iATL INTERNATIONAL ASBESTOS TESTING LABORATORIES

Current Issues in Environmental and Occupational Health & Safety Science for the Industrial Hygiene Community

Next Level

ISSUE 2022 / 04

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Regulatory Context:

The Clean Air and Clean Water Acts from the 1970's kicked off two generations of regulatory initiatives tended to address those two specific matrices. As such, hazardous chemicals and materials related to water and airborne contaminates received the greatest attention. And – why not?! Exposures to what we breathe and the sources of what we drink were, and still are, universal concerns. Yet, along the way, even by the late 1970's, a rapid expansion into other environmental sources grew. This included geologic sources, building materials, agricultural sources, and just about anything that might then become airborne.

Lack of Methods:

Though airborne asbestos laboratory methods quickly were adopted (ex. P&CAM 239 from early NIOSH Methods 1976, George Yamate method for early TEM, etc.) only a smattering of bulk building material methods by PLM were released. The 1982 release from EPA for bulk building materials is still listed as the 'interim' method – though later ventures improved upon the depth and breadth of the procedures, practices, and options available.

Soil specific methods included the 1994 release by USEPA Region 1, the initial and subsequent updates from CARB, and the seminal work from ASTM D7521 in 2015 with fully validated PLM and TEM sections.

Asbestos in Soil – Options and Recent News

There have been plenty of studies and publications on recent advances in asbestos in soil issues as well as related items on natural occurrences of asbestos (NOA). There is a myriad of reasons why matrix specific analytical methods are needed when investigating these situations. While geologic sources apply to NOA, asbestos in soil may involve a wider range of circumstances. For now, we look briefly at the latter.

Complications/considerations

A typical building survey entails collecting and submitting a representative, yet small (~2cm^3) sample of building material for laboratory analysis. While there are exceptions (ex. plasters, coatings, repairs) the assumption is that the building material is pre-formulated/manufactured and generally homogenous. This is rarely the case in asbestos in soil projects.

Laboratories must be prepared for, and in analysis account for: ⬩moisture/wet samples, ⬩matrix interferences, ⬩potential biohazards or other organic contaminates, ⬩multiple target materials ⬩vermiculite and ⬩countless remnants of building materials that may be burnt, rotting, or damaged.

While many non-specific analytical methods might suffice, the use of methods that recognize and account for these, and other challenges, benefit the lab and investigator. Laboratory training and procedures must address these possible interferences.

iATL receives projects involving these matrices. Dirt-floored crawlspaces where old insulation from pipe chases has been removed and trampled into the soil. Illegal dumping of building materials that have been bulldozed and spread around and under surface soil are common. While collecting potential lead paint evidence from building driplines – the unintended sampling of remnants of asbestos from cement siding, roofing, and insulation.

Analytical Options

iATL has a two-page list of analytical options that lists pros/cons, general costs, and intended purposes of several methods that may be appropriate for your next investigation. Please ask CustomerService@iatl.com.

While screening can use the principles listed in several methods (ex. USEPA 600 R93/116), soil specific methods would be needed to provide separation techniques such as milling (not always a good idea), sieving, wet separation using water, or high density 'heavy liquid' techniques.

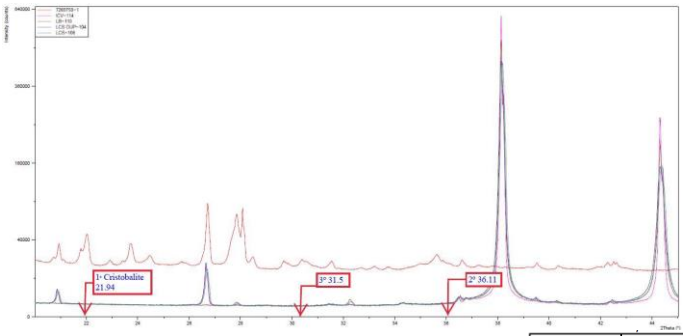
The best methods include the determination of asbestos in the respirable fraction (<120um) using TEM. Such data may benefit investigator's interest in potential exposure/risk and the likely association of airborne concentrations.

Recent USEPA Study:

iATL participated in a recent multi-lab study directed by USEPA that employed over a dozen soil samples, some that were blank, some that were formulated with carefully distributed low levels of amphibole, others with chrysotile, etc. that employed a comparison of three analytical methods for PLM. (1) USEPA 600 R93/116, (2) CARB 435, and (3) ASTM D7521. Look for follow-up data/information in a future issue.

Respirable Crystalline Silica

Equine Pulmonary Disease Study



Osteoporosis Associated With Pulmonary Silicosis in an Equine Bone Fragility Syndrome

A. M. Arens[1], B. Barr[2], S. Puchalski[4], R. Poppenga[2], R. M. Kulin[5], J. Anderson[3], and S. M. Stover[1]

Client ID	Sample #	Weight of sample measured (mg)	masses of respirable crystalline silica minerals (mg)			weight percentage		
			Quartz	Cristobalite	Tridymite	Quartz	Cristobalite	Tridymite
1 (Surface)	7269750	1565	0.27	0.23	<0.01	0.017	0.015	<0.00064
2 (1cm)	7269751	1430	0.42	0.17	<0.01	0.029	0.012	<0.00070
3 (10cm)	7269752	1486	0.23	0.19	<0.01	0.015	0.013	<0.00067

Context:

Think respirable crystalline silica and many of our laboratory staff and national and international customers automatically picture construction and demolition sites.

The human consequences of exposures to silica and its polymorphs cristobalite and tridymite, can result in various lung and immune diseases including…
- silicosis, an incurable lung disease (leading to disability and death),
- lung cancer,
- Chronic pulmonary disease (COPD); and
- kidney disease

Pulmonary fibrosis (mixed dust pneumoconiosis) has been reported in agricultural workers, and dust samples from the lungs in these cases reflect the composition of agricultural soils, strongly suggesting an etiologic role for inorganic agricultural dusts.

Crystalline silica may represent up to 20% of particles, and silicates represent up to 80%. These very high concentrations of inorganic dust are likely to explain some of the increase in chronic bronchitis reported in many studies of farmers.

Yet, other mammals are routinely impacted by natural and man-made hazards. Silica is no exception. Many agriculturally valuable farm mammals do not live past a few to several years. Whether on a farm, used for leisure, or involved in sporting events, horses (equines) can live decades.

Ask your iATL customer service representative about respirable crystalline silica testing using our state of the art PANalytical Cubix3 XRD (NIOSH 7500) and analytical services.

Geologic Connections

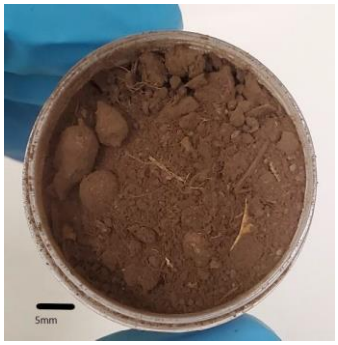
Though the mineralogic composition of surface soil varies across the globe, certain assumptions can be made. Accordingly, we know that the element "Si" constitutes the majority of the earth's crust. It is evident in many forms. From sand (crystalline quartz), igneous and sedimentary outcroppings of granite, feldspars, and gneiss etc. Soil contains many amorphous and crystalline silica-based minerals.

Vineyards and Ranches

iATL has been supplying analytical services to a wide range of international customers. Rarely do we get to visit our clients, but management is holding out hope to be invited to one of the beautiful California and Utah ranches, some that are also well-known vineyards, where a portion of ongoing research was conducted.

We were asked to propose a surface soil sample collection procedure that included three layers of (i) a rich vegetative layer (grass) as well as at depths (ii) at 1cm and (ii) 10cm. Many projects discount the grass, root, worm, detritus layer. Not here, it was key to determining how much of a fine native crystalline-silica containing soil might be entrained into the air and then into the lungs of grazing horses.

Each of the soil samples were tested for crystalline silica (alpha quartz), cristobalite, and tridymite. Along with the soil testing, localized airborne samples were submitted for testing.



Scale bar is 5mm, open vial of soil sample before homogenization.

The results were part of ongoing research by veterinary research pathologists based out of the University of California Davis, School of Veterinary Medicine, JD Wheat Veterinary Orthopedic Research Laboratory.

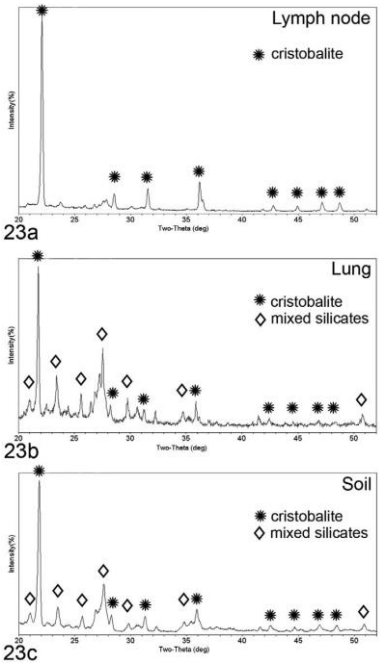
The soil results showed consistent levels of crystalline silica and cristobalite concentrations. Lung and lymph node tissue pathologic samples revealed concentrations of these minerals.

Sources?

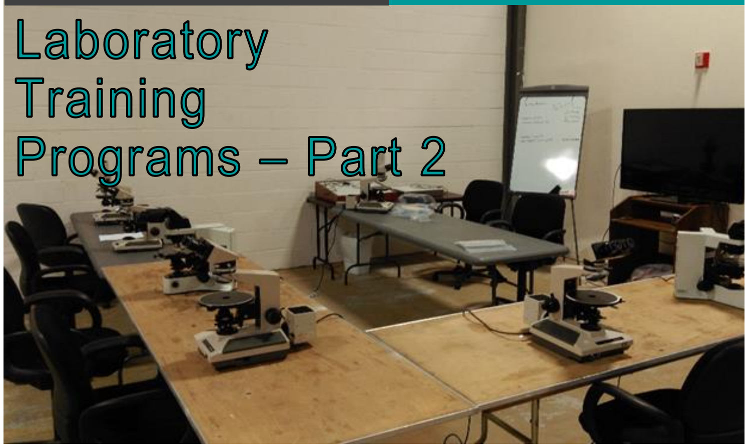
The outcropping of Miocene Monterey Shale from Monterey, Sonoma, and Napa counties consist of natural and native concentrations of SiO2 types (quartz, cristobalite, tridymite, and silicon oxide).

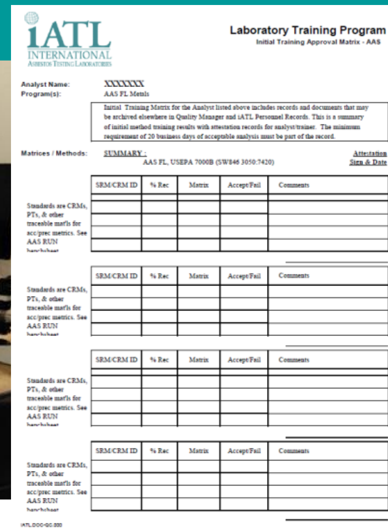
Biological Findings:

Osteoporosis was highly correlated (r ¼ 0.8, P < .01) with silicosis. No abnormalities in heavy metal or trace minerals were detected. This evaluation indicated that horses with bone fragility disorder have systemic osteoporosis associated with fibrosing pulmonary silicosis. The etiopathogenesis of the bone fragility syndrome was unknown; however, this study provided circumstantial evidence for a silicate associated osteoporosis.



Laboratory Training Programs – Part 2





iATL INTERNATIONAL Asbestos Testing Laboratories

Laboratory Training Program
Initial Training Approval Matrix - AAS

Analyst Name: XXXXXXXX
Program(s): AAS FL Metals

Initial Training Matrix for the Analyst listed above includes records and documents that may be archived elsewhere in Quality Manager and iATL Personnel Records. This is a summary of initial method training results with attestation records for analyst/trainer. The minimum requirement of 20 business days of acceptable analysis must be part of the record.

Matrices / Methods: SUMMARY : AAS FL, USEPA 7000B (SW846 3050:7420) — Attestation Sign & Date

Standards are CRMs, PTs, & other traceable mat'ls for acc/prec metrics. See AAS RUN benchsheet

SRM/CRM ID	% Rec	Matrix	Accept/Fail	Comments

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Recap from Part 1

Last month's Next Level newsletter briefly mentioned why we invest roughly 10% of all lab staff hours in initial and ongoing training modules (regulatory and accreditation requirements), how we train using the old Boy Scout EDGE method, and what is captured - the basics of documentation (iDOC, DOC, QA, narratives, checklists, etc.).

Today, we focus on the use of guest instructors and the USEPA National Lead Laboratory Accreditation Program (NLLAP) LQSR 4x5 training concept.

Opportunities to Learn

Over the last 35 years, iATL has had the privilege of soaking up many aspects of training from outside experts and important contributors to our laboratory industry. These have included visits from Eric Chatfield, James Webber, Thomas Kubic, Peter Cooke, Shu-Chun Su, and dozen more who have offered formal training, and sometimes just a visit and conversation with staff. iATL looks for these opportunities to learn from a wide range of experts including former accreditation body site assessors and those involved in laboratory Quality Assurance. While the last couple of years prevented in-person visits, online Zoom and MS Team meetings have continued.

4x5 Documentation

The USEPA NLLAP specifies all quality assurance training for environmental lead labs. In section 5.2.1.1.3 of the Laboratory Quality System Requirements (LQSR) the concept of "4x5" is introduced. Here, the chemist trainee must complete 4 independent test runs that include sample prep and analysis of at least five samples of a range of lead composition including traceable standards and all pertinent QA samples over a period of evaluation. iATL usually requires this a few times each week, over a four-week period (month). The evaluation 'acceptable' limits are defined. While these are usually offered towards the end of the initial training period, these concepts, and the documentation can be used for ongoing training and performance checks.

LTP Part 3

Part 3 will cover ongoing training activities, typical PLM QA data evaluations, and annual Data Integrity Program (DIP) provisions.

USEPA NLLAP LQSR

EYE ON IT

Building Survey Resources

A 2015 letter from USEPA sanctioned the use of sections of ASTM E2356 "Standard Practice for Comprehensive Building Asbestos Surveys," as it demonstrates compliance with the "thorough inspection" requirement as required under the Clean Air Act Asbestos (NESHAP) 40 C.F.R. §6 l. l 45(a) - Applicability sections on asbestos building surveys. Texas, Vermont, and many other states concur.

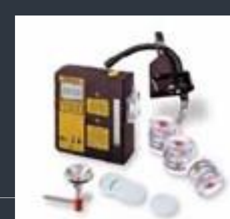
Find resources at the ASTM eLearning Center HERE.

iATL Customer Resources

Because you asked…

Respirable Crystalline Silica (RCS) pump and ancillary sampling equipment rental availability.

Contact CustomerService@iatl.com and ask for a project quote.



This Month's Q&A

Q: Why was the construction debris sample we submitted for TCLP analysis for Lead (Pb) stopped?

A: USEPA 1311 method for Toxicity Characterization Leachate Program (TCLP) is a two tier analysis.

The first part consists of suspect lead containing materials that are sub-sampled for direct digestion and analysis. For instance, the lab would include paint chips, surface coatings, metal-galvanized coatings, and soil/sand and NOT sub-sample rocks, steel, wood, drywall w/o paint, etc. This includes all material embedded with pigment that may be lead containing, and material such as the fiberglass that may contain lead as a releasing agent from the original fiberglass mold.

If the first step yields results <100ppm then the secondary (and more expensive) prep and analysis can be skipped. The basic concept is that the initial analysis uses concentrated acid solutions for digestion which more readily get Pb into solution for testing (much greater sensitivity and rarely a false negative) while the secondary analysis employs much weaker reagents and solutions (to mimic acid rain and landfill conditions).

"1311.1.2 If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run."

Next Level

Professional Development

Is it time to increase your understanding and awareness of some nuanced technical issues? email info@iatl.com.

2022 iATL Online Workshops

iATL Laboratory Director and noted speaker and presenter, Frank Ehrenfeld, will reprise many recent workshop-style presentations for our clients throughout 2022. Expect registration news in coming weeks for March, May, July, September, and November offerings. Topics may include:

- Asbestos and Talc Issues
- Erionite and other EMPs
- Natural Occurrences of Asbestos (NOA) – Evolving International Solutions
- Analytical Methods for Asbestos & International Advances
- WTC 9/11, 20 Years Later Lessons Learned
- Asbestos in Dust - Updates
- Asbestos in Water – What's New
- In situ Asbestos Analyzers
- Asbestos Disease Med Updates
- Vermiculite Method News
- Asbestos Work Practice Studies
- Asbestos in New Building Mat'ls
- Asbestos Vitrification – Updates
- Artificial Intelligence (AI) and Asbestos Analysis Progress
- eLearning through ASTM Int'l
- Combustion By-Product Analysis: Fire, Insurance, and Forensics

Registration for May 19, 2022, Webinar available here.

Register

Current Trends in NOA and Asbestos Soil Issues

While no jelly beans, marshmallow peeps, or decorated ~~TEM Air Cassettes~~ eggs will be sent to our loyal customers - a basket full of discounts filled with goodies is on the way! School spring and easter holiday breaks may mean AHERA and other clearance activity!! A short week for closed schools needs quick turn arounds and essential laboratory capacity to handle the expected swell of samples. iATL has you covered! Offer runs from April 11 – April 25, 2022 and ends 04/26/2022. Call or email customerservice@iatl.com for details on this limited time offer.

iATL Customer Service Contacts:

Need assistance with questions on upcoming projects, or information on samples in the laboratory? Get answers from staff during normal business hours – or contact us…

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customerservice@iatl.com

Toll Free (877) 428-4285
Emergency Contact(s):
(609) 923-7300
(609) 929-4211

Ask us about iATL's interactive LIMS Database, **iTRACC** Client Portal
- for your devices
- for your convenience

Upcoming Events

- AIHce Annual Conference and Exhibition
  May 23-25, 2022 Nashville TN
- ASTM Intl Johnson/Rook Asbestos Conf.
  July 25-29, 2022 Burlington VT
- Association of Enviro/Eng Geologists
  Sept 13-17, 2022 Las Vegas NV
- ASTM Int'l Symposium: DLs for Air Quality
  Oct 19-21, 2022 New Orleans LA

Next Issue for Next Level

- Holding times & sample treatments
- Lab Training Part 3
- Surprise, your air samples have been VOIDed – now what?

Link to archived Next Level issues

NEXT LEVEL
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