Sample Analysis Methods – Perspectives Between Industrial Hygienists and Lab Personnel

Presentation For:
2004 AIHCE Roundtable 239
Atlanta, GA

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Clayton Group Services
Topics of Discussion
“Back to Basics”

• Proper Chain of Custody
• Methods That Relate to Standards
• Methods For Asbestos Assessment
• Quality Assurance/Control
Chain of Custody Example

REQUEST FOR LABORATORY IMPORT
ANALYTICAL SERVICES

<table>
<thead>
<tr>
<th>Report results to:</th>
<th>Client Project Number</th>
<th>Send invoice to:</th>
<th>P.O. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>John Z.</td>
<td>Name</td>
<td>Same</td>
</tr>
<tr>
<td>Company</td>
<td>XYZ</td>
<td>Company</td>
<td></td>
</tr>
<tr>
<td>Mailing Address</td>
<td></td>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>City, State, Zip</td>
<td></td>
<td>City, State, Zip</td>
<td></td>
</tr>
<tr>
<td>Telephone No.</td>
<td>404-223-4567</td>
<td>Fax No.</td>
<td></td>
</tr>
</tbody>
</table>

Special instructions and/or specific regulatory requirement:
(method, limit of detection, etc.)

Samples are:
- Drinking water
- Groundwater
- Wastewater

<table>
<thead>
<tr>
<th>ANALYSIS REQ</th>
<th>Date</th>
<th>Time</th>
<th>Air Vol. (Liters)</th>
<th># of Contained analytes per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client Sample Identifier</td>
<td>Sample</td>
<td>Matrix/Matrix</td>
<td>(List each analyte on the line)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Air</td>
<td>1400</td>
<td>TEM</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>&quot;</td>
<td>1400</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>&quot;</td>
<td>1400</td>
<td>&quot;</td>
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</tr>
<tr>
<td>4</td>
<td>Bulk</td>
<td></td>
<td>PLM</td>
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</tbody>
</table>
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Methods That Relate to Standards

• Polarized Light Microscopy (PLM)
• Phase Contrast Microscopy (PCM)
• Transmission Electron Microscopy (TEM)
PLM

• EPA-600/M4-82-020
  • (40 CFR 763, Appendix A to Subpart E) –Compliance Method

• EPA/600/R-93/116
  • Recommended Method
Per Opsi Quadripens
PCM

• National Institute of Occupational Safety and Health (NIOSH) Method 7400
  – determines index of exposure

• Concentrations relate to Epidemiological Data/Risk
TEM

- EPA (AHERA) protocol (40 CFR 763, Appendix A to Subpart E)
  - Clearance <70str/mm2
- NIOSH 7402
  - Confirms asbestos on PCM filters
- EPA Level II
  - Counting criteria counts all asbestos
Example of Asbestos Structure
## Example of Results by TEM

<table>
<thead>
<tr>
<th>Method</th>
<th>GO</th>
<th>Sens</th>
<th>Ct.</th>
<th>Total(str/cc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHERA</td>
<td>7</td>
<td>0.004</td>
<td>6</td>
<td>0.024</td>
</tr>
<tr>
<td>N7402</td>
<td>40</td>
<td>0.0008</td>
<td>10</td>
<td>0.008 (f/cc)</td>
</tr>
<tr>
<td>LEVEL II</td>
<td>10</td>
<td>0.003</td>
<td>20</td>
<td>0.060</td>
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</table>
Examples of How to Alter Standard Methods

• Any modification to established methods
  – Counting criteria
  – Indirect Preparation
  – Number of grid openings counted

• NIOSH 7402 – Ignoring “other” fibers
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Methods For Asbestos Assessment

- PLM (1%)
- American Society of Testing and Materials (ASTM) 5755 (str/unit area)
- ASTM D 6480-99 (str/unit area)
- ASTM 5756 (Mass~1%)
- Internal/Hybrid Methods
- Superfund (EPA-540-R-97-028)
  - Captures airborne fibers from soil –determines risk
ASTM 5755

- Provides number concentration for asbestos structures/unit area
- Sampling approach may influence results (dust vs debris)
- Uses indirect prep
  - Microscopists use this to optimize filter loading for counting purposes.
- Results may be misinterpreted
# Example of ASTM 5755 Results

<table>
<thead>
<tr>
<th>GOA</th>
<th>STR/MM2</th>
<th>STR/CM2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>60</td>
<td>300,000</td>
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</tbody>
</table>

*Analytical Sensitivity = 100,000 Str/cm²*
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Elements of QA/QC Program

- Ensure QC is complete and interpreted prior to release of final results
- Monitor precision and accuracy of analysts/lab
- Proficiency test results
- Monthly QC reports
- Access to Audit findings….on and on
Quality of Data

- Use established test methods
- Note modifications to existing methods when used to meet specific needs
- Validate the modified method for a given use
  - Test using known materials
  - Develop statistical precision and bias data
- Ask for QC data from lab - internal QC, proficiency test results, etc.
Summary

• Complete the Chain of Custody Properly
• Partner with lab to ensure correct methods are used and clients goals are met
• Use established methods
• Note modifications when alternative methods used
• Ask for Quality Data from Lab – be informed