



Hazardous Building Materials Management During Facility Demolition – IOL CAB Demo Project Learning's

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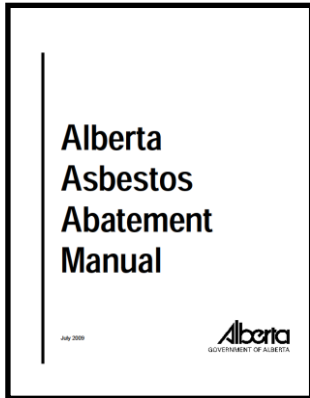
Goals of the Presentation

- Scope of Presentation
- Background on Hazardous Building Materials Assessments
 - Putting it in Perspective
- Specific Learnings from CAB Demolition Project
 - Planning / Timing / Executing
 - Destructive vs. Non-Destructive Assessments / Inaccessible Materials
 - Assumptions and Limitations
 - Analytical Methodology
 - NORM Learning's
- Review of Assessments and Data Gap Identification
 - Tips for Review
 - Minimization / Elimination of Extra Costs and Schedule Impacts

Scope of the Presentation

- “Hazardous Building Materials Assessment” is a common term used in a large portion of the provinces and territories throughout Canada and globally:

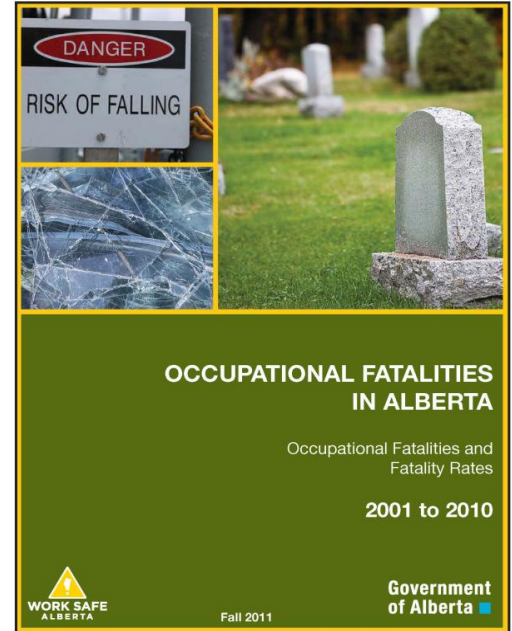
- Asbestos-Containing Materials (ACM)
- Lead-Based Materials
- Polychlorinated Biphenyls
- Mercury
- Ozone-Depleting Substances (ODS)
- Naturally Occurring Radioactive Materials (NORM)
- Misc. Chemicals





Perspective

- **Local Perspective - Alberta**
- **From 2006 to 2010:**
- 178 fatalities from motor vehicle incidents
- 220 fatalities from injuries sustained at a worksite
- **213 fatalities from occupational disease related to exposure to asbestos. Represents 73.2% of all occupational disease fatalities.**
 - Given the latency period, large numbers of fatalities are resulting from high exposure through the 1970's and 1980's;
 - **However**, the next wave could be from uncontrolled exposures during decommissioning / demolition.





Perspective

- **Not just abatement workers and insulators are at risk !!**
- Carefully planned and executed hazardous building materials surveys are a critical step to controlling exposures for all staff at site.
- Repetitive exposures, even at low doses, presents an unacceptable hazard for all staff at these sites.
- **Liability**
- Asbestos litigation is the longest, most expensive mass tort in US History, involving more than 8,000 defendants and 730,000 claimants (2002)
- Analysts have estimated the total cost of asbestos litigation in the US alone will reach \$250 billion

Chrysotile Institute, 2004

Table 5.14 Occupational Disease Fatalities by Occupation – Alberta: 2001-2010

Occupation	Number of Fatalities
Firefighters	32
Plumbers	31
Electricians (Except Industrial and Power System)	21
Welders and Related Machine Operators	20
Construction Trades Helpers and Labourers	18
Carpenters	14
Insulators	14
Truck Drivers	11
Other Labourers in Processing, Manufacturing and Utilities	10
Sheet Metal Workers	9
Construction Millwrights and Industrial Mechanics (Except Textile)	9
Other	334

Data Source: WCB Data, Prepared by E&I, Data Development and Evaluation





Perspective

- Reinforces the need for high quality assessments to be completed by competent / experienced staff , reviewed by industry specialists with applicable / sufficient experience
 - Review the project experience of the survey team
 - Consultants, Senior Technical Leaders, PMs, and Field Survey Staff
 - Abatement Contractors, Applicable Industry Experts (e.g., NORM), Operations Staff
 - Some Applicable Designations
 - CIH, CRSP, P.Eng.
 - CAB Demo Project - a team review approach
 - IOL / Golder / Tervita / EV
 - Operations Staff





Planning / Timing / Executing

■ Extent / Type of Materials

- Prior to the tendering of an abatement and demolition project an assessment for the following materials should be conducted:

Hazardous Building Materials	CAB Demo Project / Other IOL Sites
<ul style="list-style-type: none">■ Asbestos-Containing Materials■ Lead-Based Materials■ Polychlorinated Biphenyls■ Mercury■ Ozone-Depleting Substances■ Misc. Chemicals■ Fungal Assessment	<ul style="list-style-type: none">■ Preliminary Mercury Soil Sampling■ Preliminary NORM Assessments■ Fungal Assessments not required for demo unless hand demo/salvage■ Biohazards affecting abatement■ Document Pressure Vessels (e.g., ABSA)■ Ensure all historical hazmat info from Operations is confirmed■ Non-liquid PCB (new addition based on industry trends)



Planning / Timing / Executing

- **Destructive vs. Non-Destructive Assessments / Inaccessible Materials**
 - Hazmat surveys for demolition sites **should** be destructive in nature
 - All surveys / assessments include the collection of samples. The term destructive refers to the creation of openings that did not previously exist to access areas or collect samples (e.g., boilers, double walled equipment, conduit junctions, vessels, skirting on towers, etc.)
 - Include the use of an abatement / demolition contractor for assistance with the assessing / accessing suspect materials – may require a preliminary walkthrough to plan for large facilities





Planning / Timing / Executing

- **Destructive vs. Non-Destructive Assessments / Inaccessible Materials**
 - Destructive Hazmat Assessments have the same hazards as demolition - cutting, grinding, hot work, power tools, ladders, elevated work platforms, etc.





Planning / Timing / Executing

- **Destructive vs. Non-Destructive Assessments / Inaccessible Materials**
 - Timing:
 - Operations staff knowledge is a key on naming, historical info. / abatement projects, etc.
 - Operations on site = Lighting, heating, Decommissioning team to provide access
 - Scheduling Abatement Contractor
 - Must be completed prior to tender
 - Can assessments be completed before the removal of engineered ladders, walkways, etc.?
 - Complete during spring, summer or fall to avoid snow cover issues and associated hazards.
 - Mercury soil sampling scheduled in spring, summer or fall to avoid snow cover and soil freezing issues. Complete before the demolition / abatement contractors arrive onsite.





Planning / Timing / Executing

■ Assumptions and Limitations

- Even destructive assessments have limitations (e.g., insulation under metal cladding, full depth sampling, irreparable damage to transformers)
- When does destructive exploration not make sense???
- Ensure all inaccessible locations are listed and detailed
- Provide assumptions if hazardous materials are suspected in these locations
- Include everything and scale back
- Plan for 90 to 95% confidence
- Industry and facility knowledge a must – team approach





Planning / Timing / Executing

■ Future Assessments

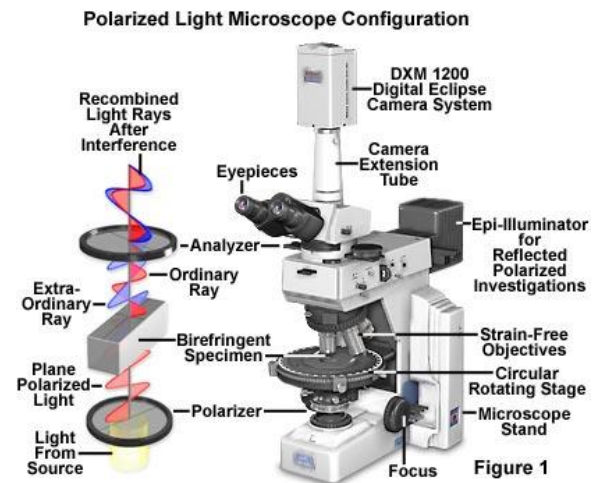
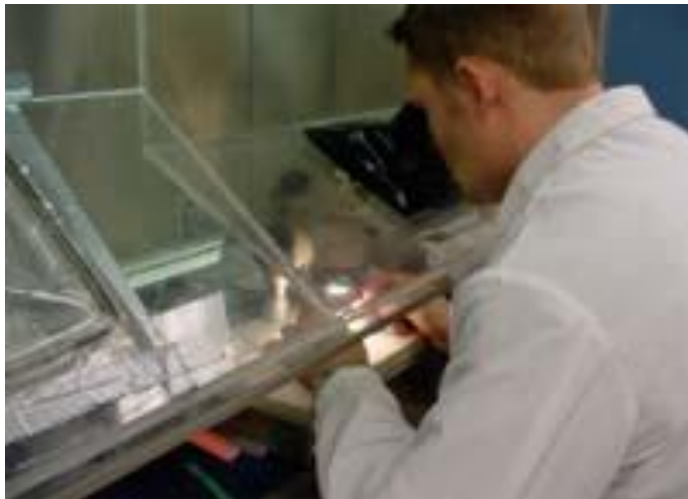
- Materials specifically identified on CAB Demo Project





Polarized Light Microscopy (PLM)

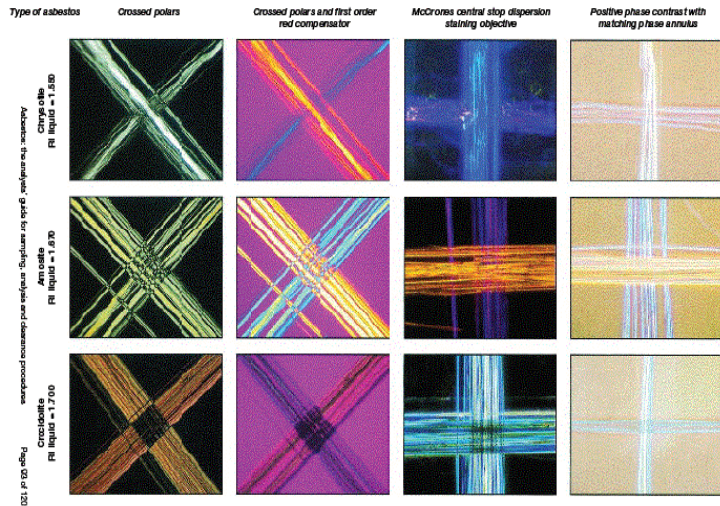
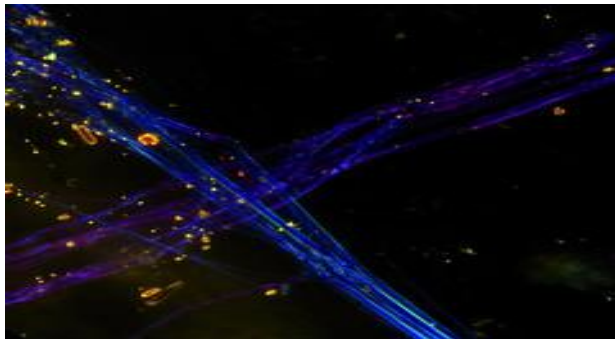
- Polarized light microscopy (PLM) analysis is the most commonly accepted technique for analyzing bulk samples for asbestos
- PLM analysis is based on optical mineralogy and uses a phase contrast microscope equipped with polarizing filters
 - Presence and amount (%) of asbestos in the sample; and
 - Type of asbestos (Chrysotile, Amosite, Crocidolite, other).



Preparation Options & Point Counting

- Pre-treatment with a solvent and / or preparation in a furnace
- “Gravimetric Separation”
- Point Counting - Part of the EPA 600/R-93/116 method.
 - Technique involves an additional analysis to provide a higher degree of accuracy when lower concentrations of asbestos are present (<1% asbestos).
 - Observation and identification of a specific # of points of sample. Analysts count 400 to 1000 points. Points are counted as asbestos or non-asbestos. Percent asbestos is determined by dividing the asbestos point by the non-asbestos, and multiplying by 100.

- Liability considerations



NORM (Naturally Occurring Radioactive Materials) – based on the IOL CAB Demo project, an internal best practice is being developed.

- Identify potentially NORM contaminated equipment prior demolition, preferably during the hazardous building materials assessment.
- Allows for collection of samples for NORM analysis at the laboratory which will characterize the impacted material for handling and disposal (if required). May require an industry expert.
- Assessment must include equipment handling produced water, equipment that is fired using natural gas (especially produced gas), and equipment that is insulated with refractory and/or fibrous insulation. Examples include:
 - piping, tankage, storage;
 - salt bath heaters;
 - fire-heated equipment (e.g., boilers);
 - flare stacks, reaction furnaces, heaters.



NORM (Naturally Occurring Radioactive Materials)

- Assess for NORM both on the exterior and interior of the equipment.
- If no access during pre-demolition hazmat assessment, the interior of the equipment to be assessed during the demolition.
- Set equipment aside for assessment prior to leaving the site for recycling/disposal.
- On-site truck screening not found to be effective due to access/safety restrictions and equipment limitations.
- Consider direct rail shipment to market?
- Recyclers detection equipment far more sensitive than hand held equipment (Ludlum).
- A cost and schedule contingency should be carried for equipment that where complete assessment of the interior surfaces was not possible.





Reviewing Reports / Data Gaps

- **Have all hazardous building materials been identified, delineated and quantified?**
 - Have all hazardous building materials identified by Operations been included in the report and identified / marked at the site?
 - Are there any suspect materials that are visually similar to the hazardous building materials identified by Operations that have not been marked on site and are they identified in the report?
 - Use of a on-site colour coding system a key once abatement and demolition begin.
 - Has your survey team discussed the site with an experienced Operations team member who can explain the various processes at the site? This will allow for anticipation of where suspect ACM may be present by referring to the commonly known “useful properties of asbestos”.

RED

PIPING/VESSELS - Indicates cleaned of all oil, sludge or hydrocarbon residue - (washed, steamed, flushed etc.).

ELECTRICAL - Indicates wiring has been deenergized.

GREEN

PIPING/VESSELS - Indicates that equipment has been tested for and is clean of Norms, Benzene, LEL & H2S.

Orange

PIPING/VESSELS - Indicates that testing revealed Norms, Benzene, LEL or H2S may be present. Yellow tag on piping or vessel will indicate what has been detected and at what level.

Black

LIVE LINE LIVE LINE LIVE LINE

PIPING/VESSELS - Stickers present on piping or vessels will indicate that equipment is still in operating service.

Yellow

PIPING/VESSELS - Indicates that the identified material contains asbestos.

Blue

PIPING/VESSELS - Indicates that the identified material contains lead based paint.





Reviewing Reports / Data Gaps

- Minimum sampling requirements are outlined for most jurisdictions, some in regulation and some in guideline to minimize the potential for false negatives
 - Based on original EPA standards for sampling homogeneous materials
 - Consider discrepancies: non-homogenous materials, sample collection errors

TABLE 1
BULK MATERIAL SAMPLES

Subsection 3 (3)

Item	Type of material	Size of area of homogeneous material	Minimum number of bulk material samples to be collected
1.	Surfacing material, including without limitation material that is applied to surfaces by spraying, by troweling or otherwise, such as acoustical plaster on ceilings and fireproofing materials on structural members	Less than 90 square metres	3
		90 or more square metres, but less than 450 square metres	5
		450 or more square metres	7
2.	Thermal insulation, except as described in item 3	Any size	3
3.	Thermal insulation patch	Less than 2 linear metres or 0.5 square metres	1
4.	Other material	Any size	3

O. Reg. 278/05, Table 1.

Table 3 Bulk Material Samples

Type of material	Size of area of homogeneous material	Minimum number of bulk material samples to be collected
Any homogenous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes and visually similar floor tiles.	Less than 90 m ² (<1000 ft ²)	3
	90 or more square metres, but less than 450 square metres (1000-5000 ft ²)	5
	450 or more square metres (>5000 ft ²)	7



Reviewing Reports / Data Gaps

■ Positive Stop Methodology

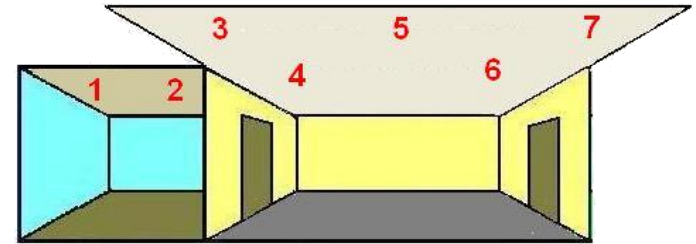
- Assists in controlling the number of samples analyzed

■ Homogeneous Material

- A suspect ACM that is evenly mixed and uniform in colour, appearance and texture

■ Challenges to homogeneity

- Non-uniform manufacturing / mixing processes
- Manually added at the time of material install
- Repairs or partial material replacement
- Low percentage ACM
- Representative sampling





Reviewing Reports / Data Gaps

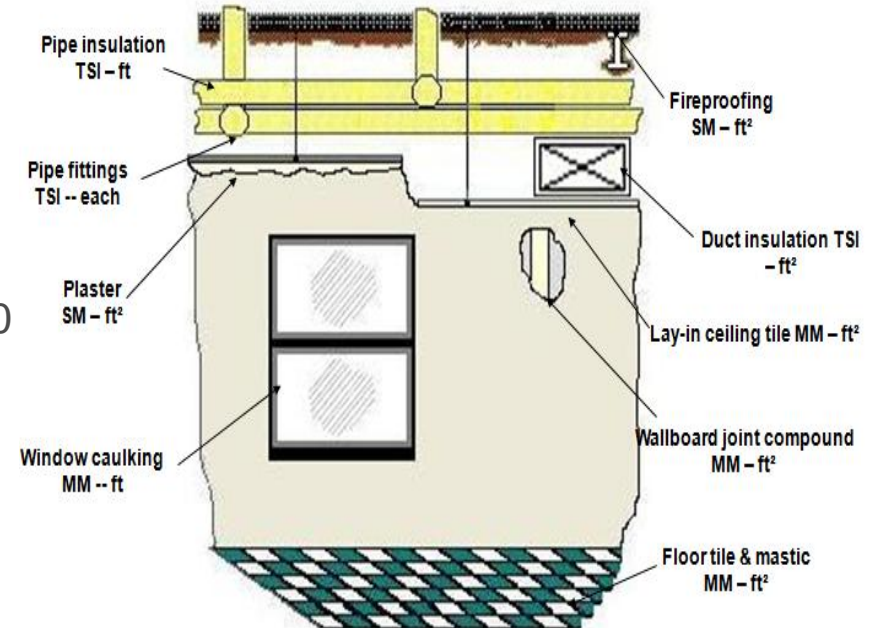
- Have all major material types been sampled and analyzed?
 - Conduct a site review or have a detailed discussion to ensure all predominate suspect materials have been sampled (e.g., foam glass mastic)



Reviewing Reports / Data Gaps

Potential pitfalls in quantification language

- What type of units are used for what type of materials?
- Order of magnitude checks
 - Large quantities not individual articles
- Unclear descriptions
 - 2 pipes / 150 m of pipe insulation – Does this mean there is two pipes, each with 150 m of insulation, and a total of 300 m of insulation, or two pipes having 75 m of insulation on each?





Conclusions

- All facilities / buildings, regardless of size, should have a detailed hazardous building materials assessment prior to demolition to control exposures and protect liabilities
- Work together, in a team approach to plan, time and execute destructive assessments such that we minimize hazards for staff, minimize access restrictions, build on internal client knowledge, and maximize the quality of the data collected.
- Utilize sample preparation and analytical methodology to meet the regulatory requirements of the day.
- NORM and mercury soil assessments should be conducted during destructive hazardous building materials assessments following a documented approach
- Perform additional quality review checks at report review:
 - Ensure historical data and knowledge is captured;
 - Anticipate locations of suspect materials that may have been missed;
 - Ensure minimum sampling requirements are met;
 - Review predominant materials to ensure they are included; and
 - Review uniformity and clarity of quantification information.



Thanks and Questions

QUESTIONS ?

