Challenges in Risk Assessment for Asbestos: An Update

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“Air Cell” Insulation

- Pre-formed, cardboard-like insulation.
- Lower heat applications (hot water pipes, radiators).
- Banned in 1975 for manufacturing.
- Some relatively intact pieces found on-site.

84 *The Literary Digest for May 2, 1925*

Using dead air to keep heat *alive* . . . . .

TO keep heat alive from furnace to radiator is everybody's problem. But it is not a difficult one.

To preserve live heat, surround it with dead air—a scientific principle.

It is upon this principle that Johns-Manville Improved Asbestocel is designed. There are multitudes of separate dead air cells in every three-foot length of this pipe covering. Ordinary pipe covering contains long, open cells through which air circulates and carries away heat.

It is this difference that makes Improved Asbestocel the most efficient pipe insulation, per dollar of cost.

Cells open like this are bad.

Cells closed like this are efficient—Asbestocel.

JOHNS-MANVILLE Inc., 292 Madison Avenue at 41st Street, New York City
Branches in the Large Cities FOR CANADA: CANADIAN JOHNS-MANVILLE CO., LTD., TORONTO

Cover your heater and pipes now!

Any heating man or plumber can apply Improved Asbestocel on your furnace body and heating pipes.

It is marked with a red band inside both ends of each length so that you may readily identify it.

Now, while your heating system is shut down, is the best time to have a heating man figure on cleaning out your heating plant and applying Improved Asbestocel. Do it now, and save next winter's coal before you buy it.

Inexpensive!

The cost of Improved Asbestocel is small compared to your annual fuel bill. Sometimes it pays for itself in one heating season.

Look for the Red Band

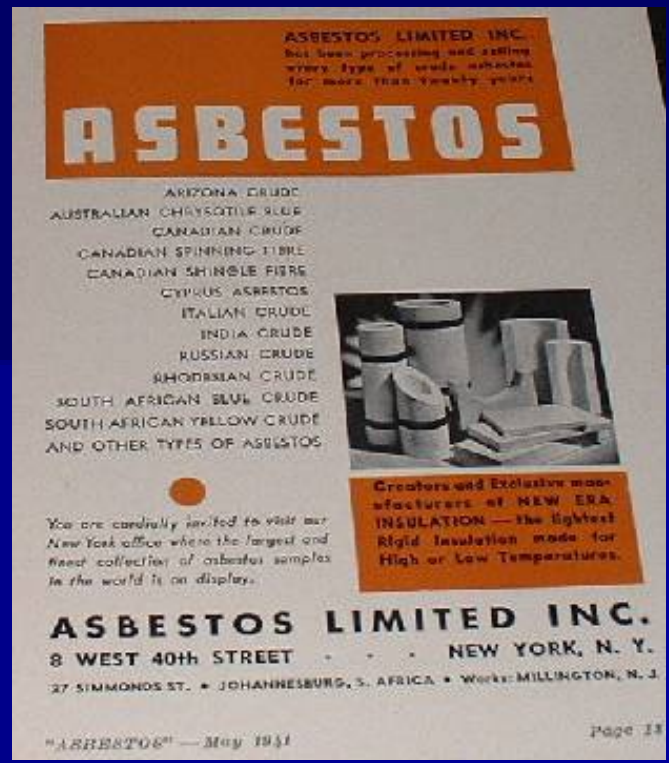
JOHNS-MANVILLE
Improved Asbestocel saves coal

Asbestos

Intact Air Cell

Damaged Air Cell from NRE

“Mag Block” Magnesium Calcium Silicate Insulation



- Typically pre-formed.
- Used for high temperature applications (boilers, piping).
- Banned in 1975 for manufacturing.
- On-site – heavily weathered.

Dust on Rafters and Floor Joist in the Crawl Space – Portland Vermiculite Site

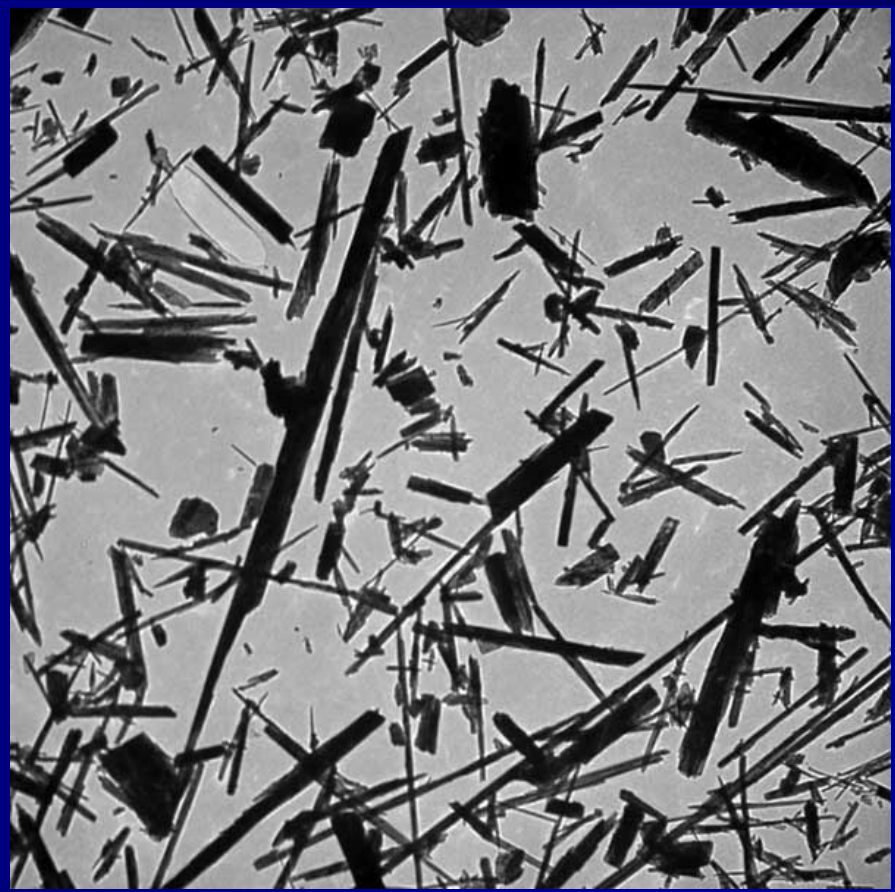
Piles and bags of vermiculite were found in the crawl space. The removal effort took more time and EPA resources than expected.


TOE OF SWIFT CREEK LANDSLIDE

EPA and OSHA regulate six types of asbestos

- **chrysotile**
- **crocidolite**
- **anthophyllite**
- **amosite**
- **actinolite**
- **tremolite**

Chrysotile and Tremolite Asbestos



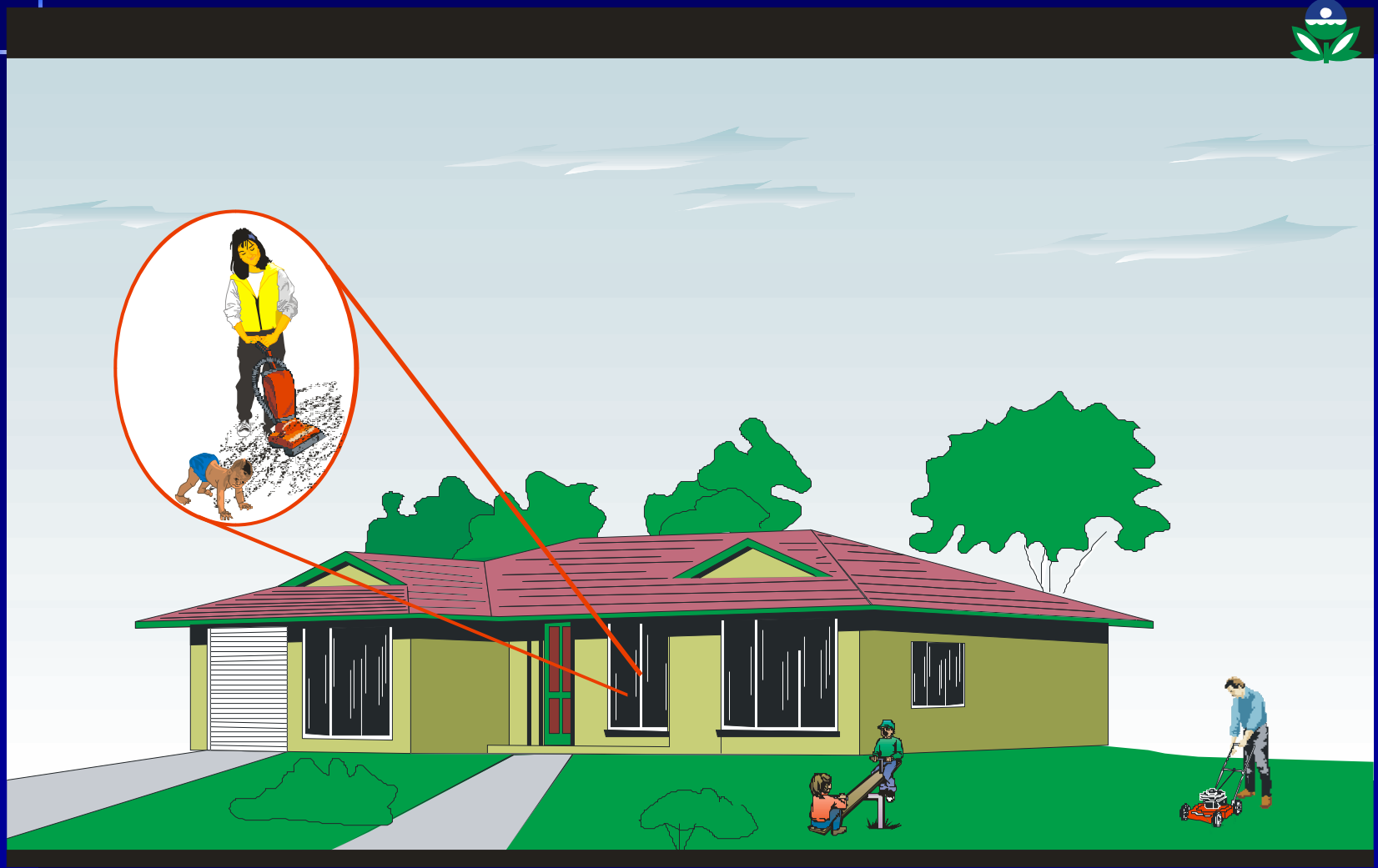
There are other types of abestiform minerals that are not regulated

- **Richterite / Winchite – similar to actinolite and tremolite, associated with Libby vermiculite**
- **Taconite – Minnesota (was asbestos responsible for illness in taconite workers?)**
- **Erionite – Oregon, South Dakota, Turkey**

How Can a Person Become Exposed to Asbestos?

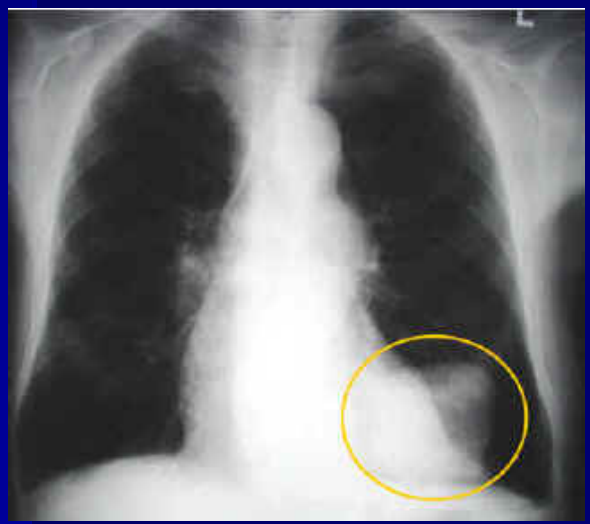
- Fibers become airborne and can be breathed into the lungs
- Not a problem if asbestos-containing minerals in soil are left undisturbed.

Conceptual Site Model



Asbestos Related Health Concerns

- Cancer
  - Lung Cancer
  - Mesothelioma
  - Other Cancers (GI? Larynx?)



- Non-Cancerous Lung Abnormalities
  - Asbestosis
  - Pleural Plaques
  - Pleural Thickening
  - Pleural Effusion (fluid)

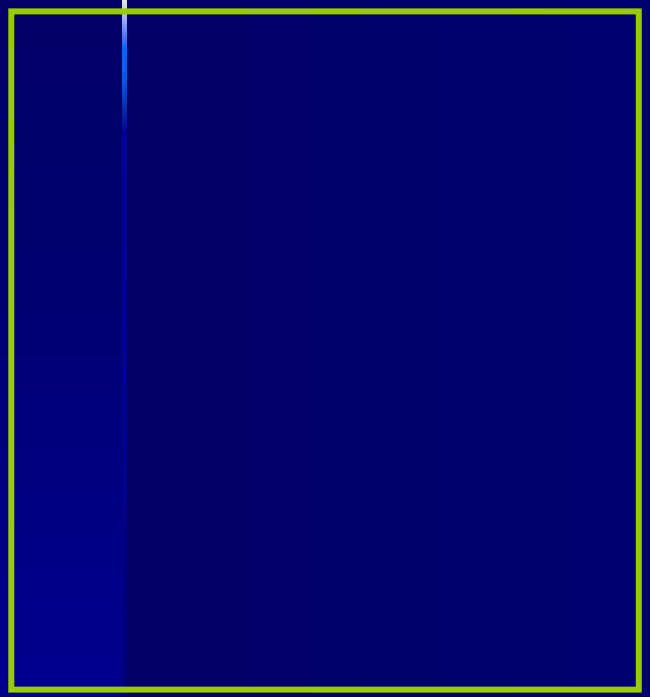
Toxicity Approaches for Asbestos

- IRIS (1986)
  - PCME fibers are related to toxicity
  - Assumes equivalent toxicity
  - Traditionally fiber counts were done using PCME
- Emerging Approaches
  - ?Weight amphiboles more heavily than chrysotile
  - ?Weight longer fibers more heavily
  - ?Thinner fibers may be more potent
  - Electron microscopy is needed for assessment

Background for Recommended Approach

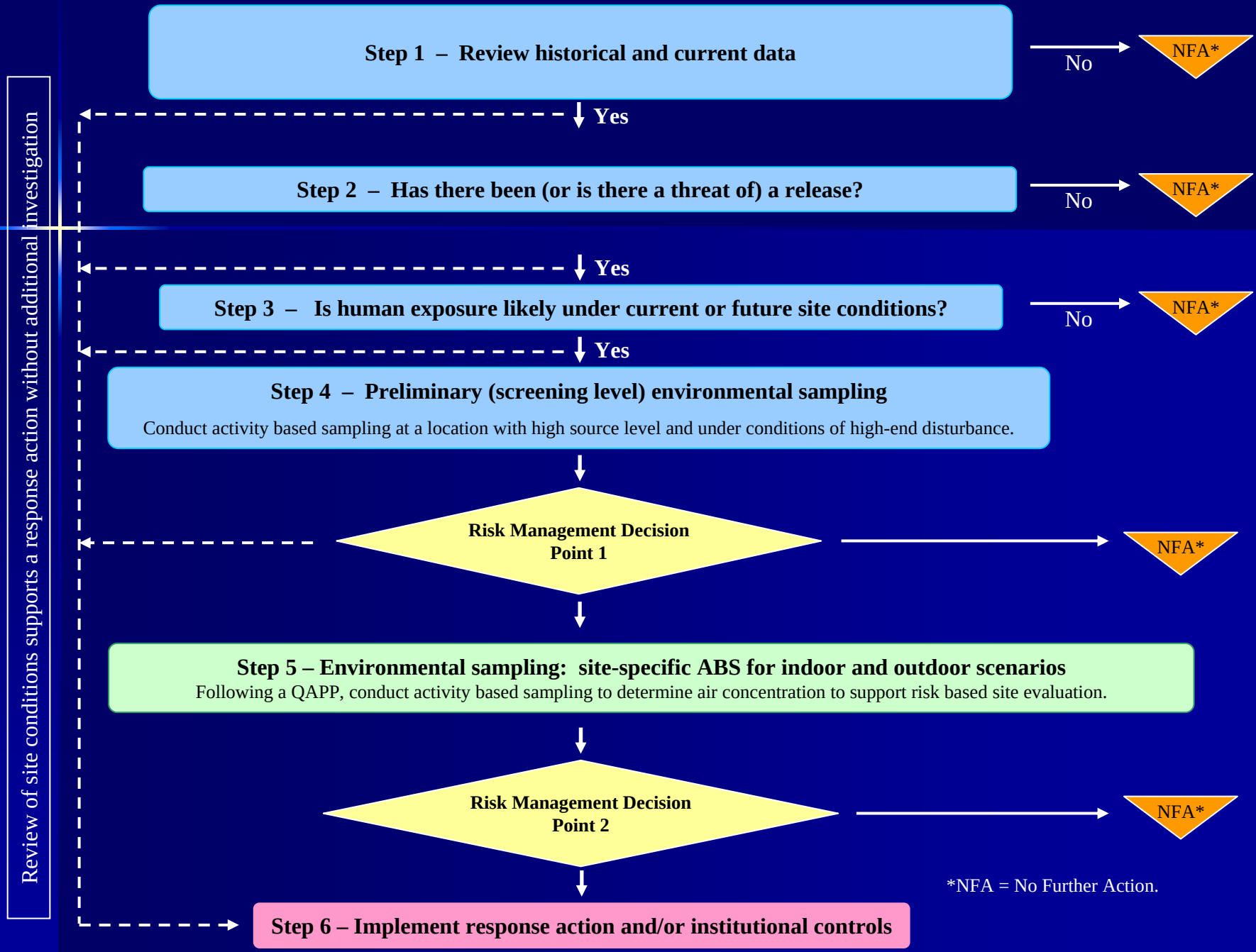
- 1% in soil historically used as clean-up level – NOT risk-based
- August 2004 Cook memo rescinded 1%
  - Regions should develop risk-based, site-specific action levels based on air concentrations
  - "an accurate exposure value could only be determined through site sampling techniques that generate [airborne] fibers from soil"

Asbestos Exposure Assessment



- Measurements made directly from the breathing zone are most appropriate for incidental soil exposures
- Measurements from stationary monitors may not provide reliable estimates of human inhalation exposure
- Solid media (e.g., soil or dust) measurements cannot be reliably converted to derive airborne exposure concentrations

Outline of the DRAFT Framework



Activity-Based Outdoor Sampling

- Uses an activity that provides a high-end soil disturbance
- Currently recommend a “raking scenario”
- Rake for specified time over a template area
- Collect personal air samples (breathing zone) and perimeter air samples
- Provides a measure of fiber release from soil

Activity-Based Indoor Air Sampling

- Activity-based sampling, if possible, if not, then generic using fans/leaf blower recommended
- Collect air samples
- Provides quantitative estimate of fibers in air

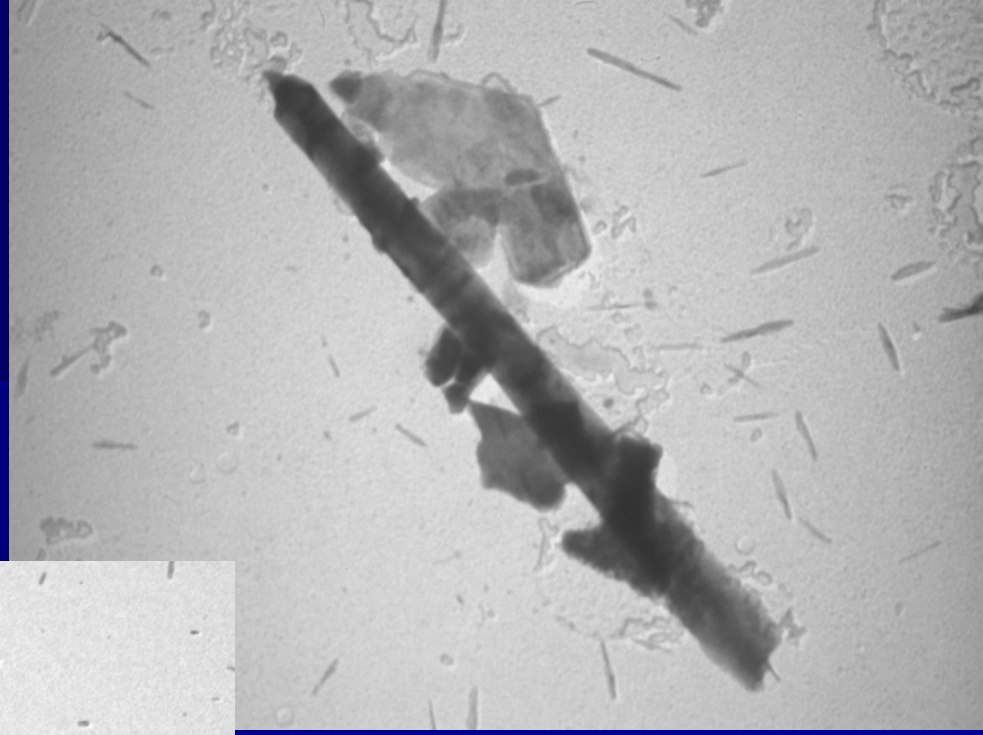
Activity-Based Sampling

Activity 1 – Digging and loading

Activity 2 – Spreading Dredged Material

Activity 3 – Recreational Activity along the Creek – note one person always trailed the other

Actinolite Fiber from Swift Creek ->



<- Chrysotile Fiber from Swift Creek

How to Estimate Exposure to Swift Creek Dredged Materials

Time Weighting Factors

Scenario	Hours/day	Days/year	Years	TWF
Walking	1	156	30	0.007632
Cross Country	1	30	4	0.00020
Dredger/Hauler	8	30	25	0.009785
1 year	8	30	1	0.000391
Child Play	2	350	10	0.011416
Farming	12	10	30	0.005871
Gardening	10	50	30	0.024462

Cancer Risk Calculation

- Risk can be estimated by multiplying the Air Concentration by the TWF and the lifetime unit risk (UR) for Asbestos:
  - Conc. (f/cc) x TWF (unitless) x UR $(f/cc)^{-1}$
  - UR = 0.23 per PCME f/cc

National EPA Work

- Noncancer reference concentration for asbestos is forthcoming
- Cancer models are being evaluated
- Releasability studies are being performed to better understand available methods/tools
- Several workgroups have formed – internal review/support
- Framework for Investigating Asbestos-Contaminated Hazardous Waste Sites (to be released soon)