



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 8**

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Asbestos Sampling Discussion  
Minot Flood Event  
Minot, North Dakota  
August 2011

**Background:** In late June 2011 the Souris River overtopped its banks causing extensive flooding in Ward and McHenry Counties in North Dakota. In Minot, ND over 4000 homes and businesses were inundated with flood waters, with over 2000 structures completely submerged. The nearby towns of Burlington, Sawyer, and Velva were also impacted. FEMA has issued a Mission Assignment to EPA to accomplish four objectives: Remove household hazardous wastes from the impacted area; decontaminate and prepare white goods and e-waste for recycling; collect and process orphan containers; and to conduct environmental monitoring and sampling in impacted and work areas. Initial recon was begun on July 11, 2011

**Issue:** Due to extensive flood damage FEMA has tasked EPA to collect and managed household hazardous wastes (HHW), white goods, e-goods, and orphaned haz-mat containers and asbestos placed on curbsides. In addition EPA provided air monitoring/sampling support throughout the operational theater. During the week of July 25th it was determined that vermiculite insulation (aka "Zonolite" or "Zonolite Attic Insulation" or "ZAI") is present in some of the older homes and neighborhoods. Consequently this asbestos bearing material has been appearing in the curbside debris piles as home owners return and gut their houses. This raised three concerns:

1. What is the potential exposure for exposure to asbestos fibers to private contractors and/or property owners who are working in and/or around damaged homes in Minot?
2. What potential exposure to asbestos fibers in the ambient air?
3. What is the potential for exposure to asbestos fibers to government and government contract workers?

**Discussion:** Through coordination with the City of Minot, the State of North Dakota, the Regional EPA Office, and the FEMA JFO an outreach and education effort describing the potential threats associated with directly handling of ZAI is underway. This education effort was designed to address the concern raised by the first question 1. Protecting individual home owners and/or their contractors was deemed outside the scope of EPA's Mission Assignment. However, the information made available and distributed to the public was judged adequate to allow people to take the needed steps to protect themselves (see Attachment 1-Vermiculite Factsheet).

In conjunction with the outreach effort the field representatives of OSHA, US ACE, and EPA began direct meetings in Minot to discuss the ZAI situation. Given the different expertise,

manpower, and equipment available to each Agency it was recognized that a step by step, coordinated approach to debris removal was needed to minimize the potential of the public and workers to asbestos. The basic outline of the plan was this: the USACE would still take the lead role in debris removal through ESF-3. However, recon teams from EP, OSHA, and USACE would make an effort to identify debris that was heavily impacted with ZAI or other potential ACM. The EPA would then address this smaller subset of debris in the flood impacted zone. It should be noted that some of this identification work had already been started by personnel from the US PHS during their mission assisting property owners evaluating their homes upon reentry.

As a result of the education efforts, some property owners have begun bagging and labeling ZAI materials and placing them segregated at the curbside for collection (see attached photo). However, this message has not been universally received. As a consequence, EPA recon teams have found both piles of loose vermiculite, and debris piles where ZAI has been mixed in with other construction materials (see Attachment 2-Photographs). EPA has set up operational teams to address all three settings. USACE debris team and safety office coordinated (and continue to coordinate) with EPA field officers to assess piles and work cooperatively to remove ZAI and other asbestos containing materials while USACE contractors removed C&D debris to prevent EPA contractors from removing hundreds of possibly lightly contaminated debris piles. As mention above, US PHS had originally identified and marked hundreds of piles as potentially containing ZAI. While in the end this effort was somewhat helpful, some of its effectiveness was lost because this information was not directly communicated to either the USACE or the EPA. As a result, significant amounts of information was lost and/or redundantly acquired. This should be included as a “lesson learned” for future events. Nonetheless, overall these coordination efforts have been working effectively to move forward both the ESF-3 and ESF-10 Missions in a safe and prudent manner.

As part of its Mission Assignment, EPA has conducted an area wide air monitoring/sampling effort in accordance with the attached plan (see Attachment 3-Air Sampling Plan). In addition to hand held real-time monitors EPA placed six stationary monitors across Minot for 24 hour/7 day a week sampling. In short, while occasional excursions of both dust and VOCs occurred (and continue to occur) during the flood recovery efforts, no sustained levels or inherently hazardous conditions were observed in ambient sampling. The data from this sampling effort can be found at EPA’s operations web viewer: (<https://react.nvs-inc.com/epasilver/>)

To assess the risk to EPA ERRS contract personnel (Environmental Restoration “ER”) EPA conducted Activity Based Sampling (ABS). Personnel air samplers were placed on workers that were engaged in all three types of EPA’s ZAI collection work (see Attachment 3-Air Sampling Plan). It should be noted that all ER personnel conducting this activity are in Level C Respiratory protection, and using engineering controls to reduce exposure. The results of the ABS sampling showed that people directly handling ZAI and/or mixed debris would be exposed to a fairly complex mixture of airborne fibers. Phase Contrast Microscopy (PCM, NIOSH 7400 Method) showed fiber levels in some cases above the OSHA PEL of 0.1 f/cc. However, a subsequent analysis of these samples by Transmission Electron Microscopy (TEM-NIOSH 7402 Method) revealed that non-asbestos fibers (largely fiberglass and cellulose) were

much more prevalent than asbestos fibers. Nonetheless, ER personnel doing this work will continue to use engineering controls and wear Level C protection. The data from these efforts can be found in Attachment 4.

EPA personnel also assisted the USACE in conducting personnel air sampling for their debris collection contractors. Operators, ground personnel, and USACE quality assurance inspectors has personal air monitors placed on their person. The levels reported by the USACE analysis were several orders of magnitude lower than those experienced by EPA ERRS personnel, and subsequent TEM revealed no asbestos fibers.

In summary the EPA is quite satisfied that there have been no wide scale releases of asbestos fibers to the ambient air, and that EPA and USACE workers are well protected against exposure to asbestos. The EPA also concludes that the outreach efforts taken to have helped to reduce the exposure of private citizens and their contractors to asbestos in their homes, but that this message has not been universally received.

**Attachment 1-Vermiculite Fact Sheet**



## Handling Flood-Damaged Vermiculite Insulation



July 2011

This fact sheet contains information about managing and disposing of vermiculite insulation that may contain asbestos

As you clean up your homes and businesses, you may need to remove flood-damaged insulation. Some buildings and homes in North Dakota are insulated with vermiculite insulation. If you have vermiculite insulation, you should assume this material may contain asbestos and be aware of steps you can take to protect yourself and your family from exposure to asbestos.

### How can I tell if my insulation is made from vermiculite?

Vermiculite insulation is a pebble-like, pour-in product and is usually gray-brown or silver-gold in color.

### How can I tell if my vermiculite insulation contains asbestos?

You should assume that your vermiculite insulation contains asbestos. Here are some pictures of vermiculite insulation:



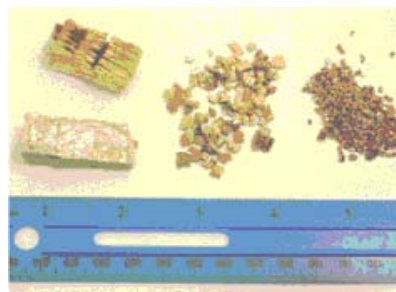
Typical vermiculite insulation



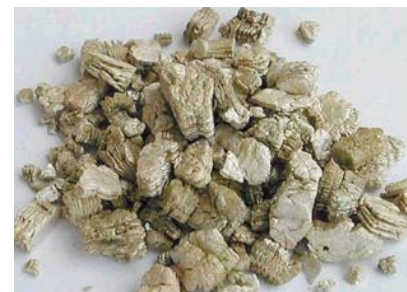
Vermiculite insulation between attic joists



Vermiculite insulation particle size relative to paper clip



Different sizes of vermiculite particles



Typical vermiculite insulation

**Attachment 2-Photographs**













## Attachment 3-Air Sampling Plan

# Air Monitoring Plan For The Minot ND Flood 2011

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USEPA will perform air monitoring for the following parameters during the cleanup of debris and other materials In Minot North Dakota caused the extensive flooding of the Souris River. Monitoring stations will be set up in six of the nine cleanup zones established by Incident Command. The purpose of the monitoring is to evaluate the ambient air levels for particulates (PM), and Volatile Organic Compounds (VOCs).

### **Particulates PM2.5**

PM 2.5 will be monitor using E-BAMs which is a portable, battery powered continuous PM monitors based on beta attenuation. The data from the E-BAMS will be transmitted via viper to a command post, The hourly particulates levels for PM-2.5 will be evaluated against the 24 hr ambient PM 2.5 standards below and if the trend is towards  $> 40\mu\text{g}/\text{m}^3$  the operations section chief will be notified.

0 -  $15 \mu\text{g}/\text{m}^3$  Good. No adverse effect.

$>15 - 40$  Moderate Unusually sensitive people should consider reducing prolonged or heavy exertion.

$>40 - 65$  Unhealthy for People with heart or lung disease, older adults, sensitive groups and children should reduce prolonged or heavy exertion.

$>65 - 150$  Unhealthy People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.

$>150 - 250$  Very unhealthy People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.

$>250 - 500$  Hazardous Everyone should avoid all physical activity outdoors. People with heart or lung disease, older adults, and children should remain indoors and keep activity levels low

### **Volatile Organic Compounds (VOCs)**

Volatile Organic will be monitored continuously using Rae Systems Area Rae equipped with a photo ionization detector. The readings from the Area Rae's will be transmitted via Viper to web site where the hourly PID readings will be posted. The hourly averages will be compared to the OSHA TWA for Benzene which is 1.0ppm. If the hourly average trend is  $>$  than 1.0 ppm the operations section chief will be notified. If at any time the hourly average is above half the OSHA STEL 2.5 ppm, the operations section chief will be notified.

### **Asbestos Ambient Air Sampling**

Asbestos samples will be collected following NIOSH method 7400 results will be provided 48 hrs after receipt of samples. Any positive results will be confirmed following NIOSH 7402. The results will be compared to the NIOSH TWA 0.01 ff/cc. IF the NIOSH TWA is exceeded the

operations section chief will be notified. Ambient air sampling locations will be co-located with ambient air particulate monitors.

### **Activity-Based Sampling during ACM Removal Operations**

To assess engineering controls put in place during removal of suspected ACM material, EPA will conduct multiple activity based sampling events. During these events a perimeter air sampler will be placed on either side of the secured work location. A personnel sampling pump will be placed on a worker performing debris removal. Real-time particulate monitors (DataRAMs) may be co-located with the perimeter air samplers to provide real-time feedback to operations personnel on dust mitigation efforts. All samples will be analyzed following NIOSH method 7400. Any positive results will be confirmed following NIOSH 7402. The results will be compared to the NIOSH TWA of 0.01 ff/cc. If the NIOSH TWA is exceeded the operations section chief will be notified. Each sampling activity will last 2-4 hours and be repeated 3 times over the course of several days.



**Attachment 4-ABS Data**

Samp_No	SampleDate	Matrix	Activity	PCM (f/cc)	TEM (f/cc)
147-HHW-001	31-Jul-11	Air	Household Hazardous Waste Pickup	0.012	0.006
147-HHW-002	31-Jul-11	Air	Household Hazardous Waste Pickup	0.031	0.005
147-ABS-001	03-Aug-11	Air	Vermiculite Removal	0.01	0.006
147-ABS-002	03-Aug-11	Air	Vermiculite Removal	<0.006	
147-ABS-003	03-Aug-11	Air	Vermiculite Removal	0.012	0.006
147-ABS-005	04-Aug-11	Air	Vermiculite Bag Collection	0.375	0.006379512
147-ABS-006	04-Aug-11	Air	Vermiculite Bag Collection	0.775	0.007751102
147-ABS-008	05-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.1228	<0.0097
147-ABS-009	05-Aug-11	Air	Vermiculite Bag Collection/Excavation	<0.0097	
147-ABS-010	05-Aug-11	Air	Vermiculite Bag Collection/Excavation	<0.0097	
147-ABS-011	05-Aug-11	Air	Vermiculite Bag Collection/Recon	0.0244	<0.003
147-ABS-012	05-Aug-11	Air	Vermiculite Bag Collection	<0.0118	
147-ABS-014	05-Aug-11	Air	Vermiculite Pile Excavation	<0.0121	
147-ABS-015	05-Aug-11	Air	Vermiculite Pile Excavation	<0.0091	
147-ABS-016	05-Aug-11	Air	Vermiculite Pile Excavation	0.0267	<0.0105
147-ABS-017	06-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.089	0.001
147-ABS-018	06-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.031	0.001
147-ABS-019	06-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.056	0.001
147-ABS-020	06-Aug-11	Air	Vermiculite Bag Collection/Recon	0.039	0.001
147-ABS-021	06-Aug-11	Air	Vermiculite Bag Collection	0.032	0.004
147-ABS-023	07-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.029	0.003
147-ABS-024	07-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.016	0.003
147-ABS-025	07-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.071	0.004
147-ABS-026	07-Aug-11	Air	Vermiculite Bag Collection/Recon	0.032	0.002
147-ABS-027	07-Aug-11	Air	Vermiculite Bag Collection	0.037	0.002
147-ABS-028	07-Aug-11	Air	Vermiculite Bag Collection	0.015	0.002
147-ABS-033	08-Aug-11	Air	Vermiculite Excavation	0.011	0.0018
147-ABS-034	08-Aug-11	Air	Vermiculite Excavation	<0.005	
147-ABS-035	08-Aug-11	Air	Vermiculite Excavation	0.013	0.002
147-ABS-036	08-Aug-11	Air	Vermiculite Excavation	0.015	0.002
147-ABS-030	08-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.009	
147-ABS-031	08-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.005	
147-ABS-032	08-Aug-11	Air	Vermiculite Bag Collection/Excavation	0.102	
147-ABS-042	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		0.001794872
147-ABS-043	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		0.001864876
147-ABS-044	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		0.002199598
147-ABS-038	09-Aug-11	Air	Vermiculite Excavation		<0.001428571
147-ABS-039	09-Aug-11	Air	Vermiculite Excavation		<0.001428571
147-ABS-040	09-Aug-11	Air	Vermiculite Excavation		<0.00141129
147-ABS-042	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		<0.001794872
147-ABS-043	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		<0.001864876
147-ABS-044	09-Aug-11	Air	Vermiculite Bag Collection/Excavation		<0.002199598

