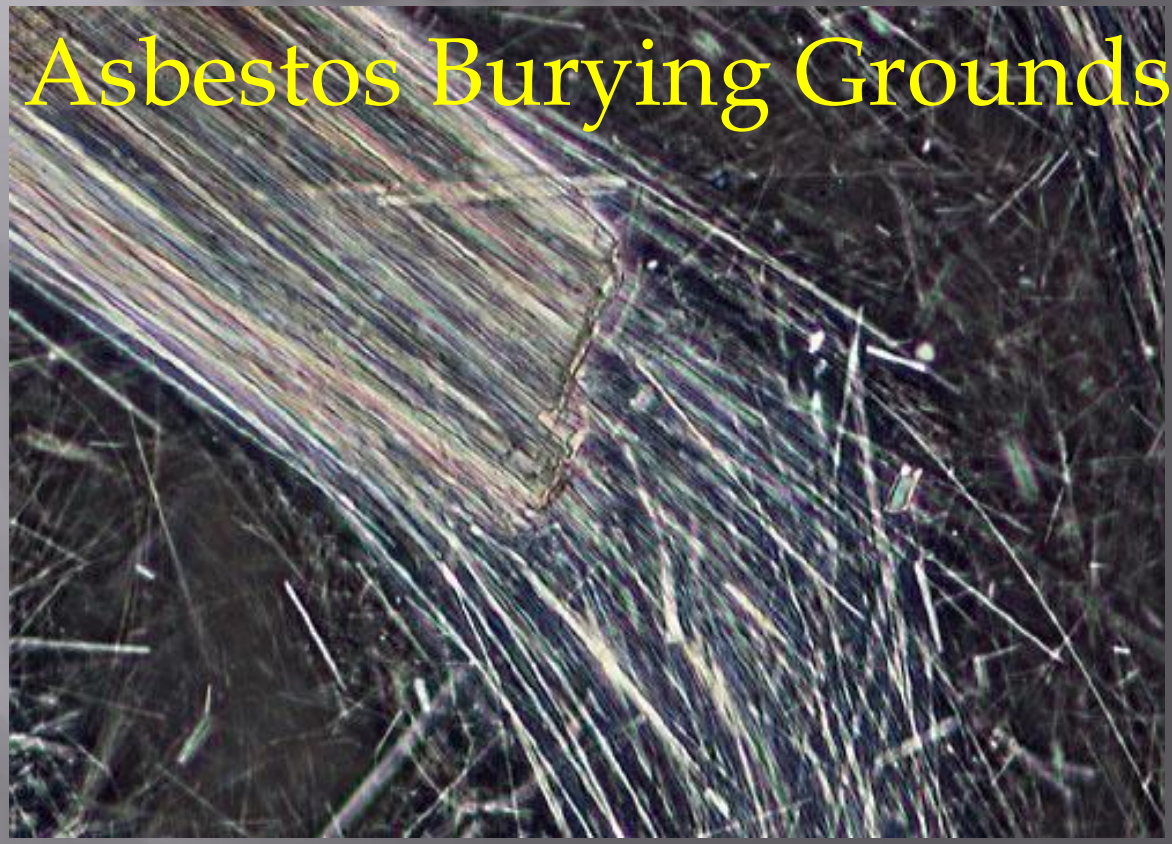
BROWNFIELDS:



Frank Ehrenfeld, International Asbestos Testing Laboratories

Definitions

- Brownfields are underutilized properties where reuse is hindered by the actual or suspected presence of pollution/contamination.

- US EPA

Historical Notes

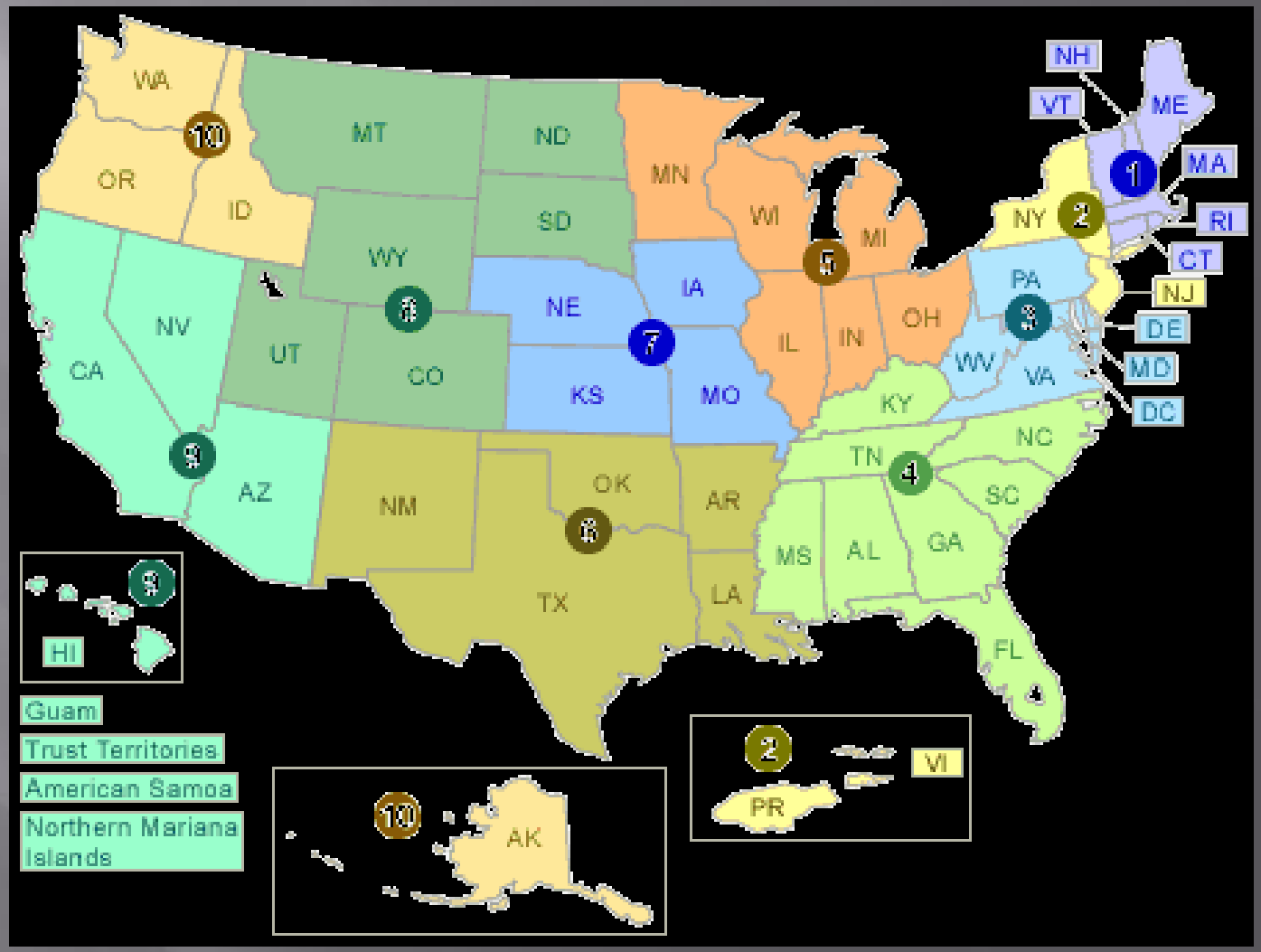
- Superfund Program CERCLA 1980

- Brownfield Reclamation 1992
- Moth-balled Brownfield
- Failed Brownfield

- TAB (Communities)
- HWCI (Contractors)
- BTSC (Engineers)
- Assessment Funding

Historical Notes

Reg 1: 17
Reg 2: 9
Reg 3: 10
Reg 4: 14
Reg 5: 19
Reg 6: 13
Reg 7: 8
Reg 8: 7
Reg 9: 15
Reg 10: 12



Historical Notes

- Industrialization, Rust Belt, Agricultural
- Federal, States, Local Government Funding
- Private Funding – Partnerships
- ROI $ (?)
- 17.5 : 1

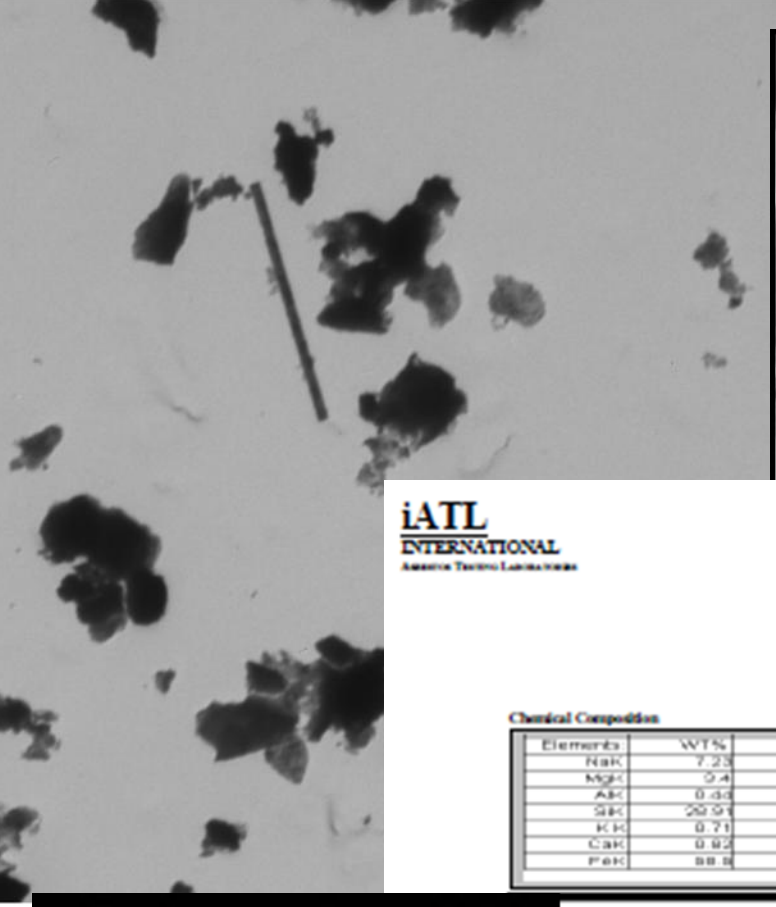
- Obstacles?

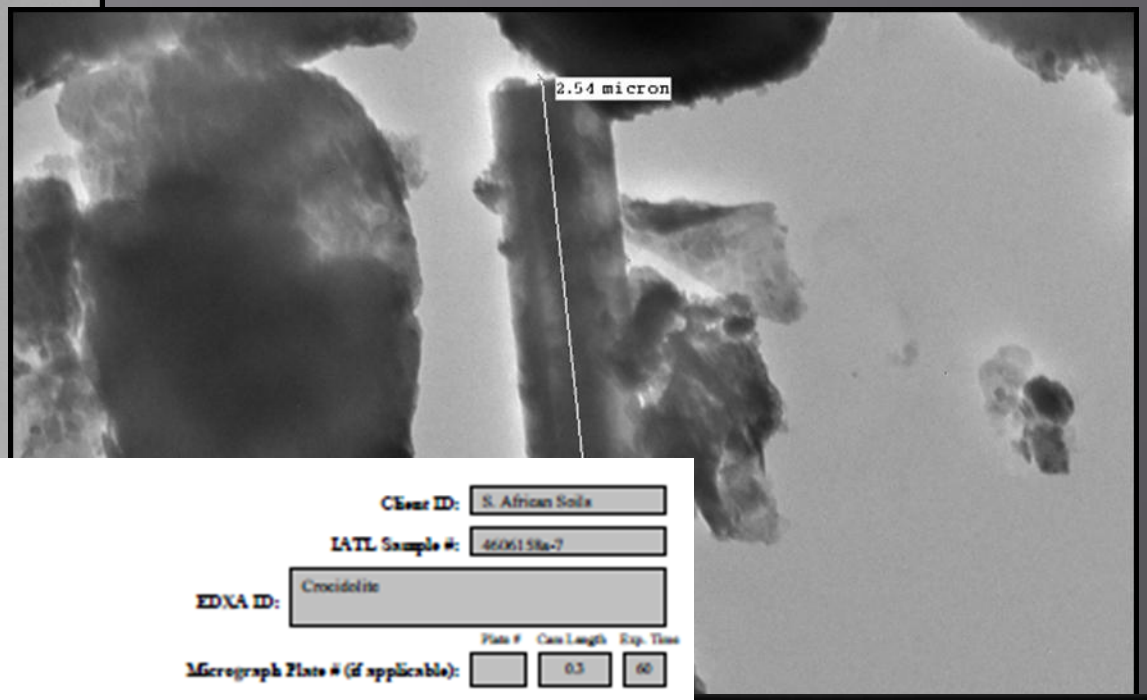
The San Francisco Bay Water Board has been involved in Brownfields cleanup and redevelopment for over 14 years.

Cleanup and redevelopment of these sites benefits the environment and communities by eliminating contamination problems, allowing economic growth, and revitalizing neighborhoods.

Made in C

CAT





iATL INTERNATIONAL
Asbestos Testing Laboratories

Client ID: S. African Soils

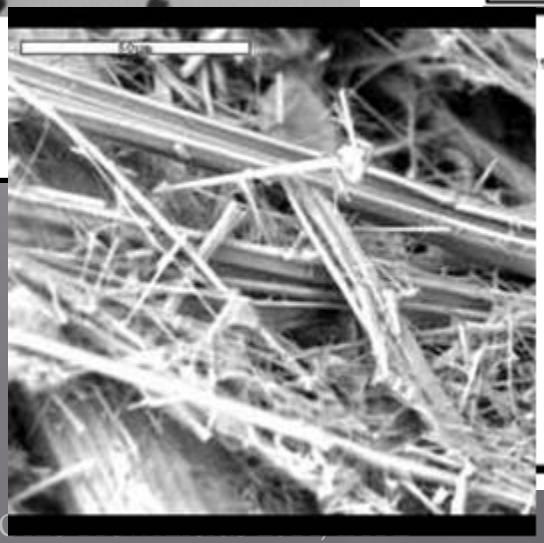
IATL Sample #: 4606158a-7

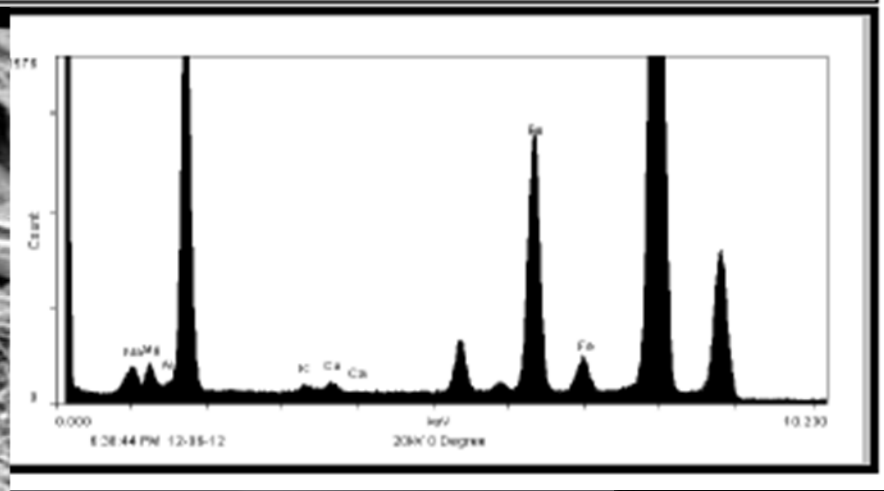
EDXA ID: Crocidolite

Micrograph Plate # (if applicable): Plate # | Case Length 0.3 | Exp. Time 60

Chemical Composition

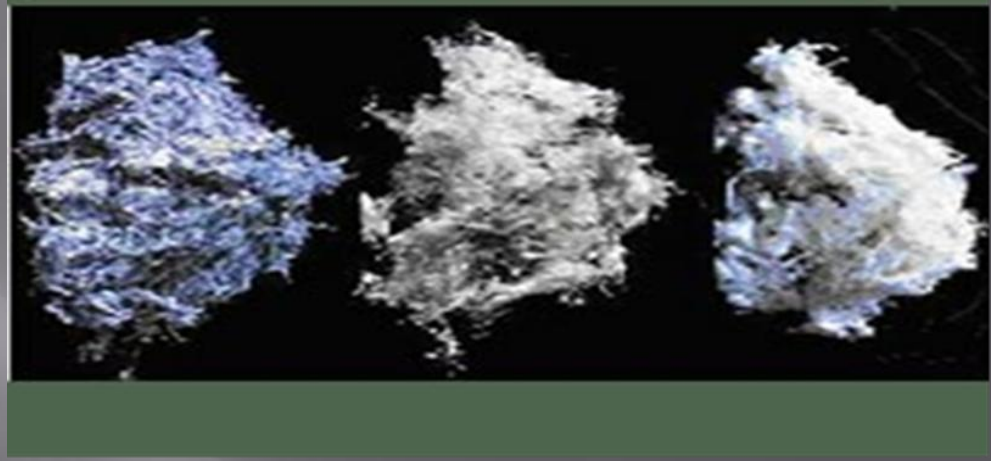
Elements	WT%	AT%	K_A	K_F	K_Z	Intensity	P/bkg
NaK	7.23	12.16	0.198	1.002	1.041	10.121	0.6
MgK	9.4	5.41	0.292	1.004	1.067	10.746	0.6
AlK	0.44	0.62	0.398	1.008	1.035	2.321	0.1
SiK	29.91	29.8	0.53	1.001	1.065	219.729	15.5
KK	0.71	0.7	0.854	1.015	1.017	6.014	0.5
CaK	0.82	0.79	0.894	1.024	1.04	6.549	0.5
FeK	58.8	48.81	0.994	1	0.949	246.383	14.8





Asbestos 101

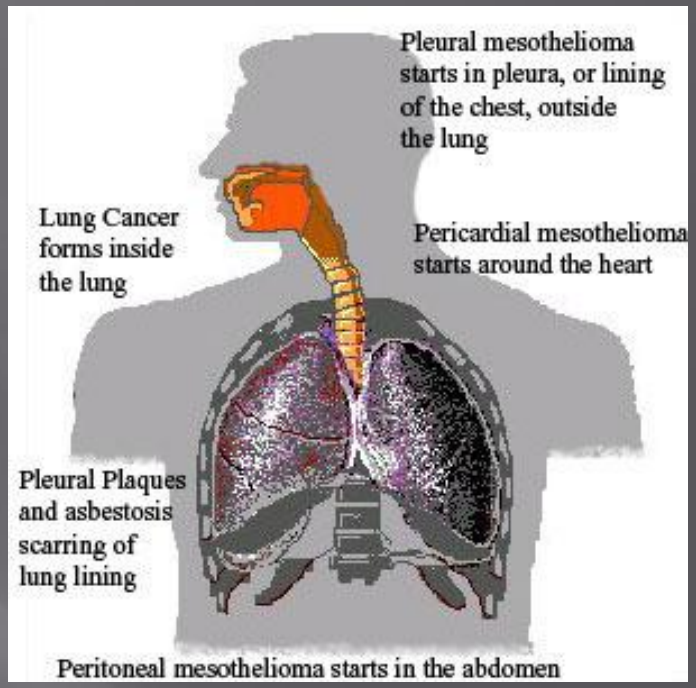
What is asbestos?



Asbestos is the name given to a number of naturally occurring fibrous minerals with high tensile strength, the ability to be woven, and resistance to heat and most chemicals. Because of these properties, asbestos fibers have been used in a wide range of manufactured goods, including roofing shingles, ceiling and floor tiles, paper and cement products, textiles, coatings, and friction products such as automobile clutch, brake and transmission parts. The Toxic Substances Control Act defines asbestos as the asbestiform varieties of: chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite/grunerite); anthophyllite; tremolite; and actinolite.

Asbestos 101

Asbestos Health Effects



Exposure to asbestos increases your risk of developing lung disease. In general, the greater the exposure to asbestos, the greater the chance of developing harmful health effects. Disease symptoms may take several years to develop following exposure. Exposure to airborne friable asbestos may result in a potential health risk because persons breathing the air may breathe in asbestos fibers. Continued exposure can increase the amount of fibers that remain in the lung. Fibers embedded in lung tissue over time may cause serious lung diseases including asbestosis, lung cancer, or mesothelioma.

Asbestos 101

Where can asbestos be found?

Asbestos fibers are incredibly strong and have properties that make them resistant to heat. Many products are in use today that contain asbestos. Most of these are materials used in heat and acoustic insulation, fire proofing, and roofing and flooring.

The extent of the problem

Between 1900 and 1980, 36,000,000 metric tons(!!!) were used worldwide in over 3000 products. Still considered invaluable in many applications for industry, military, and commerce, in 2008, the US imported 1,400 metric tons of asbestos.

Asbestos 101

Detecting asbestos

Leading the way to address the asbestos health issue, the US has adopted many worker safety and environmental regulations to control exposure and measure the problem. Accredited laboratories through USEPA are required to utilize microscopic techniques of Polarized Light Microscpy (PLM) and Transmission Electron Microscpy (TEM) to characterize suspect mineral fibers. Optical properties, crystalline structure and chemical/elemental signatures can be measured for these determinations.

Asbestos 101

Analytical Methods

USEPA along with ASTM, NIOSH, and ISO and others have developed analytical methods to detect asbestos in the following matrices:

Air – worker safety, personal monitoring (several exist, ex. NIOSH 7400 & 7402)
Air – environmental, and case-related methods (ex. ISO 10312 and 13794)

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Stone Aggregate, (CARB 435)

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Stone Aggregate, (CARB 435)
Vermiculite Mineral, variations exist (ex. EPA 04-R-004, ASTM)
Mixed soil/debris, proprietary
Surface dust, variations exist (ex. ASTM 5755,5756, 6480)
Potable and Non-potable Water, (EPA 100.1, 100.2)

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Biological, Tissue, etc.
Building waste, mixed with demolition debris, HazMat chemical slurry, live electrical conduit, and a dose of dead rats

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Asbestos/Brownfields, Case Study 1

Initial Scope

EPA Regional Site with over 60,000 square feet of multi-storied abandoned industrial space

Standard Asbestos Survey conducted using ASTM E2308 and NOT ASTM E2356

Many hazards identified including asbestos insulation materials using standard analytical techniques

Remediation plans approved and project moved forward

Asbestos/Brownfields, Case Study 1

Discovery and Expanded Scope

Laboratory testing revealed vermiculite mineral. This was not in the original plan. SOW did not call for this as a target analyte. This was going to be ignored on site.

Additional field sampling and laboratory testing using the correct Analytical Method (USEPA 600 R04-004) revealed dangerous levels of actinolite asbestos throughout the structures. Use of this method and the ASTM D7521 Method for possible materials mixed in soil, clarified the extent of the asbestos contamination.

Asbestos/Brownfields, Case Study 1

How, What, Why it makes a difference…

Vermiculite mineral often undergoes an exfoliation process before it is used as insulation material. The mica sheets often hide actinolite/tremolite asbestos and other "Libby Amphiboles" unless the proper field sampling and analytical testing procedure is applied. EPA's vermiculite method uses a wet technique to separate the vermiculite into fractions that float, sink, and are suspended. These fractions can then be analyzed by PLM and TEM to qualify and quantify any asbestos associated with the vermiculite minerals. This is unlike any previous analytical method and is specific to the unique characteristics of vermiculite.

Asbestos/Brownfields, Case Study 1

Lessons

Never assume that a material does NOT contain asbestos unless it is tested by the correct analytical methods.

Detection limits down to a fraction of a percent (<0.1%) are available with these methods.

Current accreditation programs may not include these methods.

Not all accredited laboratories offer these services.

Analysts with backgrounds in geology/mineralogy may be required.

Asbestos/Brownfields, Case Study 2

Initial Scope

Large upper mid-west city utilizing Brownfields approach at an abandoned industrial site.

Many hazards identified including asbestos insulation materials using standard analytical techniques.

Remediation plans approved and project moved forward.

Asbestos/Brownfields, Case Study 2

Discovery and Expanded Scope

Engineering group on-site discovered forgotten crawlspaces under parts of several buildings. Significant asbestos in previously (illegally and improperly) removed insulation materials was buried under the crawlspace soil.

Removal also uncovered asbestos containing concrete pipe.

Use of ASTM D7521* were employed to determine extent of contamination.

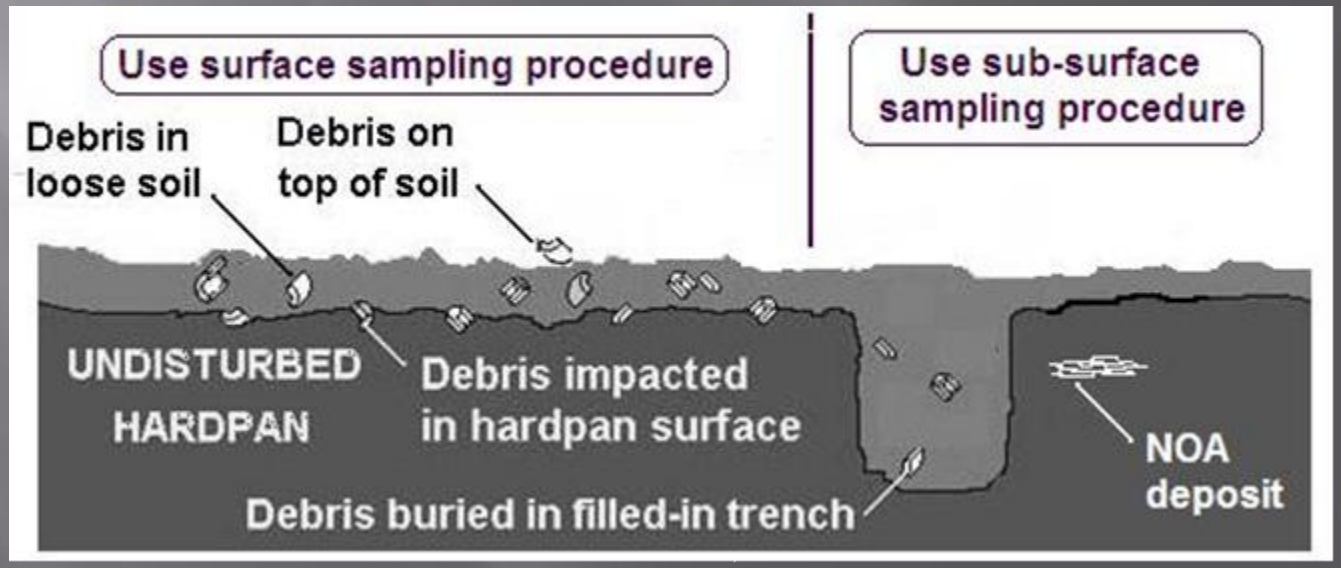
*Proprietary until 01/2013

Asbestos/Brownfields, Case Study 2

How, What, Why it makes a difference…

Simple surface and depth samples help to establish a gradient of possible soil contamination from fallen asbestos insulation.

Gravimetric analyses can increase standard building material method limits of quantitation.



Asbestos/Brownfields, Case Study 2

Lessons

Asbestos in crawlspace soil can present unique problems… how much sampling is enough? Is light microscopy 'good enough' to discern asbestos levels that have been disassociated from building materials?

Air monitoring samples analyzed by TEM (NIOSH 7402) frequently become overloaded with interfering particulate.

Use of ISO 10312 and 13794 analytical methods are often required to analyze these overloaded samples.

Encapsulating materials are often required to 'seal' the soil in such cases.

Asbestos/Brownfields, Case Study 3

Initial Scope

Straight forward UST removal at abandoned industrial site in northern Virginia warranted loads of surrounding soil/earth be removed to an off-site location.

A savvy state inspector noted old geological maps of the area and mining of asbestos.

A sample of soil/rock was taken, not for obligatory petroleum hydrocarbon testing, but for the asbestos content of the soil/rock.

Asbestos/Brownfields, Case Study 3

Discovery and Expanded Scope

Laboratory testing revealed a large deposit of natural occurrences of asbestos (NOA).

The previous demolition activity had fragmented the rock and dangerous levels of asbestos were becoming airborne… especially in construction/demo transfer trucks.

A geologic survey was conducted that amended the scope to include site dust and worker protection controls.

Air monitoring was adjusted to account for this 'new' hazard.

Asbestos/Brownfields, Case Study 3

How, What, Why it makes a difference…

The chrysotile and tremolitic asbestos that was being disturbed was not hazardous unless airborne.

Tarp covered trucks that now had wetted earth helped prevent the release of unsafe levels of asbestos fibers to the workers and surrounding community.

Asbestos/Brownfields, Case Study 3

Lessons

Asbestos needs to be included in the initial environmental survey, not just for bulk building materials, but for its potential to be naturally occurring in the geology at any site.

Analytical methods specific for asbestos in 'soil/earth' need to be utilized.

ASTM D22.07 has developed some guidance for field sampling procedures and analytical methods that can be used in various situations that involve NOA.

Engage laboratories that participate in such ASTM method development.

Asbestos Brownfields / Recommendations 1

Worker Safety:

OSHA has established various regulations and exposure thresholds for worker safety where asbestos is suspect. Proper planning and project design for asbestos removal require addition federal and, in many cases, local ordiances pertaining to asbestos and worker safety be followed.

For instance the City of Philadelphia's Air Management Services (AMS) Unit of the Philadelphia Department of Public Health has been tasked with the implementation of Philadelphia's Asbestos Control statute and regulations. AMS, conducts training and refresher courses for Asbestos Project Inspectors; designed, implemented and manages the certification and recertification process for Asbestos Project Inspectors, asbestos abatement contractors, asbestos analytical laboratories, and Asbestos Investigators; and developed and maintains the management information system which supports these certification activities.

Asbestos Brownfields / Recommendations 2

Initial Scope Survey & Analytical Methods:

Public and Private groups investigating and planning redevelopment of Brownfields, must BE PREPARED to address possible asbestos issues. The case studies mentioned in this poster allude to just some of the potential hazards of asbestos. Preparedness includes specifying the correct analytical approach so that the best data can be utilized in the decision process to control or remediate asbestos.

Possible Asbestos Hazards:

- damaged building materials left on site
- building materials buried by property owners and mixed/diluted with soil
- illegal dumping of ACM from other sources
- matrix materials that require non-routine analytical testing (ex. vermiculite)
- matrix materials that require proprietary testing (ex. post-fire water)
- reliance on old architectural/engineering prints that misidentified asbestos
- improper sampling strategies that overlook all possible matrices (ex. dust)

Asbestos Brownfields / Recommendations 3

Environmental Monitoring:

Circumstances change everyday at a Brownfield Sites. The weather, removal activities, accidental fires, dust from demolition activities, untrained workers removing debris, etc.

Pre-project "Activity Based Sampling" (ABS) regimens can be used to study the unique circumstances at a site before remediation begins. An effective Brownfields Site requires an independent third party group to monitor and record activities, sample worker and environmental air, and measure these variables as they might impact surrounding ambient air levels to protect public health.

References

References:
1- San Francisco Redevelopment Authority
2- US EPA Website (www.usepa.gov)
3- NIST Special Publication #506
4- US Chamber of Commerce (www.cancer.gov)
5- National Institute of Standards and Technology – NVLAP
6- OSHA, 29CFR 1910, Asbestos
7- American Conference of Government Industrial Hygienists, 1992
8- Philadelphia Asbestos Control standards – www.phila.gov/health
9- Various EPA and State references – contact us for information at www.iatl.com
10- ASTM D22.07 Asbestos Sampling and Analysis

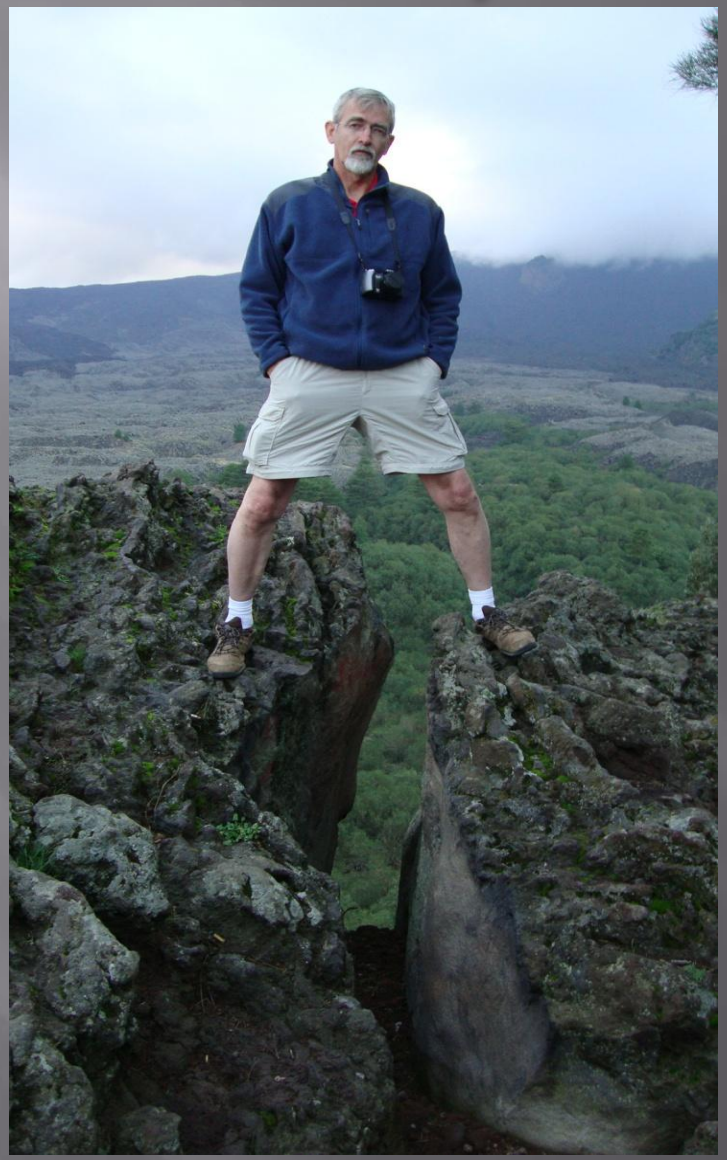
Information on Analytical Methods: www.astm.org
Information on Worker Safety and Asbestos: www.osha.gov
Information on Case Studies and this Poster: www.iatl.com

Author: Frank Ehrenfeld III, Laboratory Director,
International Asbestos Testing Laboratories
Vice-Chair, ASTM D22.07, Asbestos Sampling and Analysis

Conclusions / Contest

Define and Refine Scope

Select Analytical Methods to match circumstances

Partner with your Laboratory Professional

Conclusions / Contest