PLAINTIFF'S EXHIBIT

USG-1499

SAMPLING & ANALYSIS

of

ASBESTOS-CONTAINING MATERIALS

* * * * *

SOME LESSONS LEARNED

- Inspections: what to look for
- Defining Sampling Areas
- Selecting Sample Sites
- How to Take Samples
- Specifications & Selection of Laboratories
- Quality Assurance & Laboratory Reliability
- Suggestions on Forms & Procedures

JANUARY 1981

This handout has been prepared as an informal training aid by the Regional Asbestos Coordinator, Environmental Protection Agency, Region IV, Atlanta, Georgia 30365. (404) 881-3864

CS014 2450

HOW TO SAMPLE FRIABLE MATERIAL IN BUILDINGS

STEPS TO FOLLOW WHEN SAMPLING SUSPECT ASBESTOS-CONTAINING MATERIALS

INSPECT ALL PARTS OF A BUILDING

- Locate all friable materials; friable materials are those that can be crumbled, pulverized, or reduced to powder in the hand. One must touch the material to know if it is friable.

- Be careful not to overlook materials covering walls, support beams and columns.

- Be sure to find materials that serve as fireproofing, insulation, acoustical protection or decorative coating.

- If friable materials are found, identify them as "suspect." (It might be appropriate to hire an architect or engineering firm to design the sample collection and analysis tasks outlined below. Quality assurance requirements are very important in obtaining good results. Assistance on quality assurance matters can be obtained on 1-800-334-8571, extension: 6741.

SET UP SAMPLING AREAS

- Segment, and mark on a "Floor Plan Diagram" of the building, those areas where the suspect material differs in appearance, or in how it feels to the touch, or in contents (if known). Additions to buildings made years after initial construction should be segmented, too. Each of these areas constitute "sampling areas." It is possible to have only one sampling area, or to have several sampling areas in the same building. Give each sampling area a code for identification purpose.

- Be sure to include on the building diagram those surfaces other than ceilings (i.e., walls and support beam surfaces, etc) if they are covered by suspect materials.

- Calculate, and mark on the diagram, the outside dimensions of the areas shown.

- Calculate the number of square feet covered by suspect asbestos-containing material. Use this number to determine how many bulk samples you should obtain of the suspect material in each sampling area.

  Less than 1000 sq. ft. - 3 samples, plus duplicates
  Between 1000 and 5000 sq. ft. - 5 samples, plus duplicates
  Greater than 5000 sq. ft. - 7 samples, plus duplicates

- Duplicate samples are needed for quality assurance purposes. The number of duplicates needed are subject to good test design parameters. Assistance is available on the toll-free number above.

CS014 2451

SELECT SAMPLE SITES (LOCATIONS)

- The locations from which you should take samples of suspect materials should be selected in random fashion, and not arbitrarily, if possible. Seek EPA guidance for random number selection procedures; otherwise, do your best to be sure the samples represent the whole of the suspect material. (Don't get caught taking samples only in corners and out-of-the-way places.)

- Clearly mark sample sites by number on the "floor plan diagram." It is very important that this record be kept carefully.

HOW TO TAKE SAMPLES

- Analysis for asbestos requires at least about a tablespoon of material and no more than two tablespoons. You can sample with a small, wide-mouthed bottle such as a small medicine bottle, a plastic or metal 35mm film cannister, a cork borer, or a knife. Whatever you use, be sure to penetrate and collect the full thickness of the coating.

- Transfer the sample to a small ziploc-type plastic bag, if necessary. Fill in data on the label on the sample container as soon as you put the sample in it. Use peel-off labels for writing convenience. Each label should include: name of building, name or number of the room, location of the sample or your own sample site number, your name and the date.

- If you use the sampling tool (bottle, knife or whatever) be sure to clean it thoroughly after each sample is taken.

- Do not release samples from your custody until you are assured of their chain-of-custody pending your receipt of analytical report.

REQUEST ANALYSES ONLY FROM LABORATORIES THAT PARTICIPATE IN EPA's QUALITY ASSURANCE PROGRAM

- Understand that the best analytical methods available have limitations.

- Specify PLM (Polarized Light Microscopy) and the Petrographic Method for analyses.

- If analyses provide results with statistical confidence limits below 1% asbestos, you might then request confirmation of this report through the use of XRD (X-Ray Defraction). Always make this decision in consultation with your laboratory representative or with the assistance of the EPA contractor on the toll-free number above.

CS014 2452

HOW TO FIND OUT IF THE LABORATORY RESULTS ARE CONSISTENT & RELIABLE

Your samples should be sent to a laboratory experienced in analysis for asbestos. The lab reports the presence, if there is such, estimated percentage, and type of asbestos in the sample. You might also request identification of all other materials in the sample.

To find out whether or not the results from a lab are consistent, you may wish to send them two samples (duplicates collected side by side). Give one sample a disguised number and location.

To compare one laboratory's results with those from another, send the primary samples to the primary laboratory and send the duplicates of samples to a different laboratory.

Compare results of laboratory work on a statistical basis. Refer to EPA guidance materials, if possible, to review statistical procedures.

Don't be surprised if the results from two different laboratories differ in reported percentage of asbestos, especially when the percentage of asbestos is 30% or more. Remember, the important information you want is whether or not sample has more than 1% asbestos, and if so, what kind of asbestos does the sample contain.

Competent laboratory analysts will expect you to develop your own quality assurance concepts when you are sampling asbestos materials. They expect you to have comparable results from another laboratory, for example. They even like the idea, because comparing results gives them the opportunity to improve on the very difficult analytical procedures involved.

Be wary of laboratories claiming to be competent in asbestos analysis. There are many commercial laboratories claiming competence but few that display this skill in the EPA-sponsored quality assurance program. A good idea is to check laboratories' qualifications by calling the toll-free number previously listed.

CS014 2453

S U M M A R Y

SEARCH THOROUGHLY for soft, crumbling, or flaking surfaces.

TAKE SAMPLES WITH GOOD METHODS IN MIND, mark them at once, and locate them on your sketch map.

TAKE DUPLICATE (SIDE BY SIDE) SAMPLES to find out whether or not the laboratory is consistent or to compare results from two different laboratories. Be consistent with good quality assurance techniques.

BE ASSURED OF THE CHAIN-OF-CUSTODY for all samples, pending receipt of analytical reports.

CALCULATE THE STATISTICAL SIGNIFICANCE OF YOUR ANALYTICAL RESULTS when laboratory reports are completed. XRD may be needed.

CONVEY THE ANALYTICAL RESULTS TO YOUR ENGINEERING/ARCHITECTURAL REPRESENTATIVE in the event you did not have them do the sample collection tasks. The engineer/architect must proceed with this knowledge from laboratory work to conduct an exposure assessment. Based on such an assessment, contract work procedures should be specified to control the release of asbestos fibers.

FOR FURTHER INFORMATION AND ADVICE, CONTACT an analytical laboratory representative. Consult materials prepared by EPA on asbestos problems. Of particular interest will be those materials prepared for regulatory purposes. Remember that asbestos problems are frought with expensive litigation issues and that one should proceed with sampling procedures with this fact in mind.

SEE FIGURES 1-4 for some suggestions on forms and procedures.

C5014 2454

SELECTION OF SAMPLE LOCATIONS WORKSHEET

Sample Area No. (a) _____

Dimensions of rectangle covering the Sampling Area:

Base (b) _____ feet *(Choose first random number between 0 and no. in (b))*

Height (c) _____ feet *(Choose second random number between 0 and no. in (c))*

No.	RANDOM NUMBERS First	RANDOM NUMBERS Second	LOCATION FALLS WITHIN SA Yes	LOCATION FALLS WITHIN SA No	SAMPLE LOCATION Numbers	Unique Sample ID # *(For Lab)*
(1)						
(2)						
(3)						
(4)						
(5)						
(6)						
(7)						
(8)						
(9)						
(10)						
(11)						
(12)						

Building Name: _____

Address: _____ State: _____

Asbestos Analytical Program Coordinator: _____

Date: _____

Figure 1. Sampling Worksheet

CS014 2455

SELECTION OF SAMPLE LOCATIONS WORKSHEET

Sample Area No. (a) 2

Dimensions of rectangle covering the Sampling Area:

Base (b) 132 feet (*Choose first random number between 0 and no. in (b)*)

Height (c) 90 feet (*Choose second random number between 0 and no. in (c)*)

No.	RANDOM NUMBERS First	RANDOM NUMBERS Second	LOCATION FALLS WITHIN SA Yes	LOCATION FALLS WITHIN SA No	SAMPLE LOCATION Numbers	Unique Sample ID # (For Lab)
(1)	21	51	✓		201	217
(2)	71	45	✓		202	884
(3)	108	13		✓		
(4)	10	41	✓		203	072
(5)	119	76	✓		204	300
(6)	22	66	✓		205	940
(7)	14	71	✓		206	572
(8)	67	12	✓		207	579
(9)						
(10)						
(11)						
(12)						

Building Name: _____

Address: _____ State: _____

Asbestos Analytical Program Coordinator: _____

Date: _____

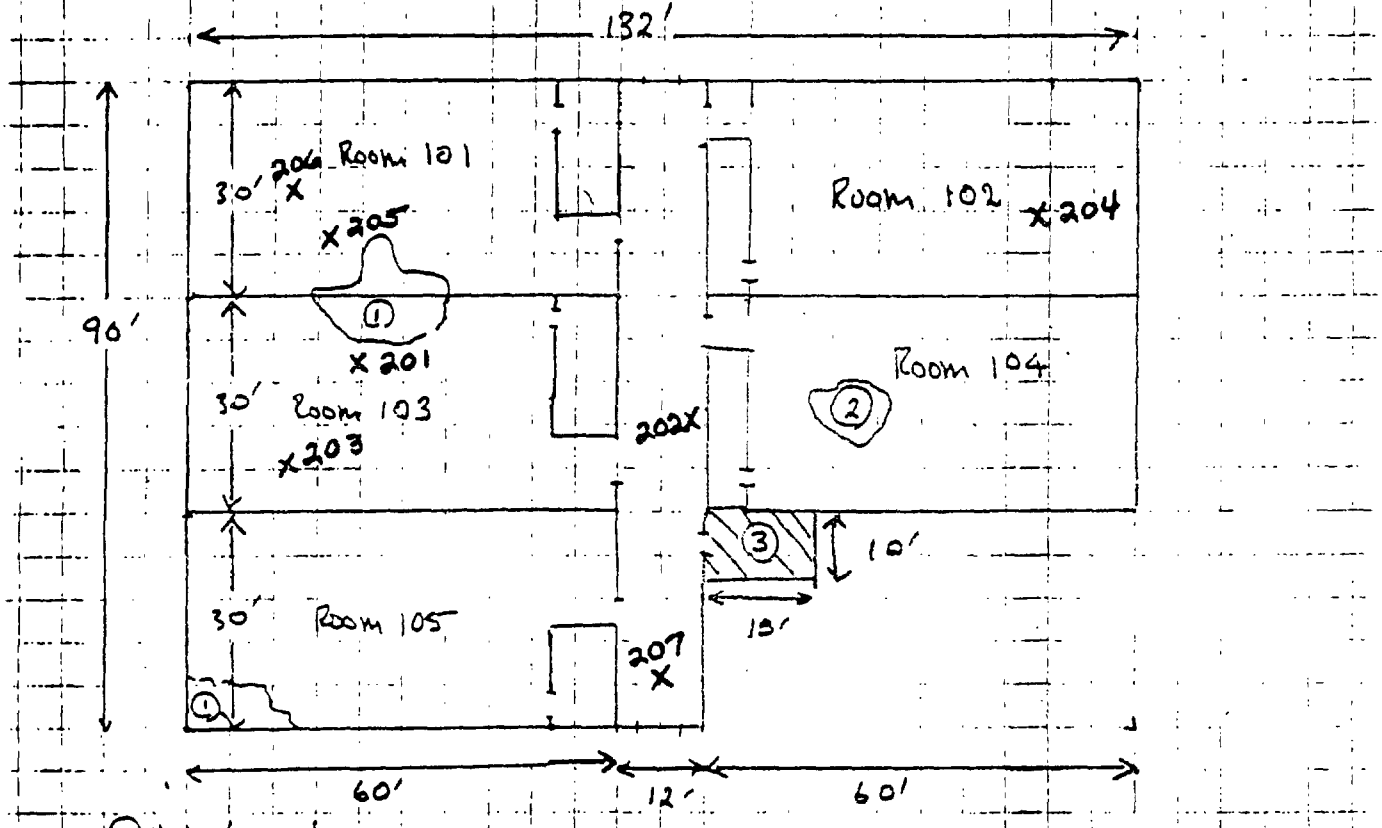
Figure 2. Example Worksheet

CS014 2456

Classroom Annex (Constructed in 1962)

Friable Ceiling Material of First Floor Classrooms.
Gray textured spray finish
Stuccoed in appearance

All ceiling areas sketched below comprise Sampling Area (2), with one exception noted.



① Water damage
② Ceiling broken and falling
③ Stairwell ceiling not friable - not in Sampling Area (2)

Scale: Square = 6' (Meas. are inside dimensions)

School _____
Address _____

Program Coordinator _____
Telephone No. _____
Inspector _____
Date of Inspection _____

am

Figure 3. Example Sampling Area Diagram

CS014 2457

TABLE OF RANDOM DIGITS

63271	59986	71744	51102	15141	80714	58683	93108	13554	79945
88547	09896	95436	79115	08303	01041	20030	63754	08459	28364
55957	57243	83865	09911	19761	66535	40102	26846	60147	15702
46276	87453	44790	67122	45573	84358	21625	16999	13385	22782
55363	07449	34835	15290	76616	67191	12777	21861	68689	03263
69393	92785	49902	58447	42048	30378	87618	26933	40640	16281
13186	29431	88190	04588	38733	81290	89541	70290	40113	08243
17726	28652	56836	78351	47327	18518	92222	55201	27340	10493
36520	64465	05550	30157	82242	29520	69753	72602	23756	54935
81628	36100	39254	56835	37636	02421	98063	89641	64953	99337
84649	48968	75215	75498	49539	74240	03466	49292	36401	45525
63291	11618	12613	75055	43915	26488	41116	64531	56827	30825
70502	53225	03655	05915	37140	57051	48393	91322	25653	06543
06426	24771	59935	49801	11082	66762	94477	02494	88215	27191
20711	55609	29430	70165	45406	78484	31639	52009	18873	96927
41990	70538	77191	25860	55204	73417	83920	69468	74972	38712
72452	36618	76298	26678	89334	33938	95567	29380	75906	91807
37042	40318	57099	10528	09925	89773	41335	96244	29002	46453
53766	52875	15987	46962	67342	77592	57651	95508	80033	69828
90585	58955	53122	16025	84299	53310	67380	84249	25348	04332
32001	96293	37203	64516	51530	37069	40261	61374	05815	06714
62606	64324	46354	72157	67248	20135	49804	09226	64419	29457
10078	28073	85389	50324	14500	15562	64165	06125	71353	77669
91561	46145	24177	15294	10061	98124	75732	00815	83452	97355
13091	98112	53959	79607	52244	63303	10413	63839	74762	50289
73864	83014	72457	22682	03033	61714	88173	90835	00634	85169
66668	25467	48894	51043	02365	91726	09365	63167	95264	45643
84745	41042	29493	01836	09044	51926	43630	63470	76508	14194
48068	26805	94595	47907	13357	38412	33318	26098	82782	42851
54310	96175	97594	88616	42035	38093	36745	56702	40644	83514
14877	33095	10924	58013	61439	21882	42059	24177	58739	60170
78295	23179	02771	43464	59061	71411	05697	67194	30495	21157
67524	02865	39593	54278	04237	92441	26602	63835	38032	94770
58268	57219	68124	73455	83236	08710	04284	55005	84171	42596
97158	28672	50685	01181	24262	19427	52106	34308	73685	74246
04230	16831	69085	30802	65559	09205	71829	06498	85650	38707
94879	56606	30401	02602	57658	70091	54986	41394	60437	03195
71446	15232	66715	26385	91518	70566	02888	79941	39684	54315
32886	05644	79316	09819	00813	88407	17461	73925	53037	91904
62048	33711	25290	21526	02223	75947	66466	06232	10913	75336
84534	42351	21628	53669	81352	95152	08107	98814	72743	12849
84707	15885	84710	35866	06446	86311	32648	88141	73902	69981
19409	40868	64220	80861	13860	68493	52908	26374	63297	45052
57978	48015	25973	66777	45924	56144	24742	96702	88200	66162
57295	98298	11199	96510	75228	41600	47192	43267	35973	23152
94044	83785	93388	07833	38216	31413	70555	03023	54147	06647
30014	25879	71763	96679	90603	99396	74557	74224	18211	91637
07265	69563	64268	88802	72264	66540	01782	08396	19251	83613
84404	88642	30263	80310	11522	57810	27627	78376	36240	48952
21778	02085	27762	46097	43324	34354	09369	14966	10158	76089

CS014 2458

Figure 4. Random Number Table
Used in Figures 3 & 4

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63271	59986	71744	51102	15141	80714	58683	93108	13554	79945
88547	09896	95436	79115	08303	01041	20030	63754	08459	28364
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84649	48968	75215	75498	49539	74240	03466	49292	36401	45525
63291	11618	12613	75055	43915	26488	41116	64531	56827	30825
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62606	64324	46354	72157	67248	20135	49804	09226	64419	29457
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13091	98112	53959	79607	52244	63303	10413	63839	74762	50289
73864	83014	72457	22682	03033	61714	88173	90835	00634	85169
66668	25467	48894	51043	02365	91726	09365	63167	95264	45643
84745	41042	29493	01836	09044	51926	43630	63470	76508	14194
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78295	23179	02771	43464	59061	71411	05697	67194	30495	21157
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04230	16831	69085	30802	65559	09205	71829	06498	85650	38707
94879	56606	30401	02602	57658	70091	54986	41394	60437	03195
71446	15232	66715	26385	91518	70566	02888	79941	39684	54315
32886	05644	79316	09819	00813	88407	17461	73925	53037	91904
62048	33711	25290	21526	02223	75947	66466	06232	10913	75336
84534	42351	21628	53669	81352	95152	08107	98814	72743	12849
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57978	48015	25973	66777	45924	56144	24742	96702	88200	66162
57295	98298	11199	96510	75228	41600	47192	43267	35973	23152
94044	83785	93388	07833	38216	31413	70555	03023	54147	06647
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Figure 4. Random Number Table
Used in Figures 3 & 4

CS014 2459