, leaving visible emissions on sites could be a problem for building owners, both from a public health and liability perspective. However, overall, I think ORD should proceed with this study and examine as many things as needed to determine whether this method can be conducted in a safe and cost-effective manner.

Bringing people in to peer review this report is admirable. We all appreciate being here, but more work needs to be done in a step-by-step fashion before any rulemaking can be considered.

[6] Webber agreed and recommended that immediately before 4.4.2.1, the Agency add a sentence to that paragraph to this effect: "However, there was removal of TSI from the crawl spaces beneath the buildings in 1999 that appears to have left some residual ACM." This can be found in Section 2.3.3 of this report.

9.5 Fifth Reviewer

I appreciate the opportunity to interact with the EPA staff and panel members and review this document. I started out with the recognition that the comparative site had inherent limitations. Since this is a research project, I hope the points made by my colleagues do help EPA in critiquing where you are and where you might want to go in the future. It will be helpful to make available to interested parties detailed information about how you got from "point a" to "point b." For this and future related research projects, it will be very helpful to provide citations for applicable regulations, considering the variety of people who may read the reports. Hopefully, this project can set this kind of example for reports that fall under the auspices of EPA or OSHA and govern activities of people in the field.

9.6 Sixth Reviewer

When the final report comes out, we may wonder: "Did I really write that? That's incredibly comprehensive." Because we worked collaboratively from different perspectives and, through our discussions, reached agreement on so many points, people who read the workshop summary are likely going to think: "Those guys really did their homework and came up with a good product." I have been privileged to work with you. Together we accomplished a lot in the two days we had here.

9.7 EPA Closing Remarks

Wilmoth thanked the reviewers and offered appreciation for their comments. He said EPA would document its response to their input. This document would be published on EPA's website and be made publicly available after the completion of the final report. He emphasized that this is a transparent process and EPA is willing to answer any questions the reviewers may have about the Agency's response. He noted that the Agency may, at times, alter the specific language suggested by the reviewers. If so, the Agency would verify the final wording with the reviewers.

Appendix A

Peer Reviewers

External Peer Review Workshop of EPA's Draft Final Report "Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings"

Andrew W. Breidenbach Environmental Research Center
U.S. Environmental Protection Agency
Cincinnati, Ohio
June 20 – 21, 2007

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Appendix B

Charge to Peer Reviewers

CHARGE TO PEER REVIEWERS

External Peer Review of the Draft Final Report "Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings"

Purpose

The Purpose of this project is to provide peer review services to the U.S. Environmental Protection Agency (EPA) to review EPA's draft final report, *Comparison of the Asbestos Control Method and the NESHAP Method for Demolition of Asbestos Containing Buildings*, prepared for EPA's research project to evaluate an alternative asbestos control method for demolition of a building with asbestos containing materials (ACM). In addition, reviewers are asked to consider the public comments received by EPA. These will be compiled and summarized and sent to the reviewers prior to the workshop in June 2007.

The final product of this peer review will be a peer review summary report prepared by ERG, in consultation with the reviewers, after the peer review workshop. The report will include the individual reviewer's pre-meeting written comments as an Appendix, but will present a consensus opinion of the panel and key recommendations for the report, which will be addressed by the Agency. The goal of the report is to convey the independent scientific judgment of the reviewers on the technical merits of the research, the scientific defensibility of the results, and the reasonableness of the analysis and conclusions.

Below are the charge questions that you are requested to address in your written comments. Feel free to provide other comments on the report as you deem helpful to improve the quality of the document.

Charge Questions

1. ***Executive Summary/ Conclusions*** – Do the executive summary and conclusions adequately reflect the findings of the research for the subject buildings and are they supported by the data in the report? Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions? If appropriate, please make suggestions on how the summary/conclusions may be improved.

2. ***Conduct of the research*** – Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures? Was the research adequately performed and documented?

3. ***Data Analysis*** - Were the data analysis procedures adequate and appropriate? Is the statistical methodology and discussion appropriate? If not, why? Make recommendations for improvement.

4. ***QA/QC*** - Was the QA/QC discussion adequate and appropriate? If not, why?

5. ***Other Comments***

   For each question, provide your reasoning for agreeing or not. Provide any other comments that serve to improve the document.

   a. Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?
   b. Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

The public comment period will end on June 14. ERG will send a compilation of any public comments received on the report prior to developing your written comments for your consideration. Please include and merge these as you deem appropriate in your discussion and comment. Any additional public comments received after the reviewer comment deadline will be distributed prior to the workshop for consideration during the workshop.

Appendix C

Reviewer Pre-Meeting Comments

Notice

Pre-meeting comments were prepared by each consultant individually prior to the meeting. They are preliminary comments only, and are used to help consultants become familiar with the document and charge questions, develop the agenda, and identify key issues for discussion. During the meeting, consultants may expand on or change opinions expressed in their pre-meeting remarks and may introduce additional issues. For these reasons, pre-meeting comments should be regarded as preliminary and do not reflect the final conclusions and recommendations of individual consultants. These pre-meeting comments will be included as an appendix in the meeting summary report, along with other background materials.

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Dr. Ron Dodson received his Ph.D. from Texas A&M University in 1969 while holding a Graduate College Fellowship in Electron Microscopy. Throughout his career he has held professorships in neurology and pathology and directorships in research. He is currently President of Dodson Environmental Consulting, Inc., and a Senior Consultant for ERI Consulting, Inc. Dr. Dodson has served on many professional boards and committees, including the editorial review board for the *National Asbestos Council Journal* (1987-1991); member of the Board of Directors for the National Asbestos Council (1988 –1991); and is currently a member of the Residency Advisory Committee for Occupational Medicine at the University of Texas Health Center since 1994); and an editorial board reviewer for the *Medical Science Monitor* (since 2004). He holds several professional licenses, including, Texas Department of Health Asbestos O & M Contractor license; Texas Department of Health Asbestos Inspector license, and Texas Department of Health Individual Asbestos Management Planner license.

COMPARISON OF THE ALTERNATE ASBESTOS CONTROL METHOD AND THE NESHAP METHOD FOR DEMOLITION OF ASBESTOS-CONTAINING BUILDINGS

I: REVIEW of CONTENTS

Quality Assurance Project Plan: Evaluation of an Alternative Asbestos Control Method for Building Demolition-March 31, 2006 Version- (as applicable to: Draft for Public and Formal Peer Review Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings; Date 4-17-07)

A4.1 Project organization
Where are the CV's and credentials of the participants? What license/certification is held by individuals/entities involved in project?

A5.1 How is "adequately wet" defined in project?

Page 17 of 66
"Potentially more cost-effective" is only as valuable as protection afforded by model(s) to public health and worker protection but that potential is basically implied rather than said.

A5/2/1 Primary objective
It is recommended that since a portion of data is based on TEM that the more appropriate use may be ATEM wherever TEM is used.

Page 19 of 66
Worker 9
The draft contains wording that could be confused by a reader that there is a NIOSH/ ATEM method or do they mean 7402.

Page19 of 66
Activity 10 A simple reference to ATEM and PCM methods as applicable to each specific application would be helpful

Page 19 of 66- 20 of 66
Actual protocol involves assessment of soil after NESHAP and Alternate Method is tested. Statement could be interpreted as written that there is a NESHAPS soil analysis method.

Page 20 of 66
What is the Alternative and NESHAP method for measuring asbestos concentration in water?

Page 24-25 of 66
Reference to PCM/ATEM count scheme and model would have been appropriate and by reference or specifically stated definition of what was counted in each count scheme would also have been helpful.

Page 27 of 66
It would have been helpful to have regulation defined regarding standards followed for transportation of debris to land field.

Page 31 of 66
Concentration of asbestos in soil by ATEM? The statement was made that thermal insulation had been removed from buildings in past. What type of asbestos was in the thermal insulation? It seems reasonable that any finding of amphiboles in soil and indeed some chrysotile component may be related to past abatement activities or degeneration of asbestos containing materials in the past.

Page 32 of 66
It would be helpful to cite reference following "application of HEPA-filtration unit" as used in abatement project.

Page 35 of 66
To make sure the reader clearly understands the observations of worker personal air monitoring it would be useful (since this is a research project) to reference the section governing such sampling and to state "within the limits of detection for the method". This is particularly important since most aerosolized chrysotile consists of fibrils that are not detected by PCM nor included in a NIOSH 7400 count scheme. The ATEM data more clearly defines the actual fiber burden but a reference should be made to the count scheme used by ATEM in assessing fibrous burden in a sample.

Page 39 of 66
A6.1.6
What instrument, magnification, and preparative technique is used for analysis of discharge air from the HEPA-filtration system? It would be of surprise if most if not all of the chrysotile are either thin bundles or fibrils and below detection of PCM.

A7.1.2 Step 2
If loading is determined by PCM then the fiber burden can only be described as non-identified fibers. ATEM is required to distinguish asbestos fibers.
What is "low"? Define limits of detection, methods, magnification incorporated as inherent in model for fiber/structure counting.

Page 48 of 66
A7.1.8 Analytical Sensitivity

This is a research project thus with the data presented it would be most useful to provide characteristics of the asbestos structures including type, length, and width from ATEM data. Such a comparison would be useful in determining ATEM versus PCM data.

Page 50 of 66
The EM analysis of air and other samples will be conducted by ATEM yet the draft does not reference AHERA/NVLAP count schemes that have been used for many clearance projects in school work and shown to yield reproducible data based on specific count parameters. The data generated from ATEM could be represented as total asbestos structures as well as broken into more descriptive definitions such as clusters, bundles, fibrils, matrix, etc. It appears that the contract laboratories were to define count schemes by ATEM rather than conforming to the requirements set forth by the primary federal and state investigators in the project.

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A7.2.3 Step 3: Identify Inputs to the Decision

1. "Measurement" as detected by what and how?
2. "Analytical sensitivity" defined as what?-Ref.

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A7.2.6 Step 6: Tolerable Limits on Decision Errors
"Chrysotile airborne asbestos concentrations often best fit a log-normal distribution"-as determined by what method (PCM-ATEM?) Most aerosolized chrysotile is fibrillar form and thus not detectable by PCM. A reference would be helpful to support the comment as made.

Page 54 of 66
A7.2.9.2
The laboratories are excellent however since this is a federally funded study it would have been reasonable to give credentials/certifications of laboratories and primary investigators at each laboratory.

Page 54 of 66
It is troubling that the issue of possible cost savings has been brought up in several places in the draft when in reality the priority of State and Federal agencies start with protection of public/worker health. It may seem a given but when extolling the potential benefits it would have been reasonable to add "potential cost savings without compromising worker or public safety".

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A8.1 Field Personnel
Does the "American Academy of Industrial Hygiene ABIH-Certified Industrial Hygienist" hold license or training as an asbestos/model accreditation defined professional?

General Question: What relevance does this study offer regarding comparative assessments where buildings contain amphibole asbestos or friable chrysotile (RACM) since the buildings evaluated were determined to have only chrysotile, which was in a non-friable (non-regulated) state under NESHAP?

II. REVIEW of CONTENTS:

Draft for Public and Formal Peer Review-Date 04/17/07
Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings

Executive Summary:
The executive summary adequately reflects the findings. It appears the actual project is a comparison with a Modified NESHAP method (not NESHAP method) versus an Alternative Asbestos Control Method [since NESHAP speaks to removal of RACM prior to demolition and the material containing asbestos in the buildings consisted of floor tile, mastic (?), joint compound (?) and wall board (?)-and thus not required to be removed unless converted to friable condition in project]. If this conclusion is incorrect then the particular reference in NESHAP should be given which requires Non-friable ACBM to be removed prior to demolition (unless it is considered to be made friable). The appropriate comparison for costs therefore are between two methods that are neither reflective of the NESHAP guidance document. It would be encouraging if the conclusion would have had as much emphasis on protection of public/worker health as on testing comparison of cost efficiency. The applicability of the findings should be fully appreciated with recognition that the buildings discussed contained non-friable chrysotile and the findings from demolition of buildings where there are appreciable components with amphibole forms of asbestos or friable chrysotile components may be totally different.

Conduct of the Research;
The research followed the QAPP with some appreciable improvements in that references were provided as necessary for support of particular processes or reference to past findings/protocols. Some available data could have added useful further information to the findings obtained. What type of asbestos was in the source water? What were the µm sizes and morphological features of asbestos structures included in a count scheme by ATEM per various applications where this instrumentation was used for assessment? The aspect ratio used for inclusion in the count scheme by ATEM (ISO 10312:1995) was 3:1. The researchers were working in an environment where the type of asbestos in the building components (as per their analysis) was chrysotile. The analysis of fibers versus cleavage fragments in demolition projects where there were amphibole containing materials would pose additional definitional problems if a 3:1 aspect ratio was applied to the count scheme. Where did the amosite and anthophyllite come from under Building 3607? There was an apparent confidence level that asbestos exposure would be very low in area adjacent to the demolition activity (since pictures from “starting demolition” appeared to show workers within the regulated area without protective clothing).

Data Analysis:
The data analysis procedures were adequate and appropriate for the objectives of the study. However the ATEM data would have been of even more value if the asbestos structures were defined as to populations based on width. The comparison of ATEM vs. PCM findings apparently were made on the basis of count scheme of ATEM being inclusive of those 0.5 µm and longer compared with those counted by PCM being 5µm and longer. However a limiting factor of detection by the PCM is also detection of a fiber based on diameter. How many fibers (structures) longer than 5µm and thinner than the resolution limit for detection by PCM were present in the sample (s)?

QA/QC;
Adequate.

Other Comments:
It is suggested that in a review of the contents of the aforementioned Quality Assurance Project Plan dated March 31, 2007 some additional clarifications could have easily been achieved by some simple additions. It would be of interest for example to those not familiar with the participants/laboratories involved with project if a CV/copy of credentials/certification be provided as a source of simple reference for the external reviewers of all primary/administrative level participants in the project. Such would have been expected if State/Federal approval/implementation were granted for asbestos related work activity/projects.

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Mr. Ron Dokell has over 35 years experience with the demolition of complex industrial structures. He is currently the president of Demolition Consultants and has recently retired as the president of Olshan Demolition Company. As the president of Olshan, he led their transition from a small, regional demolition company to one of the largest demolition companies in the U.S., specializing in the large and complex industrial demolition projects. As chairman of the NDA Safety Committee, he helped write the NDA Safety Manual and initialized industry-wide safety courses to promote safe work practices. His experience includes demolition and hazardous materials abatement at major industrial sites in 39 states.

EPA REPORT

Executive Summary

The last bullet point item is confusing. Why the alternative asbestos control method (AACM) process left less debris is vague and not necessarily something that will follow in test after test.

Introduction:

Statement: The AACM is determined to be environmentally acceptable but less costly than the current regulations may have the benefit of allowing municipalities to demolish abandoned buildings that otherwise would remain standing until they were in danger of imminent collapse.

Comment: The AACM requires much more physical space than would normally be found in municipalities demolishing buildings for which this would be practical.

Introduction: page 2, paragraph 3

Statement: AACM requires certain regulated asbestos containing material (RACM) be removed before demolition in accordance with the asbestos national emission standard for hazardous air pollution (NESHAP) and that other RACM may remain in place.

Comment: Many buildings and most residential buildings have asbestos containing material (ACM) that is only thermal system fireproofing, and very little of the other items, such as flooring, elastic joint compounds, etc. Therefore, so much of it will have to be removed as RACM that you might as well remove the little bit of RACM that is left and wind up with an asbestos-free building.

Introduction: page 2, paragraph 5

Statement: Collection of waste water in an urban environment will be very difficult. Normally, there is no space in which to do it.

Page 3 of 7, paragraph 5.2

In most demolition situations it will not be feasible to get into cavity areas and interstitial wall spaces on a AACM system.

Paragraph 8.3

No potentially contaminated water run off is permitted from the site during the demolition period. All impervious services, thoroughly washed with amended water for site closure.

Comment: In most urban areas, collection of the water runoff will be a major issue due to space limitations.

8.3, paragraph 3

Once again, the difficulty of trying to use all this water in an urban area.

Section 3.1, Site Selection, paragraph 4.

Statement: Landfill is located at 5900 Commerce Road in Fort Smith, approximately seven miles southwest of the demolition site.

Comment: In almost all major cities, the landfill is much further—sometimes as much as five times further—and the amount of loads that you might have to haul would be greater with the AACM method.

Section 4.1.2, Weather Restrictions

Statement: The demolition was not conducted during rain or snow conditions.

Comment: Demolition is often conducted during rain or snow conditions. In the northeast there could be great quantities of snow on the site which would have to be removed in order to keep it from becoming contaminated with the water runoff.

Section 4.4, bold point #1

Statement: Demolition equipment is identical to that used at the AACM building. It is not likely that the demolition equipment used on the NESHAP would be used if not described in the test. Demolition contractor stated it would have been more typical to use a bulldozer to knock the structure down, run over it, repeatedly compact it, and then use an end loader to fill the unlined trucks.

Comment: First of all, all demolition contractors are not using bulldozers to do anything. Almost all the work is done with hydraulic cranes when demolishing a building in the United States.

Paragraph 6.1.3, second paragraph

Statement: Overall, 4,100 gallons (about 20 percent) of the 23,833 gallons of amended water that was collected, filtered, trucked and disposed at the Fort Smith sewage treatment plant.

Comment: I don't see where the savings are in that. Collecting and hauling are too expensive.

Table 6-13, Weight of VAT Fragments in Soil Samples

Comment: It seemed to me that there are so few fragments that it doesn't matter. They are not friable at that point in time.

Paragraph 6.1.5.1.3, second paragraph

Statement: Demolition workers read their own samples for asbestos for almost all non-detect for both the NESHAP and the AACM.

Comment: Either method is acceptable as far as worker safety.

Item 8.2.4, Site Mobilization De-Mobilization

Statement: Site mobilization de-mobilization includes the delivery and removal of equipment prior to and at the end of the demolition. Mr. Larry Weatherford with Crawford Construction provided us with an estimate of $4,000 (includes mobilization and de-mobilization for either NESHAP or AACM building.

Comment: This would not be correct. First of all, $4,000 is way too much to mobilize and de-mobilize by as much as 50 percent or more. Secondly, under the NESHAP method, none of the scaffolding and all the supplies for the AACM method would have mobilized and de-mobilized.

8.2.5, second paragraph

Statement: The demolition of a NESHAP building requires eight hours for eight workers, for a total of $2,880, not including the operation or the excavator. The excavator operated for eight hours during the demolition of the NESHAP building for a total cost of $1,200.

Comment: There is no reason to have eight workers on the NESHAP type of demolition of a one-story structure. Two workers would be adequate in cutting the cost substantially.

Paragraph 8.4, first paragraph, last two sentences

Statement: The ultimate choice of NESHAP vs. AACM will be based upon cost and time considerations. There will always be some structures where the NESHAP will be more practical to apply than the AACM.

Comment: In almost all cases, the NESHAP will be more practical than the AACM. The primary issue here is not the cost and time considerations as much as it is space considerations—the physical layout.

Section 10, Conclusions

I would like to add the following comments to the Conclusions.

1) Costs. The amount of abatement done under the NESHAP process is extremely high in normal situations with the amount of square feet to be demolished.

2) The distance from the landfill is one of the major issues of which method to use.

3) The cost of disposal at the landfill is going to be a major difference, as demolition debris is generally twenty-five percent (25%) or less of the cost of the asbestos landfill.

4) The wrong vehicles were used for the trucking operations. The tractor-trailer with 30-50 yard capacity would have changed the costs that determined trucking. In demolition of residential structures of small commercial buildings, the major costs are trucking and landfill charges. The actual demolition costs are much smaller in comparison. Therefore, you want to use the largest trucks you can legally use in the area where you're demolishing. Again, using great big trucks makes it very difficult to get them situated to use unless a site is rather large.

5) The buildings used for samples are one-story frame buildings set on piers. Most of the inner-city buildings in the northeastern part of the United States contain basements. This makes a whole new problem of handling the water in the AACM. In some situations, you are allowed to leave the basement and backfill with solid debris or clean dirt. This would make quite a problem for the amended water issue.

6) The test buildings were on flat ground and did not have basements. In reality, most buildings are not on flat ground, and 10 foot level variations are not unusual.

7) While this method would work economically in some situations, they would be few and far between, and very few demolition contractors are going to work with this kind of operation.

8) The EPA could have saved themselves lots of time and expense if they would have brought an AACM method to the National Demolition Association and asked for their comments.

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Mr. Steve Hays, GHP partner and chairman of the board, is the driving force behind the firm's development as a recognized leader in dealing with hazards in the built environment. His background in the chemical industry, his certification as an industrial hygienist, and his knowledge of building systems give him a unique expertise in providing consulting services related to environmental hazards. His involvement since 1981 in environmental management and/or abatement design at over 10,000 facilities has helped give Gobbell Hays Partners, Inc. (GHP) a national client base, with projects in geographic locations from San Juan, Puerto Rico, to Anchorage, Alaska. Mr. Hays also serves as a seminar faculty member at Georgia Tech Research Institute and The Environmental Institute. He is a former guest lecturer at the University of California at Berkeley and Texas A & M University.

Charge Questions

I. Executive Summary/ Conclusions

A. Do the executive summary and conclusions adequately reflect the findings of the research for the subject buildings, and are they supported by the data in the report?

1. The summary and conclusions adequately reflect the findings, as the findings are presented, and are supported by the data, as the data are presented.

2. However, there are questions about some elements of the research.

3. There is no supporting evidence given for the fundamental justification of this research. First paragraph, second sentence; “This removal process…contributes to the growing crises of abandoned buildings in this country.” What authoritative source has determined that “growing crises” exist? What quantitative data do we have for the number of abandoned buildings now versus historically? If such data exist, does the abandoned building population of concern have similar architectural and ACM metrics to the buildings tested?

4. Test results would suggest that the two buildings were not identical in terms of ACM quantities. See “…architecturally identical…”, paragraph 2, first sentence.

5. The research should be considered as indicative of expected real world results only for the types of ACMs which were present in the research. This should be stated in the summary. If interpolation to other types of materials is intended, that should be stated and justified in the body of the report.

6. The Primary Objectives appear to overlook an important question. While the airborne concentrations may be considered by the researchers to be *de minimus*, did either method raise the concentrations above average historical, ambient levels for that geographical site? Given that no safe threshold exists for certain asbestos diseases, this question should have been asked and answered. How do the concentrations generated compare to historical ambient concentrations for other areas of the country?

B. Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions?

1. Did pre-demolition soil samples include random samples from the areas of each sampling grid which were under the buildings? The implication is that the crawl spaces were part of the sampling scheme, but neither the QAPP nor the Report is clear on this matter.

2. The baseline soil samples for the NESHAP building were taken before the asbestos abatement. In my opinion, soil samples should have been taken both pre- and post-abatement. It would be interesting to know how the NESHAP building asbestos in soil concentrations compared post-abatement to post-demolition.

3. It is difficult to determine from the data what impact asbestos which existed in soil prior to this research project (both under and around the buildings) had on the results for both buildings. We know that TSI had been removed from the crawl spaces in years past. It is unlikely that the asbestos in soil concentrations and distributions were identical for the two buildings. Given the inherent variables of removing ACMs in crawl spaces, either crawl space may have included "hot spots" of high concentration which may or may not have been sampled in 300 random grab samples. Based on the size of each grab sample as given in the QAPP, the percent of the total surface area which was actually sampled by the 300 grab samples was 0.7. This may be a reasonable sample size for some randomly distributed contaminants; however, removal of TSI in a crawl space can create a distribution of contamination that is not random. The bottom line question is whether asbestos in soil was adequately characterized.

4. How accurate is the estimation of 2 – 3 inches of soil excavated from the AACM site? Given the equipment being used, that is a fairly close tolerance. How was this measured? The reason this is important is in judging how much soil removal is required in actual practice to achieve the results reported. This also relates to the question of whether asbestos in soil was adequately characterized by the sampling scheme.

5. Soil moisture content was different for each test building because of rain and the wetting agent used at the AACM site. The moisture content analysis was performed on dried samples; therefore, we are unable to determine how actual moisture content affected results. How would the results have differed if no rain had occurred at either site for the duration of the tests?

6. Cost analyses are difficult at best when attempting to draw actual practice conclusions from research data. Human behavior changes when "under the microscope." This affects test results and cost estimates.

What would have been the difference in costs if this work had been competitively bid in actual practice rather than as part of a research project?

7. In the cost analysis for the AACM method, were appropriate charges added for time and materials to wet the soil before excavation, even thought this was inadvertently omitted from the test?

8. It is intuitive to me that the NESHAP building abatement took much too long. This raises the question of whether the abatement was overkill in design. Similarly, if the design was appropriate, was the execution gold plated? This would affect cost, and may have affected sample results.

9. Statistics notwithstanding, the settled dust data from the NESHAP building raise questions. Theoretically, if the abatement were done properly, there would be no asbestos structures in the air or settled dust which sources were the abated ACMs. In reality of course, some asbestos always remains after abatement. Some questions are: (a) What were the sources of asbestos in air, dust, and soil? (b) Were those sources predominantly from ACMs that existed in soil prior to this project?, and (c) How well was the abatement executed? Assuming the abatement passed clearance and surfaces were locked down properly, how likely is it that asbestos in air, dust, and soil came from the abated ACMs? This is a fundamental question because the intent of the NESHAP requirement for pre-demolition removal is to preclude release of asbestos to the environment. Even thought asbestos concentrations found in air and dust were low, do the data suggest that floor coverings also should have been removed? The asbestos found in the NESHAP samples, including small pieces of floor tile in the soil, could have come from: ACMs residual to removal (bulk material not captured by the removal effort), ACMs existing in the soil prior to the research project, ACM types which were not removed, or asbestos structures which had been locked down but were released by the energy of demolition.

C. If appropriate, please make suggestions on how the summary/conclusions may be improved.

1. The summary spends considerable text on the issue of *de minimus* concentrations. This question is not a stated objective of the research. What is *de minimus* is not defined by a consensus in the scientific community as it relates to health effects and is the topic of much continuing debate. Health effects and health risk are not part of this research project, and the report offers no support other than the opinion of the authors for declaring the concentrations to be *de minimus*. The insertion of a conclusion on a topic which was not a research objective gives grounds to question whether a research bias or hidden agenda exists. I am not suggesting that bias or a hidden agenda exists, but in the interest of factual scientific reporting, I recommend that this discussion be removed.

2. The report lists 25 secondary objectives, and not all of these are addressed in the summary. It is appropriate to note in the summary that only those secondary objectives considered to be most relevant are summarized.

3. After addressing all comments regarding the body of the report, the summary should be modified to reflect the revisions.

II. Conduct of the research

A. Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures?

1. The research appears to generally follow the QAPP. I have not done a point by point comparison in order to be more specific; however, I will spend more time on this prior to the workshop.

2. In some topic areas it is necessary to go to the QAPP for research details. For example, I could find the size of the soil sampling template only in the QAPP (unless of course I missed it in the report), and I then had to assume that the same size was actually used in the field. The reader should be able to determine research details solely from the report, or the QAPP should be an appendix to the report.

3. Some deviations from the QAPP are noted in Section 9. Were there others? Justification for all deviations should be included, along with a discussion of the impact on results.

B. Was the research adequately performed and documented?

1. The integrated air samples address the stated objectives, and the results from most air samples of all types were low. Can additional knowledge be gained from samples that were above non-detect by studying what activities were happening at the time of those samples? For example, it is no surprise that the abatement workers had the highest personal samples. Is there useful information related to what types of ACMs were being removed when the highest concentrations were measured, or do the integrated samples prohibit such analysis?

2. Did all PCM results come from filters that had been first analyzed by TEM?

3. PCME methodology and justification are inadequately discussed.

4. In Figure 4-13, it appears that sampling cassettes are hanging above the dust collection devise. If this is in fact how the samplers were arranged, it is possible that some dust settled onto the cassettes and associated tubing rather than into the dust collector. Given the small number of structures found in the dust samples, a few structures "here and there" that were prevented from entering the dust collectors could be significant.

5. How do the TEM asbestos structures per gram of soil from the project compare to the geographical area?

III. Data Analysis

A. Were the data analysis procedures adequate and appropriate?

Except for issues raised above and below, the data analysis procedures appear to be appropriate.

B. Is the statistical methodology and discussion appropriate?

The methodology appears to be adequate; however, while I have a good "industrial hygiene working knowledge" of statistics, I will leave the detailed statistical comments on this report to others.

C. If not, why?

D. Make recommendations for improvement.

IV. QA/QC

A. Was the QA/QC discussion adequate and appropriate?

1. Section 9 begins, "Due to the potential use of the results of this research study in assisting in the evaluation of an alternative method to current regulations,…" This confirms what I have assumed to be the ultimate objective of the study, that is to assist EPA in making regulatory decisions. In our conference call on May 21, the EPA representative stated clearly that his group had no interest in regulations, i.e., some other part of EPA will address regulation changes, if any. ORD's lack of direct responsibility for the regulatory process notwithstanding, I think it is important that peer reviewers provide input that may be relevant to any future regulatory process, even if such input is not directly related to the science of this research. The first sentence of Section 9 is my support for this position.

2. Page 142, first paragraph, second sentence; “These Observations did not have a significant effect on data quality…” Table 9-1 summarizes audit observations. Observation number 5 notes “Lack of formal documentation of QAPP changes.” Under the Recommendation column changes from the QAPP are noted. Two issues addressed in this peer review preliminary report are in the list of changes: (a) integrated samples during abatement and (b) photo documentation of sampling poles. “Soil sampling grid changes” is noted without explanation. “No immediate pre-abatement sampling” is also noted. Did these observations really have “no effect” on data quality?

3. Except for issues raised above and below, the discussion appears adequate.

B. If not, why?

V. Other Comments

For each question, provide your reasoning for agreeing or not. Provide any other comments that serve to improve the document.

Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?

Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

1. It is unclear exactly when respirators were used by workers, other than abatement workers.

2. The implication exists that the various limits on asbestos set by EPA result in zero health risks. This is not the case. The risk may be small, given the various limits, but EPA does not claim that its limits are completely health based and completely without risk.

3. The omission of amended water during soil excavation at the AACM site was characterized as an “operational error.” If my understanding is correct, it was also a violation of the proposed AACM methodology. The tenor of the report seems to imply that the overall results from the AACM would have been better if the amended water had been used. While it may be true that results would have been improved, it also raises the question of how often in actual practice the amended water would be overlooked. This was a thorough and good research effort. If in this environment something this basic falls to operational error, it is very likely to happen in actual practice.

4. Table 3-2 quantifies areas of ACMs. Were multiple layers of floor coverings considered and investigated? In other words, did the buildings contain the same amount (volume) of ACMs, except for the ACMs abated from the NESHAP building?

5. Abatement air clearance sample results should be reported.

6. Figure 5-1 shows a soil ample being collected. The person is not wearing gloves, which is standard procedure to prevent sample cross contamination. Was a new template used for each sample?

7. Page 2; "The RACM is less likely to become friable when the wetting process…" I do not think the wetting process prevents material from becoming friable during demolition. The wetting makes it less likely that fibers will be released to the air when the material becomes friable due to mechanical energy.

8. In terms of future regulations, there are many considerations. Will scofflaws be any more inclined to comply with this process than with current regulations? Will ***demolition*** contractors follow these procedures in practice? With current regulations, ACMs are removed by ***abatement*** contractors who are used to doing things inside containment, etc. and who are properly equipped. The premise here assumes that demolition contractors will start behaving in a very different way. Will enforcement be effective?

9. How does the cost of the AACM method compare to "regular" demolition that is done without any thought given to asbestos? The point is that the AACM, while less costly than a NESHAP-style demolition, is still relatively expensive. Will the savings be worth the trade in environmental outcome? Will the cost savings make any difference in the alleged "abandoned building crises"?

10. This NESHAP building was demolished with asbestos-containing floor coverings remaining and was demolished without water for dust suppression. Nonetheless, the air samples were statistically lower than for the AACM demolition. This would suggest that the source of the marginally higher AACM samples was the drywall joint compound, especially since the floor coverings in the NESHAP building were locked down.

11. What was the justification for leaving the floor coverings in the NESHAP building? They certainly became friable during demolition.

12. What was the justification for using latex paint as a lock down encapsulant?

13. This research was done in basically a rural environment, with sufficient room to build berms, control runoff, etc. How would these methods be successfully applied in an urban environment, or to commercial buildings rather than to what was essentially residential type construction?

14. Page 1, fifth paragraph, says, "…if determined to be environmentally acceptable…" How is environmentally acceptable defined?

15. Page 5, section 5.1, does not address whether machinery was driven over demolition debris. Was this done? If so, was it done the same way and in the same amount for both buildings?

16. With any method, execution is critical. The AACM method is solely dependent on water suppression. Related to air samples, the NESHAP method was superior, albeit marginally, to the AACM method, and an oversight in execution is the assumed reason. As noted previously, the research outcome raises a fundamental question of practical application, i.e., proper execution in practice. While development of future regulations and how those may be applied and enforced are not part of this research effort, it cannot be overlooked that the research has raised the issue, even if unintended. For this research to be useful for future regulation considerations, it is important to address moving the results from the "lab" to the field.

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Mr. Thomas Laubenthal, Technical Chief at The Environmental Institute (TEI), is responsible for researching regulatory issues and industry trends with an emphasis on the asbestos detection and control industry. He works with ATC Associates, Inc. staff, TEI's clients, the genral public and a wide variety of Federal and State regulators to provide an ongoing flow of information in this area; electronically, in print, and via a variety of professional presentations. Mr. Laubenthal also develops and maintains a variety of training programs with an emphasis on asbestos and lead-based paint issues, and serves as a lecturer and course director in a variety of programs offered by TEI.

Charge Questions

1. ***Executive Summary/ Conclusions*** – Do the executive summary and conclusions adequately reflect the findings of the research for the subject buildings and are they supported by the data in the report? Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions? If appropriate, please make suggestions on how the summary/conclusions may be improved.

The purpose of this study is to compare, differing perspectives and work practices of how NESHAP may and currently approach the asbestos issue in regards to demolition activities. The initial paragraph of the Executive Summary is written in such a manner that it seems to be a promotion for the AACM process while subtly demonizing the pre-demolition friable asbestos (RACM) removal process required by NESHAP. What this writer finds is that there seems to be a subtle thread of bias toward the negative aspects of the currently required NESHAP asbestos removal in favor of the AACM approach in general in this study. This is may not be purposeful by the authors but it is manifested in many ways throughout the study and makes assessment of various aspects difficult to assess or to merely draw conclusions. These issues will be discussed in various manners throughout my comments in various sections.

There are many aspects of the conclusions that are accurate based on the data generated within the objective descriptions and further supported by statistical analysis and or QA/QC activities. But, there are a few Objective Summaries that are not necessarily accurate because of lack of descriptive language for full operational understanding by the reader or performance of work during the study. Also there are areas where lack of data from inconclusive sampling activities leaves the statistical analysis stretched to acceptable limits in which conclusions can be drawn.

An example of a conclusion that seems to have an AACM bias (and serves as an example of bias found elsewhere in this study) is the second bullet of the Primary Objective. Here it seems that there was a need to alter statistical conclusions in favor of AACM based on visual observation. This section essentially states that there is little asbestos found on air samples but through stringent statistical analysis the AACM TEM airborne asbestos concentrations were higher than the NESHAP process. Following then, there is an explanation of observed actions to serve to explain the bias. For all intents and purposes the TEM asbestos airborne levels found during either process are very low. I see no reason for this other than to prop up the notion that the AACM is “safer”. Perhaps leaving the flooring and asbestos containing wallboard systems in the building added to the slight statistical difference? That should be the scrutiny not whether the slightly elevated air concentrations were because of the lack of wetting the soil during its removal from the AACM site. The amount of amended water utilized during the AACM process should have more that sufficed to have kept airborne fiber concentrations low. Which in all reality they were, but

the statistical scrutiny deemed otherwise, so then, it appears, the necessity of adding physical observations was chosen.

The fourth bullet of the Primary Conclusions and eighth bullet of the Secondary Objectives (connected issues) are also inaccurate for a number of reasons. I will address these in the following section because it is the way in which the work was conducted that has the ultimate impact of cost. In general the time it took to perform the asbestos abatement work prior to the NESHAP demolition was artificially long compared to that which would have occurred if this had not been a highly scrutinized project. Various work practices and waste handling procedures, added to the time taken for this project that would not have occurred in similar work elsewhere. Adding to this specification and project monitoring fees, I believe that the conclusion drawn and implied in this study that the AACM process will add thrift and time savings to asbestos-affected demolition work is overstated. Also, the employed methods in the AACM process are indeed well thought out (especially the amended water process and equipment) and would most likely work well in widespread practice. But without very thoughtful rule making (should the AACM process be allowed in the future) and federal guidance, the AACM-related methods employed in this study will be ignored in favor of the simplest and rapid method(s) for demolition which will indeed significantly increase the likelihood for worker exposures, site contamination and possible area contamination from site emissions.

As a general comment here and elsewhere in this document - Page xvii , first paragraph, line 5…"…allows most of the RACM to remain in the building during demolition."

The term RACM (friable material and Category I or II materials that could become friable due to the actions of demo/renovation activities) is used here and elsewhere in the report inaccurately. The term RACM is used globally in this document as a moniker for asbestos-containing materials. NESHAP states that RACM is to be removed before demolition and renovation activities. Therefore if RACM is in the building during demolition activities it would be a violation of NESHAP and many State regulations. For the purposes of the AACM explanations it should either be noted that the term RACM is being redefined for the purposes of the study or accurately reflect the types of materials still in the structures i.e. RACM, Category I or II materials. This will make a great difference to the average reader of this document so that there is no misunderstanding what materials are removed in advance of the AACM process and what remains. The only real clear outline of this is found in Table 1 of Exhibit 1 and in various lines of text within Exhibit 1. In order to alleviate any future misuse of the AACM procedure by end users these definitions must be clear. Those in the asbestos control industry that perform demolitions have very clear rules within current NESHAP and a variety of State regulations as to which materials constitute RACM, Category I and Category II. As such they gauge their work plans for which materials need to be removed

before demolition based on these definitions and regulatory compliance practices; especially via State enforcement.

In general, many of the conclusions are simply statement of facts from the data derived in this study. And as such are accurate reflections of that data and most are without observational biases. From the examples above there are indeed potential biases in these conclusions, whether intentional or not, which should be re-assessed so that the facts are stated and the average reader can draw their own conclusions.

The asbestos control industry (including related demolition contractors) is in great anticipation for agency conclusions and potential rulemaking activity pursuant to the AACM process. Even though this is purely a research document there will be many looking for any possibility that this constitutes an EPA endorsement of the AACM process. I think that it is imperative that a statement be developed within the Executive Summary that clearly defines that the purpose of this study was not to constitute rulemaking or a regulatory endorsement of the AACM process. There are many practitioners that do not truly understand the nature of the research/rulemaking process. With the final publication of this document, all efforts should be made to ensure that it is not perceived in a manner other than its intended purpose. A comment that this does not constitute rulemaking or an EPA endorsement should be added before "Conclusions" or at the end of the text on page xix

Because such a large portion of what impacts the conclusions is based on the conduct of the research, I will have the bulk of my comments in the section below that studies those issues.

2. *Conduct of the research* – Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures? Was the research adequately performed and documented?

In general it does seem that the many of activities in this study followed the general tenets of the QAPP. There were a number of discrepancies that were determined during audit activities but they seemed to be worked out on site or within the participating laboratories. There are other issues regarding how sampling was achieved that may be within the guidelines of the QAPP, but the actual execution may have an effect on eventual results. The experimental design of the "air sampling rings" was a thoughtful approach to determining general site conditions. This system was executed as designed in the QAPP, but it is a very unique system that would yield low analysis results based on design alone unless there was significant dry visible emissions during either demolition activity.

In another example, variations in soil sampling seemed to be necessary because of site conditions. Although there may have been a variation from the QAPP in the execution of soil sampling, the results were the useful in that ACM was found after demolition and soil removal (AACM). Apparently, because of a lack of data, especially for air sample statistics, this did not allow researchers to always meet QAPP design issues as detailed in Section 7 of this report and elsewhere. For site specific, work-based conditions, essentially a majority of QAPP issues were addressed successfully.

As for the way in which the work was accomplished, I will address various applicable issues here within the numbering system of the report.

The conduct of research cannot be assessed without looking at the portion of the report which defines the AACM process; Section #1, Exhibit #1 *Alternative Asbestos Control Method* (page 3-9). Not only does this define the process philosophy used for this project, but may also be the basis for possible regulatory changes in future rulemaking. Because of this possibility, I offer my comments on its contents in an effort to supply the authors additional feedback, now that the work has been performed, and how these concepts may need to be re-evaluated before if and any formal adoption of the AACM process:

Section 1, Exhibit 1; Alternative Asbestos Control Method (AACM)

2.0 Applicability

The size of structures which can be demolished using this method is limited to three stories or less (maximum height of 35 feet). This allows adequate wetting of both the interior and exterior of the structures and is within the working reach of both the wetting and the demolition equipment.

The limit of use, 3 stories (max. height of 35 feet) may be a bit broad and may push the limit of the AACM. The real possibility that all surfaces could be wetted by the process demonstrated later in the document in a 3 story, perhaps vast square foot footprint, may be at best difficult and impractical. To allow the open ended nature of the "working reach" leaves much open to interpretation and perhaps inadequate preparation of a wetted structure before the AACM process. In other words, the project at Ft. Chafee was heavily refereed and the AACM process was followed relatively closely. I'm not convinced that a dilapidated 3 story hotel with a 50,000 square foot footprint will most likely be left significantly dry during demolition unless there are specific operational procedures outlined in any future rulemaking.

3.0 Building Inspection/Asbestos Assessment

For the purposes of building demolition, the AHERA inspection protocols are inadequate. AHERA inspections are not "destructive." In this, AHERA inspections in general industry practice do not damage surfaces or structural elements to find <u>all</u> ACM. Without a destructive-type inspection (inspecting

between walls, multiple flooring or roof surfaces etc.) the knowledge of all materials that could be present in the structure could be inadequate, especially in the case of hidden friable materials such as pipes with TSI between floors and walls etc. This could lead to potential dry handling of friable materials, worker exposures, visible emissions, increased airborne fiber/asbestos levels during the process and impact on ACM residue/debris in soil. There is a published ASTM method (E-2356) which should be considered in difference to the AHERA protocol. This method does address destructive sampling during inspections to assure that all ACM's are identified in advance of demolition activities.

The AHERA process of material "assessment" may not really be necessary except perhaps for the purposes of asbestos removal contractor knowledge of material condition or for the purposes of the bidding of contracts. As a general industry practice, material assessment is not a normal addition to NESHAP inspections. It is worthy of note that there may be some states that require material assessment activity for NESHAP purposes and the aforementioned ASTM E2356 also includes material assessment.

4.0 Asbestos Removal

All thermal system insulation (TSI) and spray-applied fireproofing shall be removed due to the inability to adequately wet these materials during demolition. Fire curtains may be removed if it is easier to do so than to adequately wet and handle this heavy material.

In my personal opinion, and will most likely be the opinion of many, merely removing only fireproofing and TSI is inadequate. Table 1 of Exhibit 1 does clearly enumerate the materials to be removed by the original authors. I cannot agree with the list as currently defined.

Surfacing materials such as "spray applied surface coatings" and "spray applied acoustical or decorative surfacing" can cover vast areas of ceiling space of a building. These materials are always considered friable and should be removed in advance of any demolition activity. In my mind it is very questionable that these materials (and perhaps others within this list) could be properly contained and handled during the AACM process to limit worker exposures and impact site conditions negatively. It would also lead to uncontained friable material (and most likely dry) that will be deposited in landfills that could be disturbed by later activity.

I have the same misgivings with a number of miscellaneous materials such as asbestos cement products, fire curtains, fire doors, vibration dampening cloths and ceiling tiles. These materials could cause the same issues enumerated above. ACM ceiling tiles can cover vast areas and may not readily be completely wetted. Also, fire doors and asbestos cements (and perhaps others) would not be wetted at all by the described AACM process. The AACM demolition process could significantly damage these materials and release asbestos from them readily.

This Exhibit 1 list of materials to be removed is far too exclusive to assure that worker safety is assured, that visible emissions would be contained, that site (soil) conditions would not be significantly impacted and landfill conditions could become unsafe. I think that the AACM process is worthy of examining, but this list leaves a broad opportunity for abuse and negative impact at to those working the AACM process and those that would be adjacent to these areas.

All asbestos removal operations shall be performed in accordance with state and federal law by a licensed asbestos abatement contractor.

I believe that this component needs to be expanded to include the specific training requirements expected of all parties involved. This section should also include the necessity for a project specification by an accredited Project Designer, air monitoring during abatement around the removal enclosures to ensure barrier integrity (and other general industry air sampling practices), final visual inspection and final clearance air sampling by a third party firm. Without specific rulemaking and guidance in this area, compliance may be less than expected.

5.0 Demolition Practices

5.1 Equipment Used

I think that this issue is not explained in enough detail. I am not experienced in these matters, but this seems too brief. As an example; would a pair of “Bobcats” be sufficient for a 3 story structure?

5.2 Wetting Process

The body of this report demonstrates the wetting process used in the study quite well. The equipment, surfactant used (foaming) and application seemed to work on the structure studied. This section of this method should reflect the detailed practices found in this study otherwise should the AACM process be allowed in the future, contractor compliance to these practices will be spare at best.

Amended water shall be applied with a minimum of two hoses. The water shall be delivered as a mist. Direct high-pressure water impact of RACM is prohibited.

Based on the way this is written above, there will be demolition contractors that will find the use of a couple of garden hoses with lawn watering nozzles adequate to meet this criterion. The actual equipment, chemicals and application used in the study should be enumerated clearly here to avoid the under use of amended water if the AACM process is to be used. It would be reasonable to use the AACM demonstrated equipment as a guideline, but it should be noted here that a lackadaisical use of “garden hoses” would be inadequate for, say, a 3 story building, and in violation of any amended NESHAP process.

The wetting process consists of three stages. In each stage, both interior and exterior wetting of the structure shall be performed. To the extent feasible, cavity areas and interstitial wall spaces shall be wetted during each of the wetting stages.

This section of the text is inadequately detailed. To stymie misunderstandings of the expectations here, this needs to be expanded with specific step-wise work practices.

5.3 Demolition Practices

The demolition contractor shall minimize breakage of asbestos-containing materials.

While this is a meritorious philosophical concept to include in a method, how is this actually possible when employing heavy equipment with floor tile or Transite™ still in the building? The assumption here is that the demolition contractor's NESHAP trained supervisor would stop work here because of significant breakage of ACM is optimistic at best. It is not in their best interest to stop work. There should be significant discussion here as to what constitutes breakage and when work should cease. There is no component I see here for third party monitoring of this work. Without this component, it must be explicit as to what would constitute a violation in this area.

5.4 Visible Emissions

Comments here are similar to 5.3. The concept of visible emissions has been difficult at best to teach and to enforce in the field because the regulatory definitions are rather broad (as with "adequately wet"). To alleviate incompliance in this area should the AACM process become approved for NESHAP purposes, specific criteria that constitute violations needs to be addressed here.

6.0 Weather Restrictions

The issue of rain, specifically significant rainfall, should be addressed here. The AACM process relies upon the contractor to contain water from the activities. Significant rainfall could breach inadequately built containment berms or overwhelm water collection systems. This could lead to significant area soil contamination and possible runoff of contaminated water to storm drainage. Significant discussion of these issues needs to be added here on this topic.

"Visible dusting" is too broad as a criterion for work delay or stoppage. Perhaps wind speed (or other quantifiable aspects) should be used here to assist in compliance.

7.0 Monitoring Requirements

Demolition contractors are required to comply with all applicable OSHA (29 CFR 1926) regulations for worker protection during asbestos removal and demolition activities. This

This section attempts to encapsulate too many concepts in brief language. Asbestos removal may be conducted by the demolition contractor, but often this is a separate function. As such the mixing of information here such as personal protection equipment (PPE) for removal operations with the demolition (AACM) activities could be confusing to end users. The PPE language should be directed specifically at asbestos removal operations unless there is a specific goal to require PPE during the AACM process. This concept is discussed very briefly in the study.

There are also pictures of AACM workers with donned PPE. But there is no specific substantial text that describes the actual use or requirement of PPE for AACM workers. From an OSHA perspective, if the demolition contractor employing the AACM process were to have personal air sample data above OSHA permissible exposure limits, which would require the use of PPE, to me that would constitute a failure of the process. From a personal perspective, I do not believe that workers should ever be allowed to significantly disturb ACM, as with the AACM process, without the use of appropriate PPE, regardless of PCM-related air sample data.

This section should be reworked for regulatory clarity with proper regulation citations.

Also, if this section is to include removal activities, as mentioned in discussion for Section 4, all removal-related air monitoring, visual inspection and final clearance activities should be enumerated in detail here with all appropriate regulatory citations.

8.0 Waste Handling

The last line that describes vehicle decontamination should be more explicit. Without further details this will be subject to wide interpretation.

8.2 PPE

The PPE portions of Section 7 of this Exhibit should be moved here. Section 7 should address OSHA and other applicable monitoring issues as discussed. PPE issues should address removal versus AACM activities with appropriate regulatory citations (including 29 CRF 1910.134).

8.3 Potentially Contaminated Water and Impervious Surfaces

For the reasons discussed in my comments in Section 6, the construction berm construction should be discussed in more of a “means and methods” explanation. What is adequate to a contractor involved in an EPA sponsored, heavily monitored study and what would subsequently be adequate to a future end user is left to wide interpretation. In the Ft. Chafee study, there was soaking of the berm structure with what seemed to be a normal rainfall event. This should give some credence to the necessity of some specificity of construction of berms and water collection systems. One of the most difficult portions of the AACM process, if amended water is necessarily used as described in this study, is the collection of runoff and subsequent filtering and disposal. To alleviate potentially disastrous problems here should the AACM process be allowed in the future is to be far more specific in discussion of the engineering of water controls.

8.4 Potentially Contaminated Soil

If the AACM process were to be implemented as described by this Exhibit and with removal of only those materials described in Table 1, in my opinion the soil will not be “potentially contaminated,” there will be contamination to vary degrees depending on the ACM present. And even with AACM-required 3” of soil removal, it may be difficult to remove all portions of ACM material from wet soils. This study has shown this to be true with the analysis of post demolition and AACM post soil removal sampling.

Since there is no specific third party oversight of the AACM process, the depth of soil removal “until no debris is found” is left to the interpretation of the demolition contractor’s NESHAP trained supervisor. In the history of this industry I can say with some degree of confidence that this needs to be far more specific or the AACM process needs to have a final visual inspection by a qualified individual to release the contractor from the site. Otherwise we will have significant debate in the future with what is adequate completion of soil removal and ACM debris. This study made a great effort to study soil contamination with extensive analytical and statistical analysis performed to determine comparison values. It is doubtful that this level of scrutiny is planned or will be performed to determine soil contamination in post-AACM demolition. Further details here need to be developed to assure compliance should the AACM process be allowed in future NESHAP rulemaking.

9.0 Site Closure

This section is inadequately described. As with issues in the last paragraph from 8.4 above, what constitutes “closure.” We have learned many lessons in the asbestos control industry in the last 25+ years, and one thing we can state categorically is that without specific guidance and regulatory standards for

completion, this could be a significant issue in the future if demolition and or removal contractors are to be self policing in this matter.

End of review of AACM method, begin review of AACM Final Report review items

In the topics below I have provided comments on the practice of work on a section by section basis for those that apply here, including Section 8 "Cost Comparison…". There is a major emphasis on work practices for the asbestos removal before the NESHAP demolition. I have stated previously in my Summary review that the time and costs summarized in the study for NESHAP abatement are artificially high. Since these are the most significant "selling" points of the AACM process, it behooves one that reviews this report to evaluate if indeed this is the case. My comments will be specific in these matters.

Section 3 Site Information

3.3.1 Asbestos Inspection of Buildings

As previously discussed (see comments for Section 1, Exhibit 1, #3) the use of AHERA inspection procedures is most often inadequate in preparation for building demolition. Based on the type of buildings in this study and the fact that no materials were uncovered during demolition that were not anticipated, the AHERA procedures may have been adequate here. AHERA procedures should not be specified for any potential final use of AACM process unless a detailed discussion of destructive sampling is included. Destructive sampling is that in which inspectors do what is necessary to existing building systems to determine the presence of all ACM within the structure. This can include; opening wall cavities, examination of floor or roof systems that can be muti-layered and other related issues. NESHAP regulations require "adequate inspection" to determine all existing materials and removing all RACM and Category I & II materials that would become friable before demolition activities. It is imperative to determine the location of all materials that would be required to be removed (as with hidden TSI's). Without detailed scrutiny during asbestos inspection activity (i.e. destructive methods) these materials could appear once demolition started and potentially cause visible emissions, worker exposures and negatively impact soil burdens.

The very detailed process by which composite values were determined (as with the demonstrated joint compound example), while being an attempt at good procedure for the purposes of this study, are untypical of how this is performed by accredited asbestos inspectors and with normal bulk sample analysis by commercial laboratories. In actual application the samples are analyzed and quantified as received. Although the materials in this study were analyzed by layer and then calculated as a composite analysis, it is the opinion of many in the asbestos control industry, and a requirement of OSHA, that these materials should be analyzed and reported by layer.

The reason that this point is seemingly belabored, is that composite analysis is a source of abuse by building owners and by those in the demolition community to avoid the removal of, principally, wall board systems as RACM. It is noted that the one of the goals of the AACM process to allow for the demolition of buildings with asbestos-containing wallboard systems in place. It is also worth noting that wallboard joint compound can become quite friable during demolition, therefore some knowledge of the discreet asbestos content is desirable should this material become an issue with visible emissions (as in wallboard joint compound dust and or debris) soil contamination etc.

Table 3.1 Asbestos Content of Building Materials

My only comment here is that the reported asbestos percentages are in ranges. It must be assumed that these are ranges from a number of reported values of analyses made on homogenous materials. To my knowledge this is not discussed here or elsewhere. With the level of detail provided for air, soil and other analyses provided with this report, this should be in some detail here as well.

3.3.3 Concentrations of Asbestos in Soil

It is worthy of note that results of these samples were at trace levels, but the fact that asbestos was found, it should have been noted here (it was later in the report) that removal of TSI underneath the building had occurred previous to the AACM study work. It should also be noted as to when these samples were collected; contemporaneous with site preparation or months in advance.

Section 4 Study Design and Implementation

A principal question here for all air sampling other than OSHA personal air sampling:

What was the decision criterion for air sampling volumes? This was not discussed in any detail this document or in the QAPP document. There are many possibilities for the chosen volumes such as limiting dust levels to avoid overloading with debris to analytical sensitivities for TEM analytical procedures. This discussion would have been helpful as there is quite a bit of interest in this subject in the asbestos sampling and analytical community. The QAPP document (Table B-20) essentially encapsulates these issues to some extent and this is helpful for the research professional not an average reader.

A detailed discussion to explain the research nature of the air sampling procedures used here would be helpful to not set a sampling precedent for routine work should the AACM become viable. In this we need to describe that the processes used here would not necessarily be employed for routine work. Currently employed perimeter monitoring techniques used in today’s marketplace should be performed

during pre-AACM abatement activities and perhaps during the AACM process to assure those nearby of air quality. This may seem to be an unnecessary assertion, and for many it may seem obvious, but I have to field misconceptions of this nature routinely in my professional work.

4.1.3.1 Background Air Monitoring

It must be assumed that the samples here are those discussed in section 3.5.5? Also, it seems to me that the background sampling should have occurred in a timeframe as the actual work to better represent conditions at the time. I'm not sure that a comparison was made to air sampling during the actual work; perhaps I've missed the representation in later presented tables?

4.1.3.3.1 Discharge Air Sampling…

The concept of sampling discharge air from HEPA-filtration units is commonly inaccurately performed by air sampling technicians during typical asbestos abatement activity. Sampling often occurs at the immediate point of duct discharge which most likely yields inaccurate data because of the imbalance of air flow between the sampling pump and filtration unit. In-duct iso-kinetic air sampling was reportedly performed on this project. It would have been very informative to this writer, and the asbestos sampling and analysis community as a whole, to know how this was accomplished.

Also, this technique could have implications on fiber distribution on the collection filters with specific interest in how that would affect PCM analysis and could also have impact on the TEM sample preparation techniques. This information would serve a great service to the asbestos air sampling community in general.

4.1.3.3.2 & 4.1.3.3.3 Personal Breathing Zone Sampling…

I find interesting that there is a difference between the two sections in the discussion of TWA-related air sampling for OSHA comparisons. This should have also been discussed in the abatement section. The results for this sampling were described in Table 6-16 including the function of TWA.

Why were there so few personal air samples taken during 9 days of abatement? This is inconsistent with general industry practices and with OSHA's asbestos construction standard (29 CFR 1926-1101). In the absence of a negative exposure assessment, or data that is statistically below the PELs, daily personal air monitoring must occur on Class I & II asbestos projects. The fact that only 6 samples were planned for this activity is questionable for OSHA compliance. Also, in section 4.1.3.3.2 the statement that "…there was no formalized selection process", from the aforementioned OSHA standard personal sampling should

be obtained from workers representative of each type of work being performed. Data here is most likely underrepresented to meet OSHA standards for the performed abatement activity.

4.1.4.3 Surface Water from Demolition

The QAPP specifically details water collection activities. A brief mention of sampling techniques and water collection volumes would be helpful here for clarity.

4.2 Abatement of the NESHAP Building

This portion of this study took the greatest amount of days and man hours, yet there are only a few paragraphs that actually describe the removal. Even the basic project descriptions that one would expect within any final report from a consultant that provided asbestos abatement project monitoring services on behalf of an owner are absent.

Group, Inc (EEG) (Smith, November 2005). The RACM was meticulously removed under full containment, loaded into barrels, and sealed for transport to the landfill by an ADEQ-licensed

This line essentially encapsulates the entirety of description of the removal work performed and waste handling/disposal. This lack of detail here is inadequate. Questions that remain for this writer include but are not limited to the following:

Work area prep: How was the work area prepared? Critical barriers only or full containment? How was worker decontamination accomplished (if at all)? If utilized, where was the decontamination system located?

These issues can have significant impact on project time and cost and are general information that would be expected in asbestos abatement project monitoring reports.

Abatement air sampling; Which sampling station was any decontamination or waste load out adjacent to? This should be enumerated here in difference to a brief mention in section 6.1.2.1.2. Why were there no air sampling stations immediately adjacent to the work area as performed commonly in abatement project monitoring?

The perimeter air sampling concept was quite studied and seemingly well designed for measuring worksite general air quality. In the marketplace it is a general industry practice to air sample immediately adjacent to containment openings (and others such as *critical barriers* etc.) as this is most commonly where asbestos/fibers can escape. As such, I'm not sure that this level of scrutiny is reflected in related air sampling design or data.

Removal issues:

a) "…meticulously removed" is an insufficient description of how the abatement work was performed. I believe that it is not unreasonable to expect a more detailed description here.

b) Why was the floor tile and sheet flooring (linoleum) left in the building?

a) I must guess that the use of the term "meticulously removed" was an attempt by the author(s) of this section to suggest that removal was in such a manner that it met high standards or "state of the art." In the marketplace, wallboard removal projects are generally not performed to the high standards that one would expect for, say, friable fireproofing removal. Because of the nature of this project it was most likely held to the "meticulous" standard because of the high visibility aspect (public scrutiny) and federal EPA, state regulatory etc. presence. In my opinion 9 days for a wallboard removal of this size is not representative of how this would be performed in the marketplace, especially since this was not a renovation project which can be more "meticulous." In my estimation this should have taken, at best, half the amount of time.

In addition the use of drums as a removal waste handing system is a standard that is very uncommon in the marketplace. Also, the use of latex paint as a "lockdown" encapsulating agent is also beyond what it used commonly in the marketplace. Both of these components would have added additional cost and time to this removal project.

The text (p. 37 par. 2) acknowledges that this was a rigorous application of the "NESHAP process" (this term is not common in the marketplace to refer to pre-demolition asbestos removal). In my opinion this project as pursued is beyond that which is normally performed in day-to-day wallboard removal previous to demolition. I would be remiss not to note that there are states or commercial/industrial entities that expect scrutinous practices for pre-demolition of wallboard systems. But I believe these to be in the minority nationally.

Since this research project is to compare the current NESHAP practices versus the AACM process, time (as one function of cost) is one of the greatest components of comparison. Because of the issues enumerated in the previous paragraphs I believe the time taken for the removal was artificially long and unnecessarily expensive compared to general industry practices performed in the national marketplace.

b) As for the floor tile and sheet flooring, these NESHAP Category I materials would have become friable in the manner in which the building was demolished. As such they become RACM and should have been removed in advance of demolition activity. This in itself would constitute a NESHAP violation and enforced as such in a great many (most likely a majority) of states.

Personally, I am somewhat at a loss as to why this decision was made. There are many in the asbestos control industry (professional consultants to state regulatory entities) that differ significantly with leaving flooring materials in structures during demolition activities, if for no other reason that it is widely interpreted as a NESHAP violation. The concern about possible asbestos exposure to demolition workers and site contamination (NESHAP visible emissions) are the core issues. Also, in a number of states, if demolition is performed in this manner the entire waste stream would then have to be disposed of as asbestos waste. I'm sure there will be others will comment on this issue similarly.

There is no doubt that removing flooring material has added cost and time to the demolition projects. But even with removing the flooring, this work still could have been done in less than or equal to the 9 days that was used for the wallboard removal

4.3.2 Sampling Network

Figure 4-15 (also inset in in Fig. 4-15) "Pre-calibrated rotameters…"

What I find disturbing here was Dr. Chen found inconsistencies with flow meter calibration activities (see Table 9-1, #2, page 142). It seems that on a project of this importance this would not have occurred. Although I doubt that these inconsistencies would have significantly altered the overall accuracy of data from the sample collection, but in a civil case issues like this may have been deemed quite significant by attorneys and used as tool to impugn data.

Figure 4-13 "The five foot high sampling array…"

In this photograph there were 3 sampling cassettes collectively drawing 8 liters per minute (an estimate) near the top of the dust collection device. Was any thought given to the notion that perhaps losing ~8 liters of air per minute near the mouth of the collection device may have detracted from the amount of dust that might have accumulated? The report's authors in later sections (6.1.2.2 and others) suggest that higher settled dust values were a function of "closeness" and splatters from highly saturated building material. Would they have been even higher if air sampling devices were not withdrawing air at the moth of the dust settling tubes?

I must assume that this picture is representative of how these arrays were set up, perhaps not.

4.4.2 AACM demolition and disposal

Prior to demolition of the AACM building (#3607), no asbestos-containing materials were removed.

I believe that is inaccurate. TSI was removed from below this building previously. This should be noted. The earlier TSI removal may have contributed to asbestos found in soil samples obtained during this study.

4.4.2.1 Amended water system

I have to note that the use of the Kidde equipment and chemicals for this project is admirable and if performed should set the standard for how this portion of the AACM process should occur. While this report does not constitute rulemaking, if changes to NESHAP occur that allow the AACM process, the manner in which the property was soaked by this process and equipment used (in this and following sections, and Figures 4-23 through 4-28) should be specifically regulated with guidelines written regarding soaking/wetting techniques, allowable equipment and surfactant use. Otherwise we may end up with demolition contractors using garden hoses and lawn sprinkling nozzles to wet 3 story structures in preparation and during the AACM process.

4.4.2.3 AACM Demolition phase

Here I would like to specifically note the process of preparing the dump-type trucks for hauling waste.

The process in which the trucks were prepared with sheet polyethylene was well thought out and the process using scaffolding (Figures 4-29 & 4-30) is very efficient. But I would not expect that should the AACM process be allowed within NESHAP regulations that demolition contractors will be as extensive with their truck preparations unless this practice is specifically outlined in regulations or written guidelines.

The preparation of the vehicles to haul away soaked building debris with ACM within them is rather important. Without scrutinous preparation of these polyethylene liners water and or debris could become fugitive during transport. If the “burrito wrap” allowed significant air flow during transport or the material could become dry and be a hazard to drivers and landfill workers during dumping and subsequent material handling in the disposal process.

Under normal circumstances, the extra time to implement the AACM would include:

- lining the trucks (five minutes/truck),
- sealing the burrito wrap (seven minutes/truck), and

In an effort to account for time in this experiment, the author(s) of this section suggested time intervals for 3 different activities (last paragraph, page 56). Because the contractor used scaffolding in this study, the suggested time intervals for lining the truck and sealing the burrito wrap. These time intervals would only be probable if scaffolding systems (as in Fig. 4-29) are used. If workers did not have an efficient system as described it would take much (perhaps 3-5X) more time to accomplish these tasks.

Section 5 Sampling and Analytical Methodologies

5.1.5 Asbestos Soil Sampling

The soil sampling issues enumerated here and elsewhere in this report are necessary parts of this study. But because of the extensive nature of the sampling protocol and the difficulties in performing soil sampling discussed within this study it would seem that serious thought should be given to any future potential inclusions of soil sampling should the AACM process become allowable under NESHAP. It does not seem from the information in this report that soil sampling would be a requirement for concluding an AACM project, but this could be of some debate in that it should be along with visual inspection activities. If "final" soil sampling would be considered as part of the AACM process, much consideration should be given to the lessons learned here to simplify the process so that it does not become cost prohibitive or overly difficult to obtain usable samples.

5.2.4.1 Soil Preparation

- If necessary, large chunks of the dried soil were reduced to < ¾ inch in size. If rocks or organics were observed, these were removed and if present the mass and asbestos type and percentage were documented. If pieces of building materials were observed, these were removed and analyzed by PLM, and if present the mass and asbestos type and percentage were documented.

Were the soil sub-samples observed using stereo-microscopy to determine what portions were asbestos containing? A brief, more detailed discussion here would be helpful.

Similarly, some discussion as to how asbestos percentages were determined would be helpful. This paragraph most likely is meant to describe the percentages that would be obtained in section 5.2.4.2, but that might not be obvious to all readers. This paragraph makes it seem as though there are multiple activities to determine asbestos percentages.

5.2.4.2 Soil Analysis

Should the analysis of soils become a requirement for AACM-related work, it would behoove the authors of any analysis topic for rule making to be explicit with standard operating procedures, as an example, the TEM issues enumerated in AHERA. This section does enumerate various aspects of analysis of soils, which are familiar to experienced asbestos laboratory professionals. With the pace at which demolition occurs, sampling and analysis issues must be spelled out clearly to ensure compliance.

5.2.5 Settled Dust Samples (TEM)

In this section the authors claim the ASTM D 5755-03 as the cited method for sample preparation and analysis. In that there was a different ASTM sampling method used, there should be some discussion as to how these two methods are meshed and the variations from the established protocols that may have occurred between the two between the sampling and analysis activities.

Section 8 Cost Comparison…..

P. 133:

- The cost of all federal, state, and local enforcement activities relative to each method of demolition and disposal.

What does this mean? The NESHAP notification fees? I am not aware that demolition jobs are assessed fees to pay for regulators time. If fees were charged to this program outside of usual NESHAP notification fees it should be withdrawn from the summaries as this is not normal in the marketplace.

8.2.2 NESHAP Abatement

These costs are too high. As mentioned in previous sections the carefully executed process meets a standard here that is far beyond what may happen in most of the country, even with some states having specific regulations in these matters.

8.2.2.3 Abatement…monitoring

I fully believe that all abatement projects should have oversight and monitoring. That is simply not done in a large portion (if not most) of the abatement work performed pursuant to the demolition industry. Therefore adding this cost may be inapplicable in a large portion of the marketplace.

Also; the cost of the monitoring firm is (if based on 11 days, 9 days abatement, 2 days demolition) is at the national high end of cost. This should be about half of the ~$12K reported.

8.2.7.2 Lining the trucks

This cost of scaffolding is irrelevant to the marketplace. Unless specified through regulation or in project specifications, it would not be performed in this manner.

8.4 Applicability of Costs

etc. The AACM building at Fort Chaffee did not contain ACM that would require abatement prior to demolition. Different buildings at different locations may have greater or lesser cost

The statement that AACM building at Ft. Chaffee did not contain ACM that would require removal is inaccurate. There are MANY states in today's marketplace that would not allow flooring materials (NESHAP Category I) to remain, and would cause regulatory action if left in place.

In general the asbestos abatement costs for the NESHAP demolition are artificially high based on comparable work performed elsewhere in a large portion of the country.

End of Charge Question #2

3. Data Analysis - Were the data analysis procedures adequate and appropriate? Is the statistical methodology and discussion appropriate? If not, why? Make recommendations for improvement.

As with Charge Question #2, I will address these items in the sections in which they were addressed within the report.

Section 6 Results

In general: While the absence of asbestos in many of the analyzed samples is a positive aspect of this study, the lack of data to meet various levels of statistical scrutiny makes of number of, what amount to conclusions, seem broad. This is especially evident when the report has to caveat the results as seem on page 74.

6.1.2.1.2 Demolition air

As mentioned previously the way in which the sampling array rings were designed was thoughtful for the purposes of determining general site conditions during the time in which the sampling pumps were drawing air through the sampling cassettes. From my personal experience of sampling on asbestos abatement projects, if one does not sample immediately adjacent to work area openings…to put it simply, set up job-permanent sampling stations at decontamination system entrances, waste load-out egress, negative air machine exhaust (somewhat away from immediate exhaust) and others, one will not find fibers (PCM and most likely TEM) on filters. This is especially evident with exterior air sampling because of air movement that quickly "dilutes" fiber concentrations.

seven in each grouping). Visually, there does not appear to be any correlation between sample location and the small concentrations of asbestos observed in the air samplers. The wind was

This is confusing language. One does not observe concentrations "in the air samplers." I'm not sure what this means; visually inspecting the surface of collection filters for a color (loading) difference, or most likely as a result of sample analysis.

In my previous comments, I gave praise to the Kidde equipment used during the AACM to provide adequate wetting for the process and for the exhaustive work in accomplishing that goal. It is because of that diligent activity (and exterior air movement "dilution") that the air sampling results were low to non-detect.

It would be very interesting to use the same process of air sampling project scrutiny along with adjacent sampling added (as discussed above) on a public (low) bid AACM demolition project of a property that included at least all the same ACMs with a contractor left to his own devices to interpret Figure 1 from Section 1. I do not believe that you would find the same results.

6.1.2.2 Asbestos in Settled Dust

Of great interest here are a number of spikes in the data with relatively high asbestos concentrations. Regardless of low airborne fiber/asbestos concentrations during demolition activities, these dust samples suggest emissions, splatters (from "splashing") or not. The "closeness" of the sampling stations served their purpose to demonstrate that asbestos contamination can spread from these areas. The author(s) suggestion that moving berms out further from the building being demolished is admirable and should be implemented in any further study of the AACM process. I believe the "dust," splatters and all constitute emissions that occur despite what one found from the results air sampling, PCM or TEM.

Perhaps this is an indictment of the utilized, and perhaps all current air sampling methods, when used out of doors?

6.1.3 Water

I have addressed in other sections the issue of berms and their construction. The data here is clear that if the AACM process were allowed, water control is critical. Also, if the process for collection of water samples is utilized in any future NESHAP allowed AACM work, any required sampling and analysis methods must be enumerated clearly to assist in compliance matters

6.1.4 Soil

2 issues here;

a) Asbestos was in the soil from previous abatement work, it is evident from soil analysis. If post-AACM excavation soil analysis were to be used for an evidence of project completion, background soil samples must be obtained. They could be archived with proper chain of custody until needed. Without knowing the history of the worksite, and not obtaining background soil samples, demolition contractors may be held to a standard not of their making.

b) Because floor tile was left in the buildings, it was found in the soil after the demolition processes. Therefore, remove the tile before demolition, AACM or NESHAP. If not removed previous to demolition and debris is found, many states will cite the demolition contractor for visible emissions and possible illegal dumping if they have left the site.

As a general not: It seems that the statistics in this section are stretched to the limits of usefulness.

6.1.5.1.3 Worker summary

It is common to have asbestos detected on air samples when workers are removing asbestos containing materials. It seems as though this is noted as some unique item in minor discussions in this report. Although it may be a spike if a statistician's data set, the worker air sampling during abatement has no place in a comparison, anecdotally or in figures with data from demolition from either discussed demolition process. Figures 6-15 and 6-16 do separate these issues in this report

What is disturbing is that despite the high profile nature of this work, a worker was observed without his respirator by an EPA observer. Sadly, this is very common on demolition-related asbestos removal projects as there is usually no project oversight and supervisors are often absent or poorly trained and managed.

The low air sample concentrations for the AACM project are due to the fact that the employed amended water process was used diligently and in great quantity. There was water used also during the NESHAP demolition process (Fig. 4-17). This also made a great difference; I'm sure, in keeping fiber counts low during this process. In the market area in which I have served clients in these matters and through anecdotal information at meetings and in my classroom, the use of water is rare on "NESHAP" demolitions unless the projects are substantial enough for regulatory scrutiny.

4. QA/QC - Was the QA/QC discussion adequate and appropriate? If not, why?

I will relegate Section 7 "Statistical Analyses" to this portion of the review.

I am not an expert in this area and will not attempt to refute or confirm the conclusions.

But my few comments:

As for the air sample data, with the large amount of "non-detects" and samples that are at the limit of detection for the variety of methods used, there is clearly a paucity of data in which QA/QC statistics can be performed with any level of surety from which one can make firm conclusions.

The air sample data sets (for PCM & TEM), from the figures in various sections to the tables in Appendix A leave many portions of raw data unavailable if one desired to perform any basic analysis outside of what has been reported by the authors.

It seems that despite the way in which the statistical tests have been evaluated, especially with the italicized statistics-based conclusion statements in Section 6, it is beyond the average reader to comprehend the vagaries of how small of a difference there is in the statistics on which conclusions are drawn. I am not convinced a large number of items will stand up to peer review by those that have a firm grasp on these issues.

In the long run, the final version of this report should include explanations of the various tests and their limitations. This is so that those readers that do not have advanced statistical training will be able to comprehend those recommendations that are based upon very fine statistical parameters and to be able to draw their own conclusions.

5. Other Comments

For each question, provide your reasoning for agreeing or not. Provide any other comments that serve to improve the document.

a. Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?

Yes. There are many, some quite minor, others more significant, but most have been enumerated in my comments the various sections above. Many of these will be discussed in detail when the panel meets.

I believe that the best way to evaluate this process is to allow the work to occur on a few chosen public, low bid projects where the contractor determines his/her own methods based on their interpretation of the AACM method (Section 1, Figure 1) with no project specifications or project oversight; as it would be performed in reality in the marketplace. This AACM study proved a number of things, most of which that there is little difference in air samples between the NESHAP and the AACM process as performed. I believe (as a community) we will not find any precision between this heavily refereed project performed at Ft. Chafee and a project that would be left to a contractors own devices.

b. Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

As I've stated in a number of places in this document, the public is in great anticipation for the results of this study and any possible rulemaking that may occur. In this there will be many readers of this report at a variety of education levels. I think the public deserves clarity regarding the decisions or recommendations made based on this study. And that these issues are enumerated such that they can be comprehended by an average reader not just those technically trained. I would not suggest this for all EPA (or other federally funded studies) research, but the AACM process (if ever allowed) may be a fundamental shift in how the asbestos control and related demolition industry and the nation's property owners and mangers plan for and execute building demolitions. The opportunity for abuse here cannot be overstated. Without a firm understanding as to how decisions were made that would lead to a NESHAP rule change would be a disservice to state asbestos regulators, the asbestos control industry and the nation's property owners and managers.

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External Peer Review of the Draft Final Report "Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings" 4/17/07.

Charge Questions

1. Executive Summary/Conclusions

The Executive Summary adequately reflects the findings of the research for the subject buildings, however a more accurate description of the Asbestos NESHAP can be provided and therefore the comparison with the alternative method be more clear. I would suggest the first paragraph of the Executive Summary to read as follows: (Underlined are suggested changes)

The Asbestos NESHAP (National Emission Standard for Hazardous Air Pollutants) requires the removal of All Regulated Asbestos-Containing Materials (RACM) prior to the demolition of the buildings that fall under the auspices of the NESHAP. This removal process is a costly and time-consuming endeavor and contributes to the growing crisis of abandoned buildings in this country while providing protection to workers and public health in the demolition process. The Alternative Asbestos Control Method (AACM) allows Asbestos-Containing Gypsum wallboard to remain in the building during demolition. In addition to leaving the Asbestos Containing Gypsum board in the building, the AACM process differs from the NESHAP process in that it requires pre-wetting of the interior of the building with amended water (water with a wetting agent added), continuous wetting with amended water during demolition of the building, containment of all runoff, removal of two or more inches of soil after demolition, disposal of all material as regulated asbestos-containing waste.

The last sentence of the first paragraph should be deleted because the use of respiratory protection and protective garments would be required also in a NESHAP demolition project in the presents of Asbestos-Containing Floor Tile "category I non-friable ACM" in accordance with the "Occupational Safety and Health Administration" Construction Industry Standard 29 CFR 1926.1101 (Class II Asbestos Worker).

2. Conduct of the Research

The research project adhered to the quality assurance project plan (QAPP), including experimental design, sampling and analytical procedures, and documentation. However, there are two different observations that should be pointed out.

The project was designed to evaluate and compare two demolition methods. The EPA-NESHAP which required the removal of regulated asbestos-containing materials (RACM) prior to the demolition of a facility and the AACM method which allows asbestos-containing Gypsum board to remain in place during demolition. The comparison of air sampling at the landfill operations does not reflect the effectiveness of one method over the other since the demolition debris of the NESHAP method should be at a different location (construction debris landfill) than the AACM method (EPA-NESHAP regulated landfill 40 CFR 61.154). The collection of personal breathing zone air samples is useful information to evaluate employee asbestos exposure at disposal facilities but not to be used for comparison of two demolition methods.

Apparently there is a belief that in the EPA-NESHAP demolition method, where the facility to be demolished may contain asbestos-containing floor tile, the exposure to asbestos is unlikely since no respiratory protection nor protective garments were used as stated in the third paragraph of page 46 and shown in figures 4-17 through figure 4-20. See attached document from OSHA.

3. Data Analysis

The data analysis procedures were adequate for the primary and secondary objectives of this study. However, it is not appropriate to compare the results of asbestos concentration of soil samples with the definition of asbestos-containing materials under the EPA-NESHAP (last paragraph of page 90). Also, it would be helpful for the reader if the comparison of the worker breathing zone fiber concentration by PCM and TEM (first and second paragraph of page 92) specify if it is between NESHAP demolition vs. AACM demolition or abatement NESHAP vs. AACM demolition.

4. Quality Assurance/Quality Control (QA/QC)

Adequate

5. Other Comments

I agree that the cost for the demolition of these two buildings are very site specific and may vary at other sites (Section 8.4 page 139). The cost associated with asbestos abatement in the NESHAP Building #3602 does not reflect the real cost of the national asbestos abatement industry including excessive cost for abatement specifications, asbestos abatement by a licensed contractor as well as asbestos abatement oversight and monitoring. The cost of the AACM demolition should be about 75 to 80 percent of the cost of the of the NESHAP demolition for a 4,500 sq. ft. building under the conditions specified in the project.

I would like to recommend the correction of some regulatory terminology used in the report of this project.

- The first sentence of paragraph fifth (page 2) should read, "the RACM is likely to become airborne (instead of friable) when the wetting process and demolition techniques specified in the AACM are used".
- Under The Asbestos Hazard Emergency Response Act "AHERA" rules Asbestos-Containing Materials are classified as Surfacing, Thermal System Insulation and Miscellaneous. Table I of Exhibit 1 (page 6) shows Mastic for flooring and window caulking as Surfacing instead of miscellaneous materials.
- Section 3.31 (page 20)
  A comprehensive pre-demolition inspection was conducted in accordance with the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR 763) to identify the type, quantity, location and condition of Asbestos-Containing Materials (instead of only RACM) in the buildings (61.145 (a)). Under the EPA-NESHAP 40 CFR 61.145 (a) not only RACM must be identified prior to demolition or renovation but also Category I and Category II Non-friable Asbestos-Containing Materials.

ATTACHMENT

Standard Interpretations
08/26/2002 - Application of the asbestos standard to demolition of buildings with ACM in place.

Standard Interpretations - Table of Contents

- **Standard Number:** 1926.1101(g)(1)(ii); 1926.1101(g)(6); 1926.1101(g)(8)(vi); 1926.1101(k)(8)(i); 1926.1101(k)(8)(iii); 1926.1101(k)(9); 1926.1101(l)(2); 1926.1101(o)(4)

August 26, 2002

Brian F. Karlovich, IHIT
Baker Environmental, Inc.
Airport Office Park, Building 5
420 Rouser Road
Coraopolis, PA 15108

Dear Mr. Karlovich:

Thank you for your May 9, 2001 letter to the Occupational Safety and Health Administration's (OSHA's) [Directorate of Enforcement Programs]. We apologize for the delay in our response. This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any question not delineated within your original correspondence. You have questions about the OSHA requirements to be followed when a building with asbestos-containing material (ACM) is demolished with this material left in place. Your questions and our replies are provided below.

Scenario: EPA regulations permit demolition of buildings without prior removal if less than threshold quantities of friable ACMs are present. EPA also permits demolition without prior removal when any quantity of nonfriable ACM is present as long as the material is not likely to become friable.

Question 1: What OSHA Asbestos Standard requirements apply to a situation where ACM is present in a building and complete demolition is planned without prior removal of the ACM?

Reply: Demolition of a building with ACM left in place falls under the definition of removal of installed ACM. The removal of installed ACM is either Class I or Class II asbestos work, and all applicable requirements of the standard apply. Whether such demolition is Class I asbestos work or Class II asbestos work is determined by the type of ACM left in place. If any

asbestos-containing thermal system insulation or surfacing material is left installed in the building, then the work being performed is Class I asbestos work. If the ACM left installed in the building does not include any thermal system insulation or surfacing material, then the work being performed is Class II asbestos work. See 29 CFR 1926.1101(b) (definitions).

In a building demolition situation, neither the control methods referenced at 29 CFR 1926.1101(g)(5) (Class I work) nor all of the work practices and controls described in 29 CFR 1926.1101(g)(8)(i)-(v) (Class II work) can be used. Therefore, if the work performed is Class I asbestos work, you must abide by 29 CFR 1926.1101(g)(6) which sets forth requirements for instituting alternative control methods for Class I asbestos work. If the work performed is Class II asbestos work, you must abide by 29 CFR 1926.1101(g)(8)(vi) which sets forth procedures for using different or modified engineering and work practice controls. We have specifically mentioned the applicability of 29 CFR 1926.1101(g)(6) or (g)(8)(vi). Of course, the standard's general requirements covering subjects such as permissible exposure limits, multi-employer worksites, regulated areas, exposure assessments and monitoring, etc. also apply.

Question 2: Do the worker training, wet methods, bagging, and labeling requirements apply?

Reply: Yes. Also, you should take special note of the following provisions.

The standard indicates worker training requirements throughout its text. However, its main focus on training requirements for ordinary workers is at 29 CFR 1926.1101(k)(9); its main focus on training requirements for competent persons is at 29 CFR 1926.1101(o)(4).

Its general training requirements and its training requirements for performing Class I or Class II asbestos work apply to a building demolition situation. In addition, if you use a separate crew of workers for doing final cleanup at the demolition site, the standard's training requirements for performing Class IV asbestos work apply for those workers. It is apparent that building demolition does not involve the performance of any Class III asbestos work, therefore the standard's training requirements for workers who perform Class III work do not apply.

In accordance with 29 CFR 1926.1101(g)(1)(ii), you must use wet methods or wetting agents except where you can demonstrate that the use of wet methods is infeasible. Also, please be aware that the asbestos-containing waste produced by the demolition operation must be kept wet at all times until it has been loaded for transport away from the demolition site.

When you demolish a building without first removing the ACM you produce asbestos waste. In accordance with 29 CFR 1926.1101(l)(2), asbestos waste must be placed in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers. We assume that you will have a vast amount of rubble intermixed with asbestos waste when you demolish a building with the ACM left in place. If that is the case, in order to pick up asbestos waste and place it in a container, you will no doubt have to pick up at the same time a much greater amount of other rubble. In that situation, where such a large total amount of material must be picked up in order to pick up the asbestos waste, please be advised that you could comply with 29 CFR 1926.1101(l)(2) by using trucks with water-tight, dust-tight cargo haulers as your containers.

The asbestos waste produced by your described demolition contains 1% or greater asbestos because it comes from ACM. (ACM is defined in 29 CFR 1910.1101(b) as material containing greater than 1% asbestos.) Thus, in accordance with 29 CFR 1926.1101(k)(8)(i), you must label those containers in which you put the asbestos waste. Labeling must be in accordance with the stipulations of 29 CFR 1926.1101(k)(8)(iii).

Question 3: Do the alternative work practices and control requirements apply?

Reply: Yes. See the last two paragraphs of our response to your first question.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statutes, standards, regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretations of the requirements discussed. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the [Office of Health Enforcement] at 202-693-2190.

Sincerely,

Richard E. Fairfax, Director
[Directorate of Enforcement Programs]

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

James Webber
Research Scientist
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Dr. James Webber received his Ph.D. in Environmental Health and Toxicology from the State University of New York at Albany in 1999. He has been a research scientist at the Wadsworth Center Biggs Laboratory (NYS Department of Health) since 1979. Since 2000 he has simultaneously been an Assistant Professor at the State University of New York's School of Public Health. During his career, Dr. Webber has provided the first measurements of increases of environmental airborne asbestos concentrations in the 20th century using a combination of paleolimnology and analytical electron microscopy; established analytical procedures for routine and non-routine analysis of environmental samples for asbestos; instituted quality-assurance procedures to optimize analytical precision and accuracy, and to ensure comprehensive documentation; developed criteria for EPA accreditation of asbestos labs; and, as an independent technical expert for NIST, assessed performance of more than 100 PLM/TEM labs nationwide. Dr. Webber is a member of the International Standards Organization (ISO); the American Society for Testing and Materials, International (ASTM); the Institute for National Environmental Laboratory Accreditation (INELA); and the Microscopy Society of America (MSA).

Peer Review of

Date: 4-17-07

DRAFT FOR PUBLIC AND FORMAL PEER REVIEW

Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings

Prepared by

James S. Webber, PhD

1. Executive Summary/ Conclusions – Do the executive summary and conclusions adequately reflect the findings of the research for the subject buildings and are they supported by the data in the report? Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions? If appropriate, please make suggestions on how the summary/conclusions may be improved.

None of the Primary Objectives, as summarized in the Executive Summary, were adequately concluded. Below are the three primary objectives and my assessments:

*1. To determine if the **airborne asbestos (TEM) concentrations** from the Alternative Method are statistically equal to or less than the NESHAP Method.*

While the report correctly concludes that airborne concentrations were higher for the AACM than for NESHAP, it equivocates with a discussion of *de minimus* concentrations and their relationship to established exposure levels. This project's objective was not to assess exposure levels but rather to determine if AACM airborne asbestos concentrations were elevated compared to the established NESHAP method. Furthermore, the existence of pre-contaminated soil confuses any conclusions about activities contributing to measured airborne asbestos.

*2. To determine if the **post-excavation asbestos concentrations** in the soil from the Alternative Method are statistically equal to or less than the post-demolition NESHAP Method. The Alternative Method requires soil excavation following demolition and the NESHAP Method does not.*

The Report concludes that TEM concentrations of asbestos in soil from the post-excavation AACM site were significantly lower than for the NESHAP post-demolition site. While this is the case, the existence of pre-contaminated soils clouds any conclusions about the effectiveness of the AACM versus NESHAP. In fact, a logical explanation is that AACM soils were cleaner because its excavation procedure simply removed pre-contaminated soil that had existed at both sites.

*3. To determine if the **Alternative Method is more cost-effective** than the NESHAP Method considering all costs, including disposal of all asbestos-contaminated materials and soils, and projected costs for enforcement.*

The report concludes that the cost of AACM was approximately half the cost of NESHAP. However, several factors were not included that might increase AACM costs relative to NESHAP costs. Additional costs for AACM would include bidding, oversight and monitoring, and cost of plastic (and labor) to make berms impermeable. Possible reduced costs for NESHAP might include more efficient use of a bulldozer and not washing the disposal trucks before their landfill trek.

2. Conduct of the research – Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures? Was the research adequately performed and documented?

The research largely adhered to the QAPP. The three major shortcomings were starting with sites that had asbestos-contaminated soils, failing to keep the AACM excavation operation wet, and failing to elutriate all composite soil samples for potential asbestos release.

3. Data Analysis - Were the data analysis procedures adequate and appropriate? Is the statistical methodology and discussion appropriate? If not, why? Make recommendations for improvement.

As the report discussed, the large number of non-detects (ND) made statistical evaluation by traditional parametric methods difficult. Their method of combining ND's for AACM Days 1 and 2, as outlined in §7.1.1 is not transparent (Table 7-1 provides no numerical detail) and was probably not appropriate; two days of ND's for one sampler ended up with the same value as one day of ND plus one day of one fiber counted for another sampler. While ND (assume zero) is statistically indistinguishable from one in a Poisson sense, an accumulation of one-fiber counts versus an accumulation of NDs can be significant. A more appropriate approach would have been to assign to each sample either the lower Poisson limit (see Table 6-1) for the structure count (0 for 0, 0.025 for 1, etc.) or the upper Poisson limit (3.689 for 0, 5.572 for 1, etc.) and then calculate the airborne concentration on this number. This would have provided some differentiation between ND's and low structure counts.

While the report in §7.1.1 concludes that combined-day AACM airborne asbestos is significantly ($p=0.006$) greater than NESHAP, these data should be evaluated separately for AACM Day 1 and AACM Day 2. The Final QAPP did not prescribe a 90%-ND cut-point approach (described in the third bullet point in §7), so the authors should not be restricted from trying to glean additional information from their data.

The conclusion in §7.4 that Secondary Objective 5 is proven (no difference in upwind/downwind airborne concentrations) is incomplete. By combining AACM Days 1 (little emission) and 2 (higher emission), the authors may have obfuscated any gradient on either day. The data sets should be separated for AACM Days 1 and 2 and re-analyzed.

For each of the statistical analyses, the report should include a brief table detailing how the ranking calculations determined any statistical significance. See my table below in Charge Question 5.a, for example.

4. QA/QC - Was the QA/QC discussion adequate and appropriate? If not, why?

QA/QC results and discussion were appropriate for this research. Analytical quality was good.

5. Other Comments

For each question, provide your reasoning for agreeing or not. Provide any other comments that serve to improve the document.

a. Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?

Soils

Local Geology Consideration of local soil conditions is critical to the design and successful execution of the AACM. Loose, sandy soils allow greater percolation of amended water and could permit asbestos penetration to depths greater than three inches and would be more likely to yield permeable berms. Hard clay soils would probably require more constant effort in filtering pools of standing amended water. These conditions merit more discussion for this study and for future AACM activities.

Pre-Existing Contamination Figure 6-11 clearly shows high "background" levels of asbestos in soils, which complicates any evaluation of post-work asbestos-in-soil concentrations. In fact, the pre-existence of asbestos in soil enhanced AACM because the pre-contaminated soil was left at the NESHAP site. *This pre-existing contamination is not discussed in §3.3.3 and is omitted from Table 3-4.*

Work Practices

I lack the field knowledge of other panelists, but some nuances of work practices are apparent to me and should be discussed in this report because of their impact on public exposure to asbestos and on estimations of cost-efficiency. NESHAP practices are generally straightforward from a monitoring perspective. A plastic barrier keeps contamination within the abatement space until an inspection reveals removal of all ACM and clearance samples indicate that it's safe to remove the barriers. AACM, on the other hand, has several practices that do not appear as cut-and-dry:

- How is adequate soaking of all interior surfaces assured before and during demolition?
- How does one ensure removal of 3 inches of topsoil?
- Is the soil adequately wet during excavation?
- Are berms leaking?

These practices could be vulnerable to difficult-to-detect shortcuts that could increase asbestos emissions.

Proximity to Worksite

Asbestos concentrations were higher in samples near the site (Ring 1) than farther away (Ring 2). This difference was highly significant (p=1.60E-06) for settled-dust samples, using the Wilcoxon signed-rank paired test, as indicated in my Table 1 below. Filters collecting airborne asbestos in Ring 1 also produced more detects than filters in Ring 2. While not significant (p=0.1331, see my Table 2 below), the difference does indicate that proximity to project is important. These decreases with distance are consistent with the SCREEN3 and ISCST3 models discussed in the AACM QAPP. This should allow future evaluations of AACM to be performed with a single ring of monitors as close to the site as practical.

Table 1. Asbestos in Settled Dust

Monitoring Pair	Ring 1	Ring 2	Difference Ring 1 - Ring 2	Absolute Difference	Rank
SDUST-NESH-ASB-R1-H1-M9	46,771	1,852	44,919	44919	34
SDUST- AACM -ASB-R1-H1-M4	21,625	1,213	20,412	20412	33
SDUST- AACM -ASB-R1-H1-M7	19,976	0*	19,976	19976	32
SDUST-NESH-ASB-R1-H1-M13	15,050	232	14,818	14818	31
SDUST-NESH-ASB-R1-H1-M11	10,882	0	10,882	10882	30
SDUST-NESH-ASB-R1-H1-M15	10,825	146	10,679	10679	29
SDUST- AACM -ASB-R1-H1-M2	10,852	1,389	9,463	9463	28
SDUST-NESH-ASB-R1-H1-M14	9,262	182	9,080	9080	27
SDUST- AACM -ASB-R1-H1-M3	11,158	2,911	8,247	8247	26
SDUST-NESH-ASB-R1-H1-M8	8,005	546	7,459	7459	25
SDUST-NESH-ASB-R1-H1-M12	6,020	0	6,020	6020	24
SDUST-NESH-ASB-R1-H1-M7	4,862	154	4,708	4708	23
SDUST- AACM -ASB-R1-H1-M13	9,302	4,686	4,616	4616	22
SDUST- AACM -ASB-R1-H1-M18	4,851	424	4,427	4427	21
SDUST-NESH-ASB-R1-H1-M16	3,396	127	3,269	3269	20
SDUST- AACM -ASB-R1-H1-M9	2,547	0	2,547	2547	19
SDUST-NESH-ASB-R1-H1-M1	0	2,315	-2,315	2315	**18**
SDUST-NESH-ASB-R1-H1-M17	2,084	0	2,084	2084	17
SDUST- AACM -ASB-R1-H1-M15	2,426	637	1,789	1789	16
SDUST- AACM -ASB-R1-H1-M12	1,698	437	1,261	1261	15
SDUST- AACM -ASB-R1-H1-M6	1,455	463	992	992	14
SDUST-NESH-ASB-R1-H1-M6	980	0	980	980	13
SDUST-NESH-ASB-R1-H1-M10	424	1,273	-849	849	**12**
SDUST- AACM -ASB-R1-H1-M16	926	146	780	780	11
SDUST- AACM -ASB-R1-H1-M8	728	0	728	728	10
SDUST- AACM -ASB-R1-H1-M11	849	291	558	558	9
SDUST-AACM-ASB-R1-H1-M1	243	728	-485	485	**8**
SDUST-NESH-ASB-R1-H1-M3	463	0	463	463	7
SDUST- AACM -ASB-R1-H1-M10	243	0	243	243	6
SDUST-NESH-ASB-R1-H1-M2	0	212	-212	212	**5**
SDUST-NESH-ASB-R1-H1-M18	212	0	212	212	4
SDUST- AACM -ASB-R1-H1-M5	485	695	-210	210	**3**
SDUST- AACM -ASB-R1-H1-M17	0	196	-196	196	**2**
SDUST- AACM -ASB-R1-H1-M14	1,941	2,038	-97	97	**1**
				Total Rank Sum	595
*All ND's replaced with zero values				Rank Sum for Ring 1 > Ring 2	546
Pairs with only ND's were excluded				Rank Sum for Ring 2 > Ring 1	**49**
				p =	**1.60E-06**

Table 2. Airborne Asbestos

Monitoring Pair	Ring 1	Ring 2	Difference Ring 1 - Ring 2	Absolute Difference	Rank
NESH-ASB-4L-D1-R2-H1-M1	0*	0.0015	-0.0015	0.0015	**12**
AACM -ASB-4L-D1-R1-H1-M3	0.00096	0	0.00096	0.00096	11
NESH-ASB-4L-D1-R2-H1-M15	0.00049	0	0.00049	0.00049	6
AACM -ASB-4L-D1-R1-H1-M15	0	0.00049	-0.00049	0.00049	**6**
AACM -ASB-4L-D1-R1-H1-M16	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M3	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M4	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M5	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M8	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M9	0.00049	0	0.00049	0.00049	6
AACM -ASB-7L-D2-R1-H1-M10	0	0.00049	-0.00049	0.00049	**6**
AACM -ASB-7L-D2-R1-H1-M18	0.00049	0.00048	1E-05	1E-05	1
				Total Rank Sum	78
*All ND's replaced with zero values				Rank Sum for Ring 1 > Ring 2	54
Pairs with only ND's were excluded				Rank Sum for Ring 2 > Ring 1	**24**
				p =	**0.1331**

p values from *Table H. Wilcoxon signed-rank distribution: P(V ≤ v)* in E. L. Lehmann. *Nonparametrics: Statistical Methods Based on Ranks,* Holden-Day, Inc., San Francisco, 1975. and verified against tables at http://www.psych.cornell.edu/Darlington/wilcoxon/wilcox5.htm.

Secondary Objectives 14 through 17 were not carried to conclusion because all analyses were not performed. This is worrisome from a public-health perspective because of the potential of fiber emissions from future disturbances of the soil. The presence of 32 x 10^6 structures/g in an AACM post-excavation composite indicates that the soil could be a reservoir of fibers despite excavation.

5. ***Other Comments***

   b. Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

Discussion of water in §6.1.3 should not differentiate 10-µm-long fibers because this is not germane to the project – nobody is drinking from the puddles. Any waterborne asbestos fiber left behind, regardless of length, is pertinent to public health because of the potential inhalation route. Omit the last column in Table 6-9 and Figure 6-9 in its entirety.

The equation on page 107: *DL = A*a/V*, should be corrected to *DL = A/a*V*.

Airborne fiber concentrations determined by PCM should be downplayed. These, as the report correctly mentions twice (*PCM analysis is a poor indicator of asbestos concentrations* on page 83 and *It is apparent that PCM measurements have no relationship to the asbestos concentrations)* are unrelated to airborne asbestos concentrations. The report *then* incorrectly states on pages 84, 112, 115, and 127 … *the asbestos fiber (PCM) concentrations…* Remove *asbestos* to leave … *the fiber (PCM) concentrations…* in

all of these occurrences. Additionally, PCME concentrations are not relevant to public health because they exclude thin and short asbestos fibers that play a role in toxicity.

The usefulness of Secondary Objective 8 (TEM concentrations in worker breathing zones) is questionable. During NESHAP abatement, airborne asbestos concentrations are expected to be high and are thus confined within a work space where workers must wear respirators. Protective barriers are not removed until abatement completion is assured and airborne asbestos concentrations are acceptably low. On the other hand, asbestos fibers released during AACM can migrate unimpeded into areas where the general public is unprotected. The Report's §*6.1.5.1.3 Worker Summary*: *Since the NESHAP process includes the abatement process, the AACM offers a significant improvement in the reduction of workplace asbestos concentrations as compared to the overall NESHAP process* is disingenuous because NESHAP workers are required to wear protection and asbestos contamination does not leave the containment space.

Dividing settled asbestos by time in Table 6-4 is somewhat confusing in that we don't know if the asbestos settled continuously or only during working hours. All things considered, the report should simply focus on the total because that is the amount that might have been inhaled or left to be disturbed.

The discussion of statistical analysis in §7 is difficult to follow.

How was non-normality determined?

What sets of data were transformed?

What transformation(s) were used?

In Table 7-1, list the actual values, rather than surrogate ND's, that were used for the nonparametric test. The reader can always refer to Tables A-2 and A-3 for original data.

My Conclusion

AACM looks promising but the conclusions in this report, even though statistically valid in some cases, are compromised because of the confounding effects of pre-existing soil contamination and the failure to maintain wet soil during excavation. The AACM thus warrants another research attempt, applying lessons learned:

- Include costs for bid preparation and site monitoring (non-research) in AACM budget.
- During site-selection phase, check the soils (TEM structures per gram) to avoid using a site with pre-existing asbestos contamination..
- Focus on TEM analysis of total airborne asbestos concentrations.
- Increase air-monitor flow rates to increase sensitivity and reduce ND's.
- Ensure that AACM site is kept wet during excavation!
- Run *all* soil composites through elutriator as this is the best indicator of potentially entrainable asbestos.
- Costs can be reduced by:
- Reduce air monitors to a single ring as close as practical to the site.

- Omit asbestos air sampling within NESHAP abatement barriers.
- Omit total particulate measurement.
- Omit PCM sampling and analysis.

Appendix D

Observers

External Peer Review Workshop of EPA's Draft Final Report "Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings"

Andrew W. Breidenbach Environmental Research Center
U.S. Environmental Protection Agency
Cincinnati, Ohio
June 20 – 21, 2007

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Appendix E

Workshop Agenda

External Peer Review Workshop of EPA's Draft Final Report "Comparison of the Alternative Asbestos Control Method and the NESHAP Method for Demolition of Asbestos-Containing Buildings"

Andrew W. Breidenbach Environmental Research Center
U.S. Environmental Protection Agency
Cincinnati, Ohio
June 20 - 21, 2007

Agenda

DAY ONE: WEDNESDAY, JUNE 20

11:15 a.m.	**Welcome, Introductions, Agenda and Format** .....*Jan Connery, ERG, Facilitator*
11:25 a.m.	**Background** .....Sally Gutierrez, *EPA*
11:45 a.m.	**Observer Comment Session** ..... *Jan Connery*
Noon	LUNCH
1:00 p.m.	**Reviewer Discussion**.....*Jim Webber, Panel Chair*
	1:00 - 1:30 p.m. **Charge Question 4**. QA/QC - Was the QA/QC discussion adequate and appropriate? If not, why?
	1:30 - 2:00 p.m. **Charge Question 3**. Data Analysis - Were the data analysis procedures adequate and appropriate? Is the statistical methodology and discussion appropriate? If not, why? Make recommendations for improvement.
	2:00 - 2:30 p.m. **Charge Question 2**. Conduct of the research – Did the research adhere to the QAPP, including the experimental design, sampling procedures, and analytical procedures? Was the research adequately performed and documented?
2:30 p.m.	BREAK
	2:40 - 4:15 p.m. **Charge Question 2** (continued)
4:15 p.m.	BREAK
	4:25 -6:00 p.m. **Charge Question 2** (continued)
6:00 p.m.	ADJOURN

DAY TWO: THURSDAY, JUNE 21

8:00 a.m. **Reviewer Discussion of Document** .....*Jim Webber, Panel Chair*

8:00 - 9:30 a.m. **Charge Question 2** (continued)

9:30 a.m. BREAK

9:40 - 10:30 a.m. **Charge Question 1**.
Executive Summary/Conclusions – Do the executive summary and conclusions adequately reflect the findings of the research for the subject buildings and are they supported by the data in the report? Are there problems with the data or the data interpretation and how would these, if any, affect the conclusions? If appropriate, please make suggestions on how the summary/conclusions may be improved.

10:30 - 10:50 a.m. **Charge Question 5a**.
Other Comments: a. Does the report overlook any parameters that the panel considers to be of critical importance to the study for the Fort Chaffee structures?

10:50 a.m. BREAK

10:50 - Noon **Charge Question 5a** (continued)

Noon LUNCH

1:00 p.m. **Development of Conclusions and Recommendations** .....*Jim Webber, Panel Chair*

1:00 - 2:15 p.m. **Charge Question 5b**.
Other Comments: b. Can the panel provide any suggestions/recommendations to improve the scientific quality of the report?

2:15 p.m. BREAK

2:30 p.m. **Development of Conclusions and Recommendations** (cont.) *Jim Webber, Panel Chair*

3:50 p.m. Closing Remarks .....*Jan Connery, ERG, Facilitator*

4:00 p.m. ADJOURN

Appendix F

Public Comment at the Workshop

Andrew F. Oberta, MPH, CIH, The Environmental Consultancy

Mr. Oberta is an asbestos consultant with over 25 years of experience in the field. He submitted comments to the docket on May 30, 2007 and posted an illustrated and annotated version on his website at www.asbestosguru-oberta.com. The following summary of his comments was read during the public comment session at the peer review workshop. Mr. Oberta was the only member of the public who commented during that session.

****

If someone ground up twenty square feet of asbestos floor tile and spread the pieces over a quarter-acre of land, we would agree that they have contaminated the soil. That is exactly what EPA did in the Fort Chaffee AACM project – not one, but twice.

The results of the soil analyses demonstrated that the long-standing EPA policy of permitting flooring materials to remain in a building that is demolished may not have been a wise decision. It should be re-examined at least and perhaps rescinded.

Another unintended consequence of leaving 3,992 ft^2 of asbestos-containing floor tile and mastic plus 252 ft^2 of linoleum with friable asbestos-containing backing in the buildings is the introduction of a variable not discussed in the report. These materials represent a source of airborne fiber release that could have affected the air sampling results. The implied assumption that no such fiber release occurred or that it affected the results for both tests equally is not defensible.

The amount of asbestos present in these flooring materials would far exceed that in the wallboard joint compound in the AACM building if the compound was limited to the spaces between the wallboard panels. However, the photos in the Draft Report and the EEG inspection report suggest that the walls were covered with a homogeneous surfacing material of constant thickness – perhaps plaster --without other discernable materials in the immediate area of the joint. We are left unsure of how much ACM was associated with the wallboard.

The air sampling results used to compare the two methods were inconclusive, primarily due to the large percentage of samples with zero structure counts. If anything, the results faintly suggest that the AACM creates higher airborne asbestos concentrations than the NESHAP method. No effort was made to compare these concentrations during either demolition to background levels or prevailing urban ambient concentrations.

The AACM demolition was preceded by saturating the wallboard with water containing a foaming agent, which was also sprayed on the building as it was demolished. Whether a contractor demolishing a building for low bid would spend the time and money to use this method properly, or would be able to operate the spray equipment and calibrate the mixture, is very doubtful based on my experience with asbestos abatement. To ask such a contractor to measure and adjust the conductivity of the mixture for proper foaming properties when they have trouble maintaining paint sprayers in working condition is unreasonable. What happens when the nozzle gets dropped in the dirt and plugged up?

The purported cost savings of 47% for the AACM compared to the NESHAP method are reduced to 31% when expenses for project design and oversight by the owner's representative and training of the contractor's workers are included. Unless the contractor is regularly engaged in asbestos abatement as well as demolition, their general liability insurance will exclude the work required by the AACM. Firms without asbestos coverage, which the owner would be foolish not to require, would not bid and the pool of potential contractors would be reduced. The biggest and most unpredictable cost variable, as acknowledged in the report, is the competitive nature of bidding for demolition work.

There are numerous technical errors, inconsistencies and questionable items in the report. ASTM and ISO methods for sampling and analysis are misrepresented. Prevailing industry practices described in ASTM asbestos control standards are not recognized.

The following statement appears on page 1 of the Introduction: “These data may be used to help EPA determine whether it is appropriate to include an alternative method in the current asbestos regulations contained in 40 CFR Part 61 Subpart M.” If this statement signals EPA’s intentions to amend the NESHAP to allow use of the AACM, it would be a serious mistake and compromise the protection of health and the environment. Exhibit 1 appears to represent a potential draft of the regulatory language that would describe how the AACM is to be used. This Exhibit has serious flaws, the foremost of which is allowing several asbestos-containing materials that should be removed to remain in the building during demolition. An equally serious omission from the exhibit is any consideration of vacating or protecting nearby residences and businesses, and measures to assure occupants of the safety of moving back into them.

I cannot endorse the AACM on the basis of this report any more than I could before the tests were conducted.

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