iATL INTERNATIONAL ASBESTOS TESTING LABORATORIES

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

Next Level

ISSUE 2022 / 06

this issue

Regulator Considerations:

The collection of airborne particles for the determination of asbestos almost universally employs the use of membrane or polycarbonate filter media that capture the suspended particles as a certain volume of air is pulled through the filters. These particles lodged on filter surfaces and, many times, embedded into the filter membrane material, are then prepared by various means for microscopical examination.

The analytical options are numerous and varied - but share many of the same principles. The largest contributor to uncertainty is the volume of air collected and any particle interferences or particle overloading.

Analytical Options:

Building environment air surveys may, by design, or as a consequence of remediation or other disturbance activities, collect large concentrations of particulate while, it is assumed, that clearance activities, and subsequent sample collection, would usually be populated sparsely with particles.

So, what are the options when either typical work area diagnostic samples or clearance samples exceed the method's, or the regulator's, threshold for percent particulate that constitutes the samples being VOID overloaded?

Air Samples VOID Overload – Now What? Part 2

Last month we outlined the basics of overloaded air samples for asbestos analysis and how delivering the news to the 'front line' engineering and building owner consultants is received. Here, we'll talk about analytical options after a sample, or sets of samples, receives the dreaded Void Overload designation.

Wait, Doesn't a Z-Test Cover me?

Short answer – nope. The use of this option under USEPA 560/5-89/001* from 1989 is only an option under certain post-remediation/clearance activities when a set of inside work area samples 'fail' due to asbestos concentrations – NOT when samples are Void Overload by method and by regulatory memorandum.

*[*A sort of compendium if you will to the evolving AHERA protocols under 40CFR763 and Sub-Parts E in Appendix E*]

Okay, so why was I able to analyze using PCM?

This is basically an apples -v- oranges issue. What may look to be an overloading of particulate on an air sample filter may be different when evaluating the filter at 400x (PCM) or 20,000x (TEM) magnifications. Obviously particulate loading can become more of an issue at higher magnifications. Additionally, this works both ways, as many times occluded samples sent for PCM analysis that are voided (~25% particulate loading) might be viable by TEM, as the TEM prep for AHERA employs a plasma etcher – low temperature asher – that often removes organics.

Analytical Options

For most activities, especially final clearance projects under AHERA (40CFR763), an overloaded filter result fails the typical set of samples taken inside a containment work area. Many consultants re-clean, encapsulate, and re-collect samples for another attempt at clearance. Yet, another analytical option remains. ISO13794 was developed in association with ISO10312 TEM air method for the sole purpose of providing analytical options for void overload samples.

ISO13794 Saves the Day

While no superhero status has been attributed to this analytical method, there is no questioning its value in certain projects where airborne concentrations are essential in establishing occupational and/or environmental conditions. Often, this is the ONLY way of examining portions of filter and determining asbestos density and concentrations. Yet, *caveat emptor*, buyer beware, as it is a terribly expensive method most often utilized in litigation support cases, in post-fire projects, or where a 'snapshot in time' sample is needed to confirm air quality.

The method employs a series of gravimetric reduction steps, use of the aforementioned calibrated plasma etcher asher, and solvents/solutions to remove organic and many inorganic particles then re-hydrating and re-depositing the suspension onto another filter for standard preparation and analysis.

The analytical results of this indirect prep/analysis are given in density and concentration units – but, the calculations involve the gravimetric, percent filter remaining, and other variables that most customers are not aware of. Contact CustomerService@iatl.com for pricing and sample reports.

New Zealand Asbestos in Municipal Water Study

Context:

We discussed various potable water sample preservation and treatment requirements in our last Next Level issue. This month we discuss a recent project from New Zealand. BUT, as a reminder…

Current Preservation Options

Many samples require some sort of treatment as the 48 hour holding times are frequently missed. If the sample is out of holding time and/or has a turbidity that exceeds 1.0 NTU then the remedy is to treat the sample by percolating ozone (O_3) through the sample for several minutes while a UV lamp is inserted into the water bottle. This is relatively expensive and requires some clean-up, yet the combination of the two sufficiently controls any biological growth.

Why Asbestos Water Testing?

Asbestos in water testing issues traces its history back to the early days of the Clean Water Act in 1972 and related National Primary Drinking Water Act in 1974. Further studies by USEPA and Phil Cook and Nicholson in 1974 concerning taconite (grunerite cousin) in Lake Superior and the seminal research in 1979 by Chatfield and Dillon on a Canadian Survey of Water Supplies was further supplemented by Millette et al in the 1990's. The latter two became the basis for EPA's Asbestos in Water Methods 100.1 and 100.2 and associated testing for municipal utility authorities (MUAs) requirements in the US.

We already have a template listing USEPA's 7 Million Fiber per Liter (MFL) MCL ready to respond to such inquiries. "Wait, you mean to tell me that this tap water can have 6MFL and it would be acceptable?" Yep. Welcome to our world.

Ask your iATL customer service representative about sample submittals for lead (Pb) or Copper (Cu) or Asbestos in water. Chains of Custody, Sample Logs, Pre-printed labels, and information on holding times and treatment options summarized.

AU/NZ Connections

iATL Laboratory Director, Frank Ehrenfeld was the guest of the Austral-Asian Land & Groundwater Association in 2019. He was the Keynote Speaker at the annual ALGA Ecoforum and in his nearly 3 weeks traveling through both countries, presented several four-hour workshops to gatherings of regulators, academics, geologists, engineering consultants, and laboratory professionals. Along the way, many relationships with like-minded professionals developed.

Michael Knopick, Graduate Thesis student at School of Geography, University of Otago, Dunedin, NZ, introduced himself and inquired about all things related to asbestos in water. So began a year's worth of correspondence towards a project partnering with Gareth Oddy MS from ENGEO of Christchurch NZ. Then, Covid and supply chain interruptions ensued. Finally, samples were collected and submitted to iATL's laboratories in NJ USA in 2021.

The study concentrated on the determination of asbestos in the public drinking water system of Christchurch NZ (pop. <500k). Asbestos cement was a common construction material for water pipes during the twentieth century, as a replacement for metal piping that was vulnerable to corrosion.

The Study

Briefly, the study looked at the potential for AC pipe deterioration due to pH and water pressure. This might be used then to predict asbestos releasability from those pipes. Post-flush samples from water mains and hydrants (representing 15km of AC pipe) were collected and submitted to iATL (half-a-world-away) for testing. iATL checked pH and turbidity and treated with UV/O_3 as prescribed by USEPA 100.1.

The Data:

This study identified the presence of asbestos (chrysotile, amosite, crocidolite) in the drinking water supply. It showed long asbestos fibers (>10µm), with an average concentration of 0.9MFL. Short asbestos fibers (>0.5-10µm) had an average concentration of 6.2MFL. Sampling was targeted to pipes from 1930 to the 1960s in areas known also to have geologic seismic activity from local earthquake faults lines. The Everite (UK) and Fibrolite (NZ) pipes each contained varying degrees of asbestos mineral.

The corrosive nature of pH and pressure (and other factors not listed here) was insightful to understand the releasability of asbestos. Smaller diameter pipes deterioration rate was greater relative to larger diameter pipes. All samples contained chrysotile asbestos. Samples ranged from 5MFL to over 56MFL.

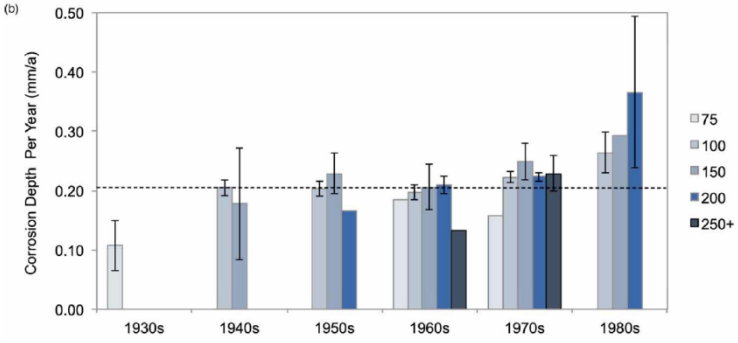

Figure 2 | Reported corrosion depth (a) and mean rate of corrosion (b) measured from damaged asbestos pipes from Christchurch City's water mains. Data on pipe diameter and corrosion damage provided by Christchurch City Council for 123 pipe sections where corrosion depth and pipe age is known. Dashed line indicates the arithmetic mean. Individual bars are for pipe diameter classes (in mm).

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The concentration and prevalence of asbestos fibres in Christchurch, New Zealand's drinking water supply

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HIGHLIGHTS

- Municipalities should monitor for the presence of asbestos fibers as a strategy for detecting pipe corrosion.
- Asbestos cement piping is reaching its end-of-life stage and is releasing short and long asbestos fibers into the water supply.
- Municipalities with soft water supply are vulnerable to cement pipe decay and we observed high corrosion rates of 0.2mm/year averaged over a lifetime from asbestos pipes.

Interested parties may request a copy of this research paper – please contact CustomerService@iatl.com.

Data Integrity Programs

QA v QC v DIP
Why It Matters

Recap from Part 1, 2, 3

The last three issues of our Next Level newsletter briefly mentioned why we invest roughly 10% of all lab staff hours in initial and ongoing training modules (regulatory & accreditation requirements), how we train, and what is captured to document the training. After QA and QC, the third leg of quality training is covered here.

Definitions Revisited

Classic (and brief) definitions of Quality Assurance (QA), Quality Control (QC), and Data Integrity (DIP) are a good place to start. **QA** is the set of systems employed as a preventive tool to assure that the analytical process produces accurate and precise data – good data quality. In case anything goes awry, labs have another associated system that when outliers or errors and mistakes happen (and they will), triggers action that review, revise, redo, monitor, evaluate, explore root cause, and otherwise control (QC) the loose data to bring it back into acceptable bounds. Yet, you can have good data quality and bad data integrity. It is sad to say, but there are plenty of studies that show how data produced in labs, academic, and industrial settings can be forged or otherwise fabricated, in order to support manufacturer's claims, a researcher's publication, and a lab's data. While modern analytical lab instrumentation has features designed to produce data, when humans become involved, there is very little control over what and how data might be handled or manipulated. So, questions may remain as to the integrity of the data.

DATA INTEGRITY PROGRAM (DIP)

The DIP at iATL started out as business ethics training – but on QA steroids. While iATL carefully considers new hires, and provides ethics training, the DIP goes broader and deeper in monitoring, evaluating, and documenting this level of training. The program is a one-day classroom set of modules and a second day of readings, quizzes, videos, and case studies before final attestations. The syllabus includes sections on defining integrity, QA, QC, types of errors/mistakes, negligence, and fraudulent practices, manipulating data, dates, records, and results, and violating other ethical code of conduct standards customized to iATL operations. Data recall, data back-up trail, and security systems to protect archived data, etc. are included along with individual and systems evaluations.

Regulatory Oversight

It has since been a mandated requirement by all NELAC accredited labs (2016 VIM2 sec 4, 5) as well as both USEPA and NYSDOH, with the latter including civil and criminal penalties under NYS Public Health Law, Article 5, Title I, Section 502 for any false laboratory data.

EYE ON IT

ASTM Johnson/Rook

Delayed twice by the global pandemic, ASTM International's five-day conference in Vermont will once again be the focal point of all things asbestos when the international audience gathers at the end of July 2022. This year; a transition towards re-naming the conference after long-time ASTM D22 Chairman Dr. Harry Rook. The conference will cover - Medical Research, Exposure and Risk Assessment, Regulatory Perspectives, Analytical Methods, Soils, Talc, NOA, Legal Aspects Analytical QA, Mineralogy and Hazardous Elongate Particles

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.

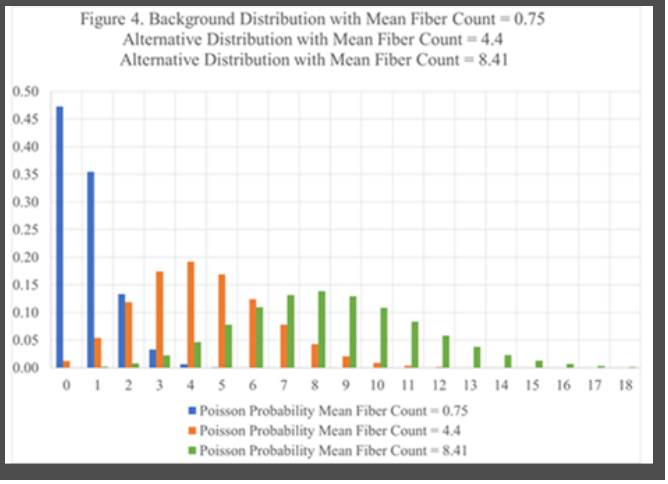
This Month's Q&A

Q: Isn't one or two fibers counted just background – when does it become *statistically significant*?

A: Airborne filter samples analyzed for fibers (ex. NIOSH 7400) or for characterized structures in air (ex. AHERA 40CFR763, ASTM D6281, or ISO10312) do consider the issues of detection limits and analytical sensitivity. It can be complicated.

Most asbestos professionals know the 5.5 fiber threshold when using NIOSH 7400. These low counts do not 'count' in concentration calculations – until more than the 5.5 fiber benchmark is eclipsed. Airborne samples analyzed by microscopy methods offer a detection limit of n=1; meaning we can count 1 as lowest quantity detected. Yet, the 'statistical significance' does not always equate with the analytical method's interpretation of what can be calculated as part of a concentration. While MCL's and other threshold values are NOT a part of this brief answer, the asbestos professional keeps their finger on the pulse of those regulator response values and not necessarily the statistically significant concept, which can seem nebulous at best – requiring an understanding of the physics and algorithms necessary to understand this issue.

NEXT MONTH… A review of Poison Distributions, Counting Criteria, and D6620 Standard Practice for Asbestos Detection Limits



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 July 19, 2022, Webinar available here.

Register

Current Trends in NOA and Asbestos Soil Issues

iATL is looking to AIR IT OUT this summer – save up to 15% on TEM air/Mold air/PCM air samples from now through July 4th, 2022! Here's how:

- Clients new to iATL that register using this link will receive an automatic 15% discount on all TEM air, mold air and PCM samples during the discount period**
- Current clients can take advantage of a 5% discount on TEM air, Mold air, or PCM samples if they refer a new client to iATL that uses us for any one of those services(you both win!)

Contact our Customer Service representatives (CustomerService@iatl.com or 856-231-9449) and let them know you want your SOS discount!

**Clients are considered new if they have not used our services for 2 years or longer
***iATL reserves the right to modify or cancel this promotion at any time. Account must be in good standing at the time samples are received. Subject to quantity limits.

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

Upcoming Events

- ASTM Intl Johnson/Rook Asbestos Conf.
  July 25-29, 2022 Burlington VT
- Association of Enviro/Eng Geologists
  Sept 13-17, 2022 Las Vegas NV
- InterMicro 2022 – McCrone Research Inst
  72nd Annual, Sept 20-23, 2022 Chicago IL
- ASTM Int'l Symposium: DLs for Air Quality
  Oct 19-21, 2022 New Orleans LA

Next Issue for Next Level

- Asbestos in the Grand Canyon
- USEPA's LQSR Revisit
- Nephrite & Jade Exposures

Link to archived Next Level issues

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