

NYSDOH Environmental Laboratory Approval Program – PLM Checklist

LAB ID:	LABORATORY NAME:
DATE:	ASSESSOR NAME:

**BULK ASBESTOS BY POLARIZED-LIGHT MICROSCOPY**

**Method Number:**  
**SOP Number:**  
**Revision Number:**  
**SOP Date:**

**Personnel records observed** (including seasonal if applicable):

**Data records observed:**

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	Y	N	NA	Comment	Code
<b>BULK ASBESTOS BY POLARIZED-LIGHT MICROSCOPY</b>					
<b>I. Analytical Method</b>					
A. Is an approved method followed? (Note: Item 198.1 for Friable Bulk Samples and Item 198.6 or EPA 600/M4/82/020 for Non-Friable Organically Bound Bulk Samples. NYS does not allow visual estimation.)					G1008
B. Are necessary charts and tables available to analyst (e.g., McCrone 1989 or Su 1994 or 2009 dispersion staining table)?					G1012
C. Does the lab maintain a list of non-asbestos fibers that can be confused with asbestos? (Note: This could be a poster, SOP, etc.)					G1245
a. Does the list include optical properties that disqualify each fiber being identified as asbestos?					G1246
D. Does the lab have a textbook or reference book on mineralogy or crystallography (e.g., McCrone 1980; McCrone 1988; Deer, Howie, and Zussman 1996)? (Sec 3.13)					G1247
<b>II. Polarized-Light Microscope</b> (Sec. 3 of Items 198.1 and 198.6 and Sec. 1.5 and 1.6 of EPA 600/M4/82/020)					
A. Is the PLM equipped with the following:					
a. substage polarizer?					G1020
b. analyzer oriented perpendicular to substage polarizer?					G1024
c. eyepiece with a fixed crosshair aligned in direction of polarizer?					G1028
d. 550 nm (first-order red) retardation/compensator plate at 45° to the polarizer?					G1032
e. graduated rotating stage (360° in 1° increments)?					G1036
f. focusable condenser with centerable iris diaphragm?					G1040
g. low (3.2-10X) and high, dry (30-50X) magnification objective? (Sec. 3.19.7) (Sec. 1.5.1 states "Objective lenses: 10X, 20X, and 40X or near equivalent.)					G1044
h. eyepiece of ≥ 8X magnification?					G1048
<b>III. Equipment and Supplies</b> (Sec. 3 of Items 198.1 and 198.6 and Sec. 1.5 and 1.6 of EPA 600/M4/82/020)					
A. Does the lab have the following equipment/material:					
a. laminar-flow hood or negative pressure glove box with HEPA filtration?					G1056
b. low-power (10-45X) stereobinocular microscope with external source for gross examination?					G1060
c. forceps, dissecting needles, probes, scalpel or razor blades for manipulating bulk samples?					G1064
d. smooth removable substrates (glassine paper or clean glass plate) as surfaces for manipulating bulk samples? (For Bulk, EPA Sec.1.5.1)					G1068
e. <b>homogenization equipment</b> that includes:					
1. mortar and pestle?					G1080
2. mini-blender (approximately 30-mL capacity), liquid-nitrogen mill, or Wiley mill?					G1084
f. centrifuge?					G1088
g. <b>filtration apparatus</b> for polycarbonate filters? (For <b>NOB</b> )					G1432
1. 0.4-µm-pore polycarbonate filters?					G1428

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2. petri dishes and covers?					G1429
h. muffle furnace capable of sustained operation at 500°C?					G1096
1. crucibles (bottom and lid)?					G1436
2. one of the following instruments or materials capable of calibrating a muffle furnace at 480°C: high-temperature thermometer with range to at least 500°C and with subdivisions of 5°C or less, melting-point solids with capability of differentiating 5°C differences between 400°C and 500°C, or potentiometer capable of differentiating 5°C differences between 400°C and 500°C?					G1095
3. dessicator to cool samples prior to weighing them?					G1443
i. balance with readability of 1 mg or less?					G1445
j. concentrated hydrochloric acid (reagent grade)? (For <b>NOB</b> )					G1444
k. reagent-grade dilute acetic or hydrochloric acid? (For <b>Bulk</b> , EPA Sec.1.5.1)					G1104
l. surfactant such as sodium metaphosphate or aerosol OT?					G1108
m. heat lamp, slide warmer, or drying oven?					G1109
n. ultrasonic bath? (For <b>NOB</b> )					G1448
o. filtered (0.1-µm) distilled water? (For <b>NOB</b> )					G1452
p. calibrated thermometer with range of 0 to 50°C and readability of ±1°C?					G1098
q. microscope slides?					G1072
r. slide coverslips (>250mm <sup>2</sup> for circular or >480 mm <sup>2</sup> for square)?					G1076
s. marker for labeling slides?					G1077
<b>B. Does the lab have the following reference materials:</b>					
a. NIST SRM 1866a (Common Commercial Asbestos – chrysotile, amosite (grunerite), crocidolite (riebeckite), and synthetic glass fiber)?					G1228
b. NIST SRM 1867 (Uncommon Commercial Asbestos – anthophyllite, tremolite, and actinolite)?					G1244
c. at least 10 different Vinyl Asbestos Tiles (VAT) references that have been analyzed by an ELAP-certified TEM lab? (For <b>NOB</b> )					G1456
1. at least 2 of the verified slides are negative for asbestos?					G1464
2. at least 2 of the verified slides have asbestos concentrations between 1 and 10%?					G1468
3. at least 2 of the verified slides have asbestos concentrations greater than 10%?					G1472
d. permanent mount of NIST amosite in refractive index oil with n <sub>d</sub> = 1.680?					G1223
e. a complete set of RI oils ranging from n <sub>d</sub> = 1.49 to 1.72 in intervals ≤ 0.005?					G1224
f. either a solid RI calibration material (e.g., Cargille glass) or a refractometer capable of an accuracy of ±0.004.					G1252
<b>IV. Sample Preparation</b>					
A. Are samples homogenized when necessary?					G1116
a. Are at least 4 subsamples from the residue prepared?					G1118
B. Are samples acid treated when necessary?					G1120
C. Are samples dispersed with surfactant when necessary?					G1124
D. Are samples ashed when necessary?					G1128

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E. Are layers in layered samples analyzed individually?					G1130
<b>V. Analytical Records</b>					
A. Does the analysis sheet include/indicate the following:					
a. analyst's signature and date of analysis?					G1136
b. sample ID number?					G1140
c. gross description of material including color?					G1144
d. gross description of material including homogeneity?					G1148
e. gross description of material including texture?					G1152
f. disqualifying optical property for each non-asbestos fiber identified?					G1177
g. at least four slide subsamples are prepared for each sample?					G1180
h. use of EPA or ELAP point count methods?					G1184
i. tally of points for each type of asbestos?					G1188
j. quantitation results that are based on point counting?					G1192
B. For each type of asbestos type identified, is the following recorded:					
a. morphology?					G1156
b. birefringence?					G1160
c. angle of extinction?					G1164
d. sign of elongation?					G1168
e. RI (to the nearest 0.004) for fiber length?					G1172
f. RI (to the nearest 0.004) for fiber width? (Note: Fiber width and fiber length should be different.)					G1176
<b>VI. Calibration Records</b>					
A. Are there records of the following:					
a. <b>quarterly or next use</b> calibration of refractive index oils to within 0.004?					G1256
b. calibration of RI oils to within 0.004 when a new container is opened?					G1257
c. <b>daily or next use</b> alignment of PLM?					G1260
d. <b>monthly</b> determinations of dispersion-staining or Becke-line colors from the lab's permanent amosite mount?					G1264
e. <b>semi-annual</b> measurements of HEPA-ventilated enclosure(s) demonstrating a face velocity of at least 75 fpm?					G1268
f. <b>quarterly</b> calibrations of muffle furnace in the range 450-480°C?					G1270
g. room temperature being checked <b>daily or next use</b> ?					G1271
<b>VII. Quality Control (QC) and Personnel Records</b>					
A. Have all QC analyses been performed and evaluated before final reports are submitted to clients?					G1301
B. Are QC samples submitted blindly to the original analyst so that the analyst is unaware that the sample will be reanalyzed? (Note: A random number generator could be used for 1-person labs.)					G1303
C. For intra-analyst precision, does the original analyst reanalyze <b>at least 2%</b> of blind QC samples? (NELAC 2003 Ch. 5 App. D.6.2.13.a.)					G1305
a. For single analyst labs, is <b>at least 1 out of every 10</b> blind QC samples					G1304

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reanalyzed? (NELAC 2003 Ch. 5 App. D.6.2.13.a.)					
D. For inter-analyst precision, does a different analyst reanalyze <b>at least 6.7%</b> of blind QC samples given to the original analyst? (NELAC 2003 Ch. 5 App. D.6.2.13.b.)					G1307
E. Do QC reanalyses include complete and independent re-preparation and analysis of the sample?					G1309
F. Are R-bar charts showing intra- and inter-analyst precision kept up-to-date for each analyst?					G1310
a. Are records of each analyst's replicate and duplicate analyses kept?					G1388
b. Is corrective action taken when R values are > 1 or < -1 for inter-analyst QC? (Note: Acceptable range = 1 to -1)					G1311
c. Is corrective action taken when absolute R values are > 1 for intra-analyst QC?					G1313
G. Is <b>at least 1%</b> (1 out of 100) of samples analyzed a standard or reference sample that has been routinely resubmitted? (NELAC 2003 Ch. 5 App. D.6.3.3a. and b.)					G1312
a. For friable materials, does at least 50% of the QC reference samples submitted contain between 1 and 10% asbestos?					G1315
H. Are X-bar charts showing analyst's accuracy kept up-to-date?					G1314
a. Are the records from reference standard analyses kept for each analyst?					G1392
I. Are re-analysis of inter-laboratory QC samples performed <b>at least quarterly</b> or <b>at a rate of 1 sample per 500 routine samples</b> (whichever is less)? (Note: NYSDOH PT studies can be used. Each study includes 4 samples.)					G1317
J. Have all misclassifications (false positives and false negatives) and misidentifications of asbestos types associated with inter-laboratory reanalyses been resolved?					G1320
K. Is at least one non-ACM blank prepared <b>daily</b> or <b>with every 50</b> samples analyzed, whichever is less? (Item 198.1, Section 8.3.2)					G1325
a. Or, is a blank check made <b>after every 20</b> uses of each piece of homogenization equipment? (Item 198.1, Section 8.3.2)					G1323
L. Is at least one non-ACM non-friable material prepared and analyzed <b>with every 20</b> samples analyzed? (Item 198.6, Section 8.3.2)					G1327
M. Do <b>monthly</b> summaries reveal an error rate of <b>less than 1%</b> on the classification of samples?					G1326
N. Are all analysts able to correctly identify the six regulated asbestos types? (Note: The six types are chrysotile, amosite (grunerite), crocidolite (riebeckite), anthophyllite, actinolite, and tremolite)					G1395
O. Are records kept for each analyst outlining resolutions of any QC deficiencies?					G1396
P. Has each analyst completed a formalized course in PLM?					G1397
<b>VIII. Results and Reports</b>					
A. Do the final results include the type and percentage of each asbestos type?					G1200
B. Do the final results include the type and percentage of each non-asbestos fiber type?					G1204
C. Does a recent client report on an ACM include the following:					
a. color of the bulk sample?					G1208
b. type and percentage of each asbestos type?					G1212
c. type and percentage of each non-asbestos fiber type?					G1216
D. Are results from layered samples reported as separate layers? (Note: Labs can do composites, but lab needs to record results for original layers.)					G1217

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E. Are the samples stored in a secure area for <b>at least 60 days</b> after result reporting?					G1218
<b>IX. Proficiency Test (PT)</b>					
A. Are copies of past PT reports retained as part of the laboratory record?					G1404
B. Has all the raw data used to generate PT data been retained as part of the laboratory record?					G1408
C. Do records of analysis of PT samples indicate lack of outside assistance?					G1413
D. Do records of PT analysis support the reported test result?					G1420
<b>X. Non-Friable Organically Bound</b>					
A. Do NOB analysis sheets show calculation of percent matrix loss during muffle furnace ashing?					G1476
B. Do NOB analysis sheets show calculation of percent matrix loss during acid digestion?					G1478
C. Are reduced samples cooled in a dessicator prior to weighing?					G1488
D. Are percentages of matrix loss used in calculating final asbestos percentage?					G1480
E. Are <b>inconclusive</b> ( $\leq 1\%$ ) asbestos results by PLM reported with the ELAP required disclaimer? (See disclaimer below.)					G1484
F. Is the gravimetric reduction method used to generate the NOB asbestos result?					G1487

**Additional Observations/Notes:**

Disclaimer (from Item 198.6, Sec. 6.3.2.2)

"Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing."