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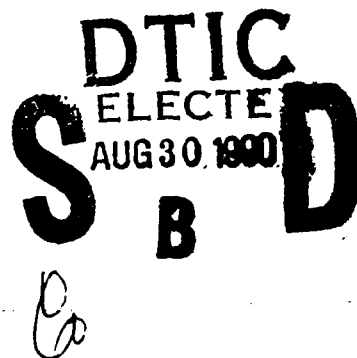
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**U.S. Army Toxic and Hazardous Materials Agency
Report of Sampling and
Analysis Results**

**Rural Ridge Army Housing Units
Rural Ridge, Pennsylvania**

August 1990



Prepared for:

**U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground
Maryland 21010-5401**

Prepared by:



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Roy F. Weston, Inc. has conducted a sampling and analysis program of the Army housing property located Rural Ridge, Pennsylvania. The objectives of this effort include further characterization of environmental contamination identified in an enhanced preliminary assessment carried out in 1989. The specific activities performed at this site were identification, evaluation of the condition, and collection of samples from specific suspected asbestos-containing materials, including floor tiles, pipe run and pipe fitting insulation, dust in the ductwork, and exterior siding, where present. These evaluations were necessary to clarify potential environmental issues identified in the earlier report, prior to the sale or realignment of the property.

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**SAMPLING AND ANALYSIS AT THE U.S. ARMY
FAMILY HOUSING UNIT (FHU) PROPERTY
RURAL RIDGE, PENNSYLVANIA**

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	ii
SECTION 1. INTRODUCTION	1
1.1 PURPOSE AND SCOPE	1
1.2 SITE DESCRIPTION	1
1.3 REPORT ORGANIZATION	2
SECTION 2. ASBESTOS-CONTAINING MATERIALS	3
2.1 SAMPLING RATIONALE	3
2.2 FIELD ACTIVITIES AND OBSERVATIONS	3
2.3 LABORATORY PROCEDURES AND RESULTS	4
2.4 CONCLUSIONS AND RECOMMENDATIONS	9
SECTION 3. AIRBORNE ASBESTOS ASSESSMENT	11
3.1 SAMPLING RATIONALE	11
3.2 FIELD ACTIVITIES AND OBSERVATIONS	11
3.3 LABORATORY PROCEDURES AND RESULTS	12
3.4 CONCLUSIONS AND RECOMMENDATIONS	13
SECTION 4. SUMMARY OF FINDINGS	15

LIST OF TABLES

TABLE 2.1	BULK SAMPLE SUMMARY, RURAL RIDGE FAMILY HOUSING ...	7
TABLE 2.2	ASBESTOS CONTAINING MATERIALS, RURAL RIDGE FAMILY HOUSING	8
TABLE 3.1	RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS ..	14

LIST OF APPENDICES

APPENDIX A.	ASBESTOS SUPPORTING DATA
A.1	FIELD DATA, ASBESTOS SAMPLING
A.2	LABORATORY DATA, ASBESTOS SAMPLES
APPENDIX B.	AIRBORNE ASBESTOS SUPPORTING DATA
B.1	FIELD DATA, AIRBORNE ASBESTOS SAMPLING
B.2	LABORATORY DATA, AIRBORNE ASBESTOS SAMPLING

EXECUTIVE SUMMARY

The U.S. Army family housing units (FHUs) at Rural Ridge, Pennsylvania were inspected by Roy F. Weston, Inc. (WESTON) personnel during March 1990 to further evaluate the environmental concerns identified in the enhanced Preliminary Assessment reports prepared and submitted earlier by Argonne National Laboratory (ANL) for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Three of the 12 single-family "Capehart" housing units were examined on 05 March to investigate the possible presence of asbestos-containing materials (ACM). An assessment of airborne asbestos exposure was performed at one unit on this property on 17 April 1990 by a WESTON Certified Industrial Hygienist (CIH), because asbestos fibers were detected in the dust deposited within the ductwork of the heating system.

The ANL Draft Sampling and Analysis Plan, Revision 1 (SAP) specified sampling the following materials, where present, which are suspected to contain asbestos, from ten per cent of the housing units or a minimum of three housing units, whichever is greater.

- Pipe run insulation.
- Dust accumulated inside heating ductwork within the concrete slab, where present and open.
- Vinyl floor tiles.

The WESTON personnel selected three housing units for inspection after review of maintenance records and drawings, discussions with housing management personnel, and determination that the units were in similar condition. The housing units chosen, Nos. S-001, S-005, and S-010, were considered to be representative of the other nine units, but this was not confirmed by an examination of all the units.

Twelve dust samples, 14 samples of floor tile, and one sample of expansion joint were collected by WESTON and analyzed. These analyses revealed that asbestos is present in dust accumulated within the heating ductwork, in the expansion joint, and in floor tile at the three housing units examined. Asbestos was found in eight of the twelve dust samples by transmission electron microscopy (TEM), and in at least two samples from each unit. Asbestos was quantified at 1% or greater by polarized light microscopy (PLM) in all 14 floor tile samples. Asbestos was found by PLM analysis in the expansion joint sample at 50%. No pipe insulation samples were collected since the accessible pipes in the units examined were not insulated and the remainder were not accessible without destructive sampling. During the asbestos sampling activity, other suspect materials observed were roofing materials.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The risks posed by the asbestos-containing dust in the ductwork cannot be clearly evaluated, because the sampling and analysis program only included a qualitative screening of this material since no approved quantitative procedure exists. Further studies, such as air sampling, were recommended to determine if the asbestos is becoming airborne and to define what risks, if any, are presented by these findings. These studies were subsequently performed and the findings are presented in this report.

- The vinyl floor tiles pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be managed in place under an Operations and Maintenance (O&M) program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.
- The duct expansion joints should be left in place and managed under an O&M program as long as they are in good condition, but should be removed or replaced during the next renovation or prior to demolition.

Samples for airborne asbestos were collected from four floor vents, one located in each of the living room, kitchen, bedroom, and bathroom, in an unoccupied unit which had not been inspected previously. As a consequence, dust samples were also collected from these vents. The air samples were subjected to analysis by TEM to identify and quantify any asbestos fibers collected. No asbestos fibers were found in any of the samples from this house. The sample volumes collected resulted in detection limits for airborne asbestos fiber concentration of <0.004 fibers per cubic centimeter (f/cc), which does not pose a substantial risk to occupants. The sampling procedures employed were designed to simulate the worst-case concentration that is likely to be encountered. Chrysotile fibers were detected in three of the four dust samples collected during this follow-up study.

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SECTION 1. INTRODUCTION

**SAMPLING AND ANALYSIS AT THE U.S. ARMY
FAMILY HOUSING UNIT (FHU) PROPERTY
RURAL RIDGE, PENNSYLVANIA**

SECTION 1. INTRODUCTION

Roy F. Weston, Inc. (WESTON) was retained by Argonne National Laboratory (ANL) to provide assistance in gathering additional environmental data for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) at 53 family housing unit (FHU) properties in 12 states. The Rural Ridge, Pennsylvania property is one of these FHUs.

1.1 PURPOSE AND SCOPE

The purpose of this project was to provide the Department of the Army with sound environmental data on the properties which are scheduled for sale or realignment as a result of the Defense Authorization Amendments and Base Closure and Realignment Act (Public Law 100-526). Environmental assessments of each property covered by the Act are required by the Secretary of Defense prior to their closure or realignment. Such actions must be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA) to ensure that any environmental hazards will be identified and mitigated where required.

Previously, ANL conducted enhanced preliminary assessments (PAs) for each property. These enhanced PAs made recommendations regarding sampling and analysis to determine (1) whether and in what quantities asbestos is present in certain building construction materials (including pipe run insulation, dust accumulated in heating ductwork, vinyl floor tile, and exterior siding shingles, where present), (2) in selected contexts, whether and in what concentration soils and groundwater may be contaminated, and (3) whether and in what range transformer oils at selected sites may contain polychlorinated biphenyls (PCBs). WESTON gathered this data by implementing ANL's Draft FHU Sampling and Analysis Plan, Revision 1 (SAP). Subsequent to the initial studies, WESTON, ANL, and USATHAMA decided that a follow-up effort was required to determine if asbestos fibers were becoming airborne from the dust in the heating system. This study was implemented, and samples were collected to evaluate any risks to occupants from this source.

1.2 SITE DESCRIPTION

The Department of the Army's FHU property in Rural Ridge, Pennsylvania consists of 12 single-family housing units located on 6.32 acres, with a 0.14-acre easement. The site is divided into two sections; each street has a single row of houses on the east side, with five houses on the lower street and seven houses on the upper street. The two streets that make up the site are on different levels. Just north of the site on the same side of Crawford Run Road is a Methodist Church and cemetery. West of the site the terrain is gently rolling to steep slopes along gullies and streams.

The two and three-bedroom "Capehart"-style single-family housing units were constructed in 1958. The single-story, wood-frame units were built on concrete slab foundations with no basements or crawl spaces. The ducts for the original heating system and domestic water lines were embedded in the concrete slab, which

was covered with vinyl floor tile. The units have pitched roofs surfaced with asphalt shingles and exteriors finished with vinyl siding.

1.3 REPORT ORGANIZATION

This report contains the results of the sampling and analysis program performed by WESTON. Section 2 contains a description of the asbestos sampling performed at the property and laboratory results for samples of suspected asbestos-containing material (ACM) collected. Copies of field notes and laboratory results pertaining to asbestos are provided in Appendices A.1 and A.2. Section 3 presents a description of the field sampling activities and results of the analyses for airborne asbestos fibers. Field notes and copies of the laboratory reports for this effort are presented in Appendices B.1 and B.2, respectively. Section 4 is a summation of all activities and findings for the Rural Ridge FHU.

SECTION 2. ASBESTOS-CONTAINING MATERIALS

SECTION 2. ASBESTOS-CONTAINING MATERIALS

WESTON personnel inspected three of the 12 "Capehart" units at the Rural Ridge family housing facility on 05 March 1990 for the presence of suspected ACM. Vinyl floor tile, expansion joint, and dust accumulated within the heating ductwork were the only suspect materials found within the buildings. All sampling was done following the requirements of ANL's SAP. Additionally, all field work was performed in accordance with applicable Federal regulations, including 40 CFR Part 61 Subpart M, 40 CFR Part 763 Subpart E, and 29 CFR Part 1910.1001.

2.1 SAMPLING RATIONALE

The sampling rationale used by WESTON for this project followed the recommendations set forth by ANL. The type of suspect ACM to be sampled, the number of housing units to be examined at each FHU facility, and number of samples to be taken for each material found were described in the SAP. The plan for Rural Ridge required sampling of the following materials, if present:

- Pipe run insulation.
- Accumulated dust inside heating ductwork if not sealed.
- Vinyl floor tiles.

In accordance with the SAP, three units were examined at this facility. The sampling plan, however, did not identify specific units which were to be sampled. The task of determining which housing units were representative of the facility as a whole and, therefore, would be sampled was left to the WESTON field team. After reviewing all available maintenance records and drawings and discussing the facility with Directorate of Engineering and Housing (DEH) personnel, it was determined that all of the units at the Rural Ridge FHU were similar in condition. Units S-001, S-005, and S-010 were chosen by the WESTON field team leader as representative units to be sampled.

The SAP specifies that a minimum of two pipe run insulation samples, four dust samples, and one sample of each color of floor tile be collected from each of the housing units examined. Twelve dust samples and 14 samples of vinyl floor tiles were collected at the facility. In addition, one expansion joint sample was collected. No pipe insulation samples were collected since the accessible pipes in the units examined were not insulated.

2.2 FIELD ACTIVITIES AND OBSERVATIONS

Each of the units was inspected to determine if suspect materials were present. Heating ductwork vents in the units were not sealed, so dust samples were collected by wiping the inner surface of the duct near the designated exhaust vents with a fiber-free wipe selected for its ability to trap dust in a non-fibrous matrix. Each wipe was placed in the jaws of a flexible small parts pick-up tool and moistened with fiber free water. The grille was then removed and the tool inserted into the duct opening. The interior surface was wiped to collect dust on the moistened surface of the wipe. After the dust was gathered, the wipe was placed in a small plastic wide-mouth jar, sealed, labeled with the sample number, and shipped to the lab. The grille was then replaced and the tool was cleaned by rinsing and wet wiping the surfaces prior to collecting the next sample. Samples were collected from the living room, kitchen, bedroom, and main bathroom in all three units.

Seven colors, tan, light brown, brown, dark brown, dark brown with streaks, gray, and green, of 9" x 9" vinyl floor tile and white 12" x 12" floor tile were sampled. All three units contain brown floor tile. Units S-01 and S-05 contained tan and dark brown floor tile. Units S-01 and S-10 contained gray floor tile. Unit S-01 contained light brown, dark brown with streaks, and white 12" x 12" floor tile. The only sample of green 9" x 9" floor tile was taken at Unit S-10. One sample of each of the floor tile types was taken in each housing unit, resulting in a total of 14 samples for laboratory determination of asbestos content. These samples were taken by breaking off a small piece of floor tile in an inconspicuous location. About one square inch of the tile surface area was taken for each sample. No effort was made to separate the mastic, which sometimes contains asbestos, from the floor tile samples themselves.

The vinyl floor tile in all three of the units inspected was in good condition. This material is considered to be a non-friable type of ACM, unless damaged. If significant damage occurs, such that the material becomes friable as defined in the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), the U. S. Environmental Protection Agency (EPA) would classify these tiles as friable materials. However, an EPA interpretation was recently released that changes certain previous interpretations regarding non-friable ACM. On 23 February 1990, a memorandum was issued by the Director of Emissions Standards Division, the Director of Stationary Source Compliance Division, and the Associate Enforcement Counsel for Air Enforcement of the EPA Office of Air Quality Planning and Standards (OAQPS). This memorandum was circulated to other air quality officials and EPA regional offices in early March 1990. This latest position states that floor tiles and certain other non-friable materials do not have to be removed from a facility prior to demolition, unless they are severely damaged and thus are considered friable, or unless the demolition may cause fiber release through grinding or abrasion of the tiles. Floor tile removal shall be done if demolition is to be accomplished by burning, either of the unit or of the debris from demolition. However, if the floors in the housing units are to be renovated, special care must be taken during the process to prevent the release of asbestos fibers.

The WESTON field team was directed, as a part of the project scope contained in the SAP, to perform sampling and analysis of specific suspect ACM. One sample of an expansion joint on a heating unit was collected and analyzed. No other suspect materials were observed within the buildings. However, the roofing shingles and felt are materials that sometimes contain asbestos. Copies of the field notes are included in Appendix A.1.

2.3 LABORATORY PROCEDURES AND RESULTS

The bulk samples of building materials were analyzed for asbestos content by WESTON's optical microscopy laboratory in Auburn, Alabama. This laboratory is accredited by the American Industrial Hygiene Association (AIHA) and the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The bulk samples were analyzed by Polarized Light Microscopy (PLM) using the EPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/M4-82-020, December 1982. Copies of the laboratory reports are included in Appendix A.2.

Vinyl floor tile samples for which no asbestos was found using PLM methods and wipe samples of dust accumulated within heating ductwork were analyzed qualitatively for the presence of asbestos by Transmission

Electron Microscopy (TEM) at WESTON's NVLAP accredited electron microscopy laboratory in Auburn, Alabama. Copies of these laboratory reports are also included in Appendix A.2.

All analyses were performed in accordance with protocols set forth in the Laboratory Accreditation package submitted by WESTON under NVLAP. This document includes standard procedures for sample analysis and quality assurance / quality control (QA/QC) which were acceptable to NIST. The QA/QC protocols for the laboratory differ significantly from those commonly found in chemical analysis procedures, due to the nature of the analytical procedure. Since there are no reagents, digestions, or other steps in the process that provide significant opportunities for sample contamination or analyte loss, lot blanks and sample spikes are not performed. Instead, all analyses are performed using the following steps:

- Incoming samples are divided into lots of ten for analysis.
- One sample is selected at random to serve as the QC check and divided into two containers.
- The sample lot is assigned to an analyst who determines the asbestos content of each sample.
- The QC sample is analyzed by a different analyst, designated by the sample custodian.
- The results of both analysts are submitted to the QC Coordinator for review, and comparison to the laboratory QC chart.
- The results are reviewed and approved, based on the written QC review procedures, or rejected. If rejected, the sample lot and QC sample are reanalyzed.

The WESTON laboratory routinely runs blank checks to ensure that equipment and refractive index oils are not contaminated, collects and analyzes samples of the air in the work areas to document that airborne asbestos fibers do not threaten worker health or contaminate samples, and analyzes samples submitted by NIST to document precision of results as required by the NVLAP program. Samples provided in past rounds of proficiency checks are used for analyst training and to document analyst proficiency. The use of third party laboratory comparisons is often done, and is accomplished by sending duplicates of samples to an outside laboratory and comparing the results obtained by the two facilities.

In interpreting the asbestos results, it should be noted that the definition of asbestos presence differs between the EPA and some state agencies. According to the EPA definition, any materials that contain greater than one per cent (>1%) asbestos are classified as ACM by the 1977 NESHAP regulations. However, California has recently implemented state regulations that consider all materials containing 0.1 per cent or more asbestos as asbestos-containing. It is believed that several other states will soon follow the lead of California in lowering the threshold limit to 0.1 per cent, including some in which properties under review in this study are located. Currently, the State of Pennsylvania continues to abide by the EPA definition, hence, all samples containing >1% asbestos are considered to be ACM.

The matter is further complicated by the fact that the PLM method was developed specifically for friable materials, but not for non-friable types of suspect ACM such as vinyl floor tiles, vinyl sheeting, and siding. In fact, no specific method has been developed and promulgated to date for such samples, so laboratories use PLM as the only available documented procedure for their analysis. PLM has an inherent

limitation on fiber resolution of about 0.25 micrometer (um) in diameter, while reliable detection and quantification of fibers smaller than 1 um in diameter is difficult. The manufacturing process for vinyl floor tiles, for example, often produces the very small fiber diameters which cannot be seen by PLM. WESTON's experience is that frequently such samples do, in fact, contain significant quantities of asbestos. WESTON has developed a qualitative technique using TEM to detect the presence of such small fibers and minimize false negatives in the laboratory results. This technique, however, does not allow a good quantitative estimate of asbestos content.

For these reasons, the WESTON laboratories have implemented a policy of reporting asbestos presence as follows:

- Asbestos determined by PLM to be present at greater than 1% is reported as the quantity detected.
- If asbestos is estimated to be less than 1% by PLM, it is reported as "<1%". This estimate of asbestos content may be made when only one asbestos structure is observed.
- If asbestos is not detected in certain non-friable materials by PLM, then the samples are subjected to TEM analysis. The results are reported as positive if asbestos is detected by TEM.

Recommendations made in this report are based on the >1% regulatory limit, except for floor tiles as discussed earlier and except as otherwise noted. However, all samples in which asbestos was detected are discussed. This represents a conservative approach to the assessment of asbestos presence at the facility.

Table 2.1 contains a summary of all samples collected at the Rural Ridge FHU, including sample locations, material descriptions, and laboratory results. PLM results are quantitative while TEM results are qualitative. Quantity estimates for materials sampled that were suspected to contain asbestos are presented in Table 2.2. The field notes describing the observations are provided in Appendix A.1, while copies of the original laboratory reports are included as Appendix A.2.

All 14 floor tile samples were found by PLM to contain asbestos at or greater than the 1% level. WESTON considers the 1% value reported for sample BU-391-45-PA-501-AFT to be sufficient to define the samples as asbestos-containing, due to the analytical uncertainty of the PLM method when applied to floor tiles, previously discussed. The nine units not inspected should be considered to have ACM present in the floor tiles unless additional sampling and analysis is performed and shows that no asbestos is present in these units.

Analytical results for the dust samples taken from the heater ductwork indicate that this dust contains some asbestos fibers. Qualitative TEM analyses revealed the presence of asbestos in eight of the twelve dust samples. At least two samples from each unit had detectable asbestos fibers. This data lead to the conclusion that asbestos is found in the dust trapped by the heating ducts.

Asbestos was found in the one sample of the expansion joint at a concentration of 50% by PLM. Other suspect materials noted were roofing shingles and felt.

TABLE 2.1
BULK SAMPLE SUMMARY
RURAL RIDGE FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS
=====				
Unit S05				

BU370-45-PA-S05-AFT	Tan 9" x 9" floor tile	Kitchen	Chrysotile, 10%	
BU371-45-PA-S05-AFT	Brown 9" x 9" floor tile	Living room/Hall	Chrysotile, 10%	
BU372-45-PA-S05-AFT	Dk brown 9" x 9" floor tile	Living room/Hall	Chrysotile, 10%	
BU373-45-PA-S05-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2	Chrysotile, 3%	
BU374-45-PA-S05	Expansion joint	Htr room	Chrysotile, 50%	
BU375-45-PA-S05-ATD	Dust within ductwork	Bath 2	---	Positive
BU376-45-PA-S05-ATD	Dust within ductwork	Bedroom 1	---	Negative
BU377-45-PA-S05-ATD	Dust within ductwork	Living room	---	Positive
BU378-45-PA-S05-ATD	Dust within ductwork	Living room	---	Positive
Unit S10				

BU379-45-PA-S10-AFT	Gray 9" x 9" floor tile	Kitchen/Hall/Bath 2/ Living room	Chrysotile, 5%	
BU380-45-PA-S10-AFT	Green 9" x 9" floor tile	Living room/Hall	Chrysotile, 10%	
BU381-45-PA-S10-AFT	Brown 9" x 9" floor tile	All bedrooms/Bath 1	Chrysotile, 10%	
BU382-45-PA-S10-ATD	Dust within ductwork	Bath 1	---	Negative
BU383-45-PA-S10-ATD	Dust within ductwork	Bedroom 1	---	Positive
BU384-45-PA-S10-ATD	Dust within ductwork	Living room	---	Negative
BU385-45-PA-S10-ATD	Dust within ductwork	Living room	---	Positive
Unit S01				

BU386-45-PA-S01-AFT	Lt brown 9" x 9" floor tile	Kitchen	Chrysotile, 10%	
BU387-45-PA-S01-AFT	Tan 9" x 9" floor tile	Kitchen/Living room	Chrysotile, 1%	
BU388-45-PA-S01-AFT	Brown 9" x 9" floor tile	Living room/Hall	Chrysotile, 12%	
BU389-45-PA-S01-AFT	Dk brown streaked 9" x 9" floor tile	Living room/Hall	Chrysotile, 10%	
BU390-45-PA-S01-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1	Chrysotile, 10%	
BU391-45-PA-S01-AFT	White 12" x 12" floor tile	Bath 2	Chrysotile, 1%	
BU392-45-PA-S01-AFT	Dk brown 9" x 9" floor tile	Living room	Chrysotile, 12%	
BU393-45-PA-S01-ATD	Dust within ductwork	Bedroom 3	---	Positive
BU394-45-PA-S01-ATD	Dust within ductwork	Bedroom 2	---	Positive
BU395-45-PA-S01-ATD	Dust within ductwork	Kitchen	---	Negative
BU396-45-PA-S01-ATD	Dust within ductwork	Living room	---	Positive

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
RURAL RIDGE FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
=====				
Unit S05 -----				
BU370-45-PA-S05-AFT	Tan 9" x 9" floor tile	Kitchen	100	Square ft
BU371-45-PA-S05-AFT	Brown 9" x 9" floor tile	Living room/Hall	337	Square ft
BU372-45-PA-S05-AFT	Dk brown 9" x 9" floor tile	Living room/Hall	35	Square ft
BU373-45-PA-S05-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2	474	Square ft
BU374-45-PA-S05	Expansion joint	Htr room	1	Each
BU375-45-PA-S05-ATD	Dust within ductwork	Bath 2	N/A	
BU377-45-PA-S05-ATD	Dust within ductwork	Living room	N/A	
BU378-45-PA-S05-ATD	Dust within ductwork	Living room	N/A	
Unit S10 -----				
BU379-45-PA-S10-AFT	Gray 9" x 9" floor tile	Kitchen/Hall/Bath 2/ Living room	524	Square ft
BU380-45-PA-S10-AFT	Green 9" x 9" floor tile	Living room/Hall	35	Square ft
BU381-45-PA-S10-AFT	Brown 9" x 9" floor tile	All bedrooms/Bath 1	422	Square ft
BU383-45-PA-S10-ATD	Dust within ductwork	Bedroom 1	N/A	
BU385-45-PA-S10-ATD	Dust within ductwork	Living room	N/A	
Unit S01 -----				
BU386-45-PA-S01-AFT	Lt brown 9" x 9" floor tile	Kitchen	103	Square ft
BU387-45-PA-S01-AFT	Tan 9" x 9" floor tile	Kitchen/Living room	44	Square ft
BU388-45-PA-S01-AFT	Brown 9" x 9" floor tile	Living room/Hall	430	Square ft
BU389-45-PA-S01-AFT	Dk brown streaked 9" x 9" floor tile	Living room/Hall	60	Square ft
BU390-45-PA-S01-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1	542	Square ft
BU391-45-PA-S01-AFT	White 12" x 12" floor tile	Bath 2	23	Square ft
BU392-45-PA-S01-AFT	Dk brown 9" x 9" floor tile	Living room	5	Square ft
BU393-45-PA-S01-ATD	Dust within ductwork	Bedroom 3	N/A	
BU394-45-PA-S01-ATD	Dust within ductwork	Bedroom 2	N/A	
BU396-45-PA-S01-ATD	Dust within ductwork	Living room	N/A	

2.4 CONCLUSIONS AND RECOMMENDATIONS

The sample analyses performed by WESTON have revealed that asbestos is present in most floor tile samples collected in the three housing units examined and that the dust inside the heater supply ducts contains asbestos. These units are thought to be representative of the other nine at the site, but this was not confirmed by sampling all units. Analytical results of the expansion joint indicated asbestos was present in the one sample taken.

The asbestos dust accumulated within the heating ductwork represents an unusual problem, since the source of this asbestos is not readily apparent, and the quantity is not precisely known. As a conservative approach, the heating ductwork located within the concrete slab should be cleaned or permanently sealed when the units are renovated. Since the heating systems are currently operational, sealing the floor vents will require replacement with attic ducts and ceiling vents, or provisions of an alternate heating source. If the ducts are cleaned, a high-powered vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter should be employed, since other vacuum cleaners are not capable of trapping all of the small asbestos fibers that may be present.

The source of the asbestos in the ducts cannot be positively determined, due to the sampling and analysis procedures employed. However, there are several potential sources, based on observations at the numerous facilities inspected during this project. Units, presumed to be the original heaters, found at other facilities frequently contained an expansion joint which served to isolate the return air plenum from the heater itself, preventing the transmission of vibrations and noise to the ductwork. The fabric-like material used to form this joint was determined, in some cases, to be chrysotile asbestos in a nearly pure form. It is possible, even likely, that the heating systems in these units had similar expansion joints which have been removed. During the 25 to 30 years that the original units were in service, erosion of these joints was likely, and could have caused asbestos fibers to accumulate in the dust.

Another possibility is that residual debris from the removal of vinyl-asbestos floor tiles, such as was found in other sites, may have been left in the ducts during floor tile removal and replacement. Conversations with the TEM analysis indicate that there was some evidence of chlorine observed during the identification of the asbestos fibers by X-ray dispersion analysis in samples from some sites. The most likely source of this element, considering the site history, is the vinyl chloride polymer which forms the floor tile matrix. However, other asbestos sources, such as debris imported into the facilities from outside activities of the occupants, cannot be ruled out.

The vinyl floor tiles in the three housing units inspected were in good condition, but, should they become broken or damaged, asbestos fibers may be released. The recent EPA clarification of the definition for damaged non-friable materials apparently removes some concerns about the status of these materials at the time of renovation or demolition. Inspection of these normally non-friable materials prior to demolition is required, but, if they are in good condition at the time, they may be left in place as long as planned demolition procedures will not release a significant amount of asbestos fibers. However, if demolition will subject these non-friable materials to grinding, sanding, or abrading, or if demolition involves burning of the structure or debris from the structure, all forms of ACM, including these floor tiles, must be removed in advance.

The vinyl floor coverings should be left in place and managed under an O&M program. An O&M program must address the following:

- The locations of all known and suspected ACM.
- The procedures and frequency for periodically assessing the ACM in the facility.
- The procedures for safely handling the ACM during maintenance or removal activities.
- Designation of an asbestos coordinator for the facility.
- The responsibilities and requirements for training of personnel involved with maintenance and renovation of the facility.
- The record-keeping program for the facility.

The vinyl floor tiles should be removed during a planned renovation of the units, in accordance with the regulations applicable at the time.

Each of the heating systems in the three units inspected contained a friable woven asbestos cloth expansion joint. The duct expansion joints should be left in place and managed under an O&M program as long as they are in good condition, but should be removed or replaced during the next renovation or prior to demolition.

Although the roofing materials were the only other suspect materials noted, care should be taken during renovations or demolition to identify suspect materials that may have been hidden from the view of the assessment team. The suspect materials observed by the field team, and any hidden suspect materials found later, should be analyzed for the presence of asbestos prior to being disturbed.

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

Sampling for airborne asbestos fibers was performed at one unit of the Rural Ridge, Pennsylvania FHU on 17 April 1990 by WESTON. Dr. Leonard Nelms, a Certified Industrial Hygienist (CIH) visited the site and collected the samples using procedures described in the Asbestos Hazard Emergency Response Act (AHERA). These procedures were designed for verifying that clean-up of a contained area, following completion of an asbestos abatement action in public schools, was adequately performed. All samples were analyzed by TEM following the protocols specified in AHERA.

3.1 SAMPLING RATIONALE

WESTON followed the procedures and guidelines set forth during discussions among ANL, USATHAMA, and WESTON staff members, to provide a fast-track field sampling program and rapid analysis of samples collected. The urgency of this effort was driven by the finding that asbestos fibers were a component of the dust contained in the sub-slab ductwork of a number of the installations. The approach chosen required that the WESTON CIH collect four samples of air from selected heating registers, generally from one vent in each of the living room, kitchen, bedroom, and bathroom.

Air samples were to be collected in one unoccupied unit at the site while the heating system was operating, to simulate the worst possible case for exposure of occupants. The vacant unit selected was to be one of those from which dust within ducts had been sampled during the initial investigations, where possible. If no unit that had been sampled previously was vacant at the time, another unit was to be chosen from among those available, and samples of dust from the ducts were to be collected. These samples were to be collected after completion of sampling for airborne fibers, using the procedures employed previously. Unit S-08 was selected at the Rural Ridge site, since it was vacant, but it had not previously been sampled. Therefore, dust samples were also collected from the vents.

3.2 FIELD ACTIVITIES AND OBSERVATIONS

The sampling activities at this site were performed during the morning, on a cold spring day, during a sleet and snow storm. The diaphragm pumps were unpacked, placed in the selected sampling locations, and turned on as soon as possible after arrival at the site to allow the mechanical components to warm up prior to checking flow rates. The heating system was turned on as soon as the pumps were in operation, to allow the air flow to stabilize, since it had not been in operation recently.

A test filter cassette, identical to those used for sample collection, was placed on the pump system being calibrated and the airflow into the filter was measured using a calibrated rotameter. This followed AHERA requirements and good industrial hygiene (IH) sampling protocols. After the pumps were calibrated, a sampling cassette made of an electrically conducting plastic was attached to the sample line, placed directly over the heating register to be sampled, and securely held in place with duct tape. The cassette contained a 25 mm diameter mixed cellulose ester (MCE) membrane filter, having a nominal pore size of 0.45 μm . The time at which sample collection was begun was recorded and the air was sampled for approximately three hours.

The pumps were operated for a length of time sufficient to draw about 1,600 liters (L) of air through each filter, based on the initial daily calibration. At the expiration of this time, the filter cassettes were removed from the heating register, inverted while the airflow continued, and lightly tapped to dislodge any fibers that may have adhered to the cowlings of the cassette. Then, the cassettes were carefully removed from the sampling pump, resealed with the plugs and end caps that are a part of the cassettes, and labeled. The flow rate of each pump was again determined by exactly the same procedure used prior to the start of sample collection. After all sampling was completed, the heating system was returned to the same condition and setting that was found on entry to the unit.

The volume of air drawn through each filter was calculated, based on the average sample flow rate and the duration of sample collection, and recorded on the cassette label. Each cassette was then sealed in an anti-static plastic zipper-seal bag and placed in a shipping carton with a custom-designed anti-static foam liner. All sampling equipment, samples and other gear were then removed from the unit and the site was secured prior to departure.

Samples were collected from the four interior locations selected. In addition, a background sample of ambient outside air was taken near the entry door to the kitchen and a field blank was prepared. No significant problems were encountered during the sample collection activities. After completion of air sampling, the dust samples were taken using the procedures described in the ANL SAP.

During the sampling effort the facility was examined to identify any potential sources of asbestos that may be responsible for the asbestos fibers found in the dust. The heating system has a coarsely woven fabric expansion joint that appeared to have been in place for some time. This type of material sometimes contains asbestos. The heating ducts themselves are a fibrous material that may contain asbestos.

3.3 LABORATORY PROCEDURES AND RESULTS

Samples were shipped to the laboratory soon after collection by common carrier. The dust samples were examined using TEM, as described in Section 2. The four samples of air from within the unit were analyzed by WESTON's NVLAP-accredited TEM facility, using the sample preparation and analytical procedures set forth in the EPA AHERA method. A section of the exposed filter was cut from each sample and three wedges were placed on copper wire grids for TEM mounting. The samples were etched in a plasma asher, which also destroyed some of the organic materials that may have been collected, and vacuum-coated with a thin layer of carbon, embedding the fibers that were on the filter surface. Each carbon-coated grid was placed in a Jaffe wick washer, in which the MCE filter matrix was dissolved and wicked away, leaving behind the carbon film containing any asbestos fibers collected. The grids were then examined and found to be ready for analysis.

Once the sample grids were prepared, each grid was examined by the TEM protocols of AHERA. A specified number of grid openings were scanned looking for fibers that may be asbestos. Typically, between six and ten grid openings had to be examined to comply with the detection limit of 0.005 fibers per cubic centimeter (f/cc) set forth in the regulations. Whenever a fiber was observed during this examination, the microscopist examined its morphology and determined its elemental composition from the emitted X-ray spectrum. If these indicated that it may be an asbestiform mineral, the crystal lattice structure was examined by observation of its electron diffraction pattern. The fiber was then classified either by the type of asbestos determined to be present during the analysis, or as a non-asbestos fiber.

The results for the four samples from inside Unit S-08 are presented in Table 3.1. No asbestos fibers were detected in any of these samples at a limit of detection that was between 0.0035 and 0.0045 (f/cc). Based on these findings, the background sample and field blank were not examined, since no asbestos fibers were detected inside the unit.

3.4 CONCLUSIONS AND RECOMMENDATIONS

The air samples collected indicate that asbestos fibers from the dust found within the heating system ductwork are not being released in significant quantities at this facility. No airborne asbestos fibers were found at the detection limit of the method. The limits of detection were <0.004 f/cc, which is at or below the acceptability limit set forth in AHERA for clearance of an abatement area in a school, and were far lower than the OSHA Permissible Exposure Limit (PEL) for workers of 0.2 f/cc.

While asbestos has been shown to pose a health risk to humans at high fiber concentrations, there are no definitive studies that indicate that a risk is associated with low-level airborne exposures such as the 0.005 f/cc AHERA limit. Therefore, sampling and analysis for airborne asbestos at this site did not reveal any health risk to the occupants of the houses, based on the TEM analyses of the samples collected. However, it is recommended by the U.S. Army Environmental Hygiene Agency (AEHA) that, if the units are to remain under the management, operational control, or ownership of the Army, additional sampling and analysis for airborne asbestos be undertaken. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater. This additional sampling and analysis effort, along with the other recommended actions, will help to ensure that there is no long-term exposure risk to the occupants or to maintenance personnel.

Chrysotile asbestos was found in three of the four dust samples collected in this unit. This is consistent with finding of asbestos in eight of the 12 samples of dust collected in the other units at this location.

TABLE 3.1. RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS
RURAL RIDGE, PENNSYLVANIA FAMILY HOUSING UNITS
(ALL VALUES IN FIBERS/CC)

SAMPLE NUMBER	SAMPLE LOCATION	ASBESTOS IN DUST	ASBESTOS CONCENTRATION	ASBESTOS TYPE FOUND
S-08-LR	Living Room	YES	ND <0.003	ND
S-08-KI	Kitchen	NO	ND <0.004	ND
S-08-BR	Bedroom	YES	ND <0.004	ND
S-08-BA	Bathroom	YES	ND <0.004	ND

ND = Not Detected at the Limit of Detection Cited.

Note: The asbestos in all dust samples was chrysotile.

SECTION 4. SUMMARY OF FINDINGS

Sampling and analyses performed at the Rural Ridge, Pennsylvania FHU reveal the presence of several issues of concern from an environmental standpoint. The most significant are the detection of asbestos in 11 of the 16 dust samples, in all of the 14 samples of floor tile, and in the woven fabric expansion joint on the furnace return air plenum of one unit.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The friable asbestos-containing expansion joints are generally in good condition. They should be left in place and managed under an O&M program as long as they are in good condition. They should be removed and replaced with an asbestos substitute during the next renovation or prior to demolition, in accordance with state and Federal regulations.
- The vinyl floor coverings pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be left in place and managed under an O&M program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.
- Additional sampling and analysis for airborne asbestos at this site is recommended by AEHA, if the units are to remain under the management, operational control, or ownership of the Army. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater.

The air monitoring performed in Unit S-08 indicated that no detectable asbestos was being emitted in air from dust collected in the heating ducts. The detection limit of the method, <0.005 f/cc, is below the AHERA limit and well below the OSHA PEL of 0.2 f/cc. Chrysotile asbestos fibers were confirmed in the dust samples collected from three of the vents sampled.

SECTION 4. SUMMARY OF FINDINGS

APPENDIX A.1. FIELD DATA, ASBESTOS SAMPLING

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01
 FACILITY BLDG. NO. Rural Ridge Family Housing Unit 505
 FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER (412) 777-1231
 TECHNICIAN NAME Michael Skotnicki SIGNATURE Michael Skotnicki
 TECHNICIAN NAME Rita Erga SIGNATURE Rita Erga
 TIME ARRIVED 11:09 TIME DEPARTED 11:50 DATE 05 Mar 90
 dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

The units at Rural Ridge were chosen by Sandy Ricketts, Housing Manager, based on the availability of vacancies while we were at the site. Mrs. Ricketts said that all the houses are in similar condition and each has had similar renovation and changes performed on them.

Unit 505 is a three bedroom, Capehart-style unit. ^{vinyl} siding on outside, and tar and gravel roofing. Inside is covered by vinyl flooring; walls and ceilings are plasterboard. There is no attic in this unit. All pipes observed are bare w/ insulation. The pipes run in ~~wall~~ ^{ceiling} below the ceiling. It is impossible to determine if insulation occurs on pipe inside chase. There is a cloth expansion joint in furnace. This material was sampled.

There were no transite shingles on the outside. The shingles could be under aluminum siding, but there is no way to tell without destructive surveying.

For this take, the expansion joint and four dust samples taken.

The area for the closets was included with area for the rooms in which the closets occur.

ACTIVITY CHECKLIST

Interviews Completed	<u>N</u>	Number of Samples	<u>9</u>
Drawings Reviewed	<u>N</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>0</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check ☒	SIGNATURE <u>Michael Skotnicki</u>	DATE <u>21 MAR/90</u>	dd mm yy

ASBESTOS SURVEY DATA

0811

BLDG. NO.: S1015

INSTALLATION 101415

TASK TEAM MEMBERS

Rust Erga

Michael Keadley

W.O. No. 2104-13-01

CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Swan Ridge Family Housing Unit S05

DATE (dd/mm/yy): 05/03/90

BLDG. DESCRIPTION: Cupboard

TIME ARRIVED: 11:00

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B10131710-415-PIA-S1015-AFIT					KITCHEN	11010	-	11010	SI
2.	B10131711-415-PIA-S1015-AFIT					HALL	1317	-	11011	SI
3.	B10131712-415-PIA-S1015-AFIT					HALL	1315	-	11012	SI
4.	B10131713-415-PIA-S1015-AFIT					BEDROOM 2	1474	-	11013	SI
5.	B10131714-415-PIA-S1015-AIT					HALL	1111	-	11014	SI
6.	B10131715-415-PIA-S1015-AITC					BATH 1	1111	-	11015	SI
7.	B10131716-415-PIA-S1015-AITC					BEDROOM 1	1111	-	11016	SI
8.	B10131717-415-PIA-S1015-AITC					BEDROOM 1	1111	-	11017	SI
9.	B10131718-415-PIA-S1015-AITC					BEDROOM 1	1111	-	11018	SI
10.	1111-1-1-11-AIT						1111	-	11019	SI
11.	1111-1-1-11-AIT						1111	-	11020	SI
12.	1111-1-1-11-AIT						1111	-	11021	SI

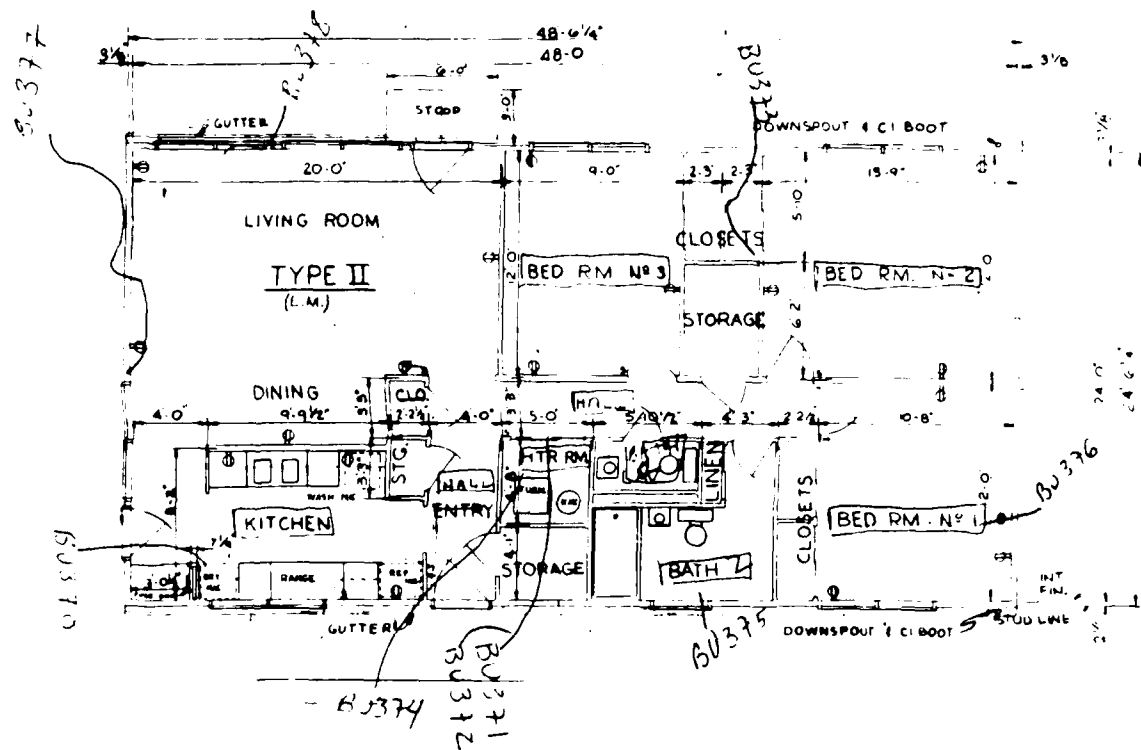
NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Tan 9' x 7' floor tile
02	Brown 9' x 7' floor tile. Also in Living Room.
03	Dark brown 7' x 9' floor tile. Also in Living Room.
04	Gray 9' x 7' floor tile. Also in Bedroom 1, Bedroom 3, Bath 1, and Bath 2.
05	Expansion joint on furnace duct. Waxed cloth. Quantity = each.
06	Dust in ductwork

TECHNICIAN
SIGNATURE

Michael Keadley

QUALITY ASSURANCE
SIGNATURE

Michael Skofitzki



Unit S-05
Rural Ridge Pa.

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. Rural Ridge Family Housing Unit S10

FACILITY CONTACT Sandy Re-hoff TELEPHONE NUMBER (412) 777-1231

TECHNICIAN NAME Michael Kindley SIGNATURE Michael Kindley

TECHNICIAN NAME R. E. Engle SIGNATURE R. E. Engle

TIME ARRIVED 1155 TIME DEPARTED 1230 DATE 05 Mar 90
dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit S10 is a three bedroom Capehart-style unit with ~~vinyl~~ ^{vinyl} siding on the outside (no transoms panels) and a tar and gravel roof. The inside has vinyl flooring and plaster covered walls and ceiling. There is an attic. Pipes run in wooden or plaster lined chases and it is impossible to observe pipes inside without destructive surveying. All pipes observed were bare of insulation. There is a cloth expansion joint in furnace similar to the one in Unit S05.

Most of floor tile is covered by carpet.

Three floor tiles and four dust samples taken. The area for the closets are included with the area for the rooms in which the closets occur.

ACTIVITY CHECKLIST

Interviews Completed	<u>N</u>	Number of Samples	<u>7</u>
Drawings Reviewed	<u>N</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>0</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check ☒	SIGNATURE <u>Michael Skofnicki</u>	DATE <u>21 MAR 90</u>	
		dd mm yy	

ASBESTOS SURVEY DATA

0823

BLDG. NO.: 151101

INSTALLATION 101115

TASK TEAM MEMBERS

Rolf Erga

Michael Kindley

W.O. No. 2104-13-01

CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Rural Ridge Family Housing, Unit 510

DATE (dd/mm/yy): 05/03/90

BLDG. DESCRIPTION: Supermarket

TIME ARRIVED: 1155

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B1013171-415-PIA-S110-AFIT					KITCHEN	1524	-	111010	01
2.	B1013181-415-PIA-S110-AFIT					KITCHEN	1135	-	111010	02
3.	B1013211-415-PIA-S110-AFIT					BEDROOM 2	1422	-	111010	03
4.	B1013212-415-PIA-S110-ATID					BEDROOM 1	111	-	111010	04
5.	B1013212-415-PIA-S110-ATID					BEDROOM 2	111	-	111010	05
6.	B1013214-415-PIA-S110-ATID					LIVING ROOM	111	-	111010	06
7.	B1013215-415-PIA-S110-ATID					LIVING ROOM	111	-	111010	07
8.	1111-1-1-11-All					HALL	111	-	111010	08
9.	1111-1-1-11-All					1111	111	-	111010	09
10.	1111-1-1-11-All					1111	111	-	111010	10
11.	1111-1-1-11-All					1111	111	-	111010	11
12.	1111-1-1-11-All					1111	111	-	111010	12

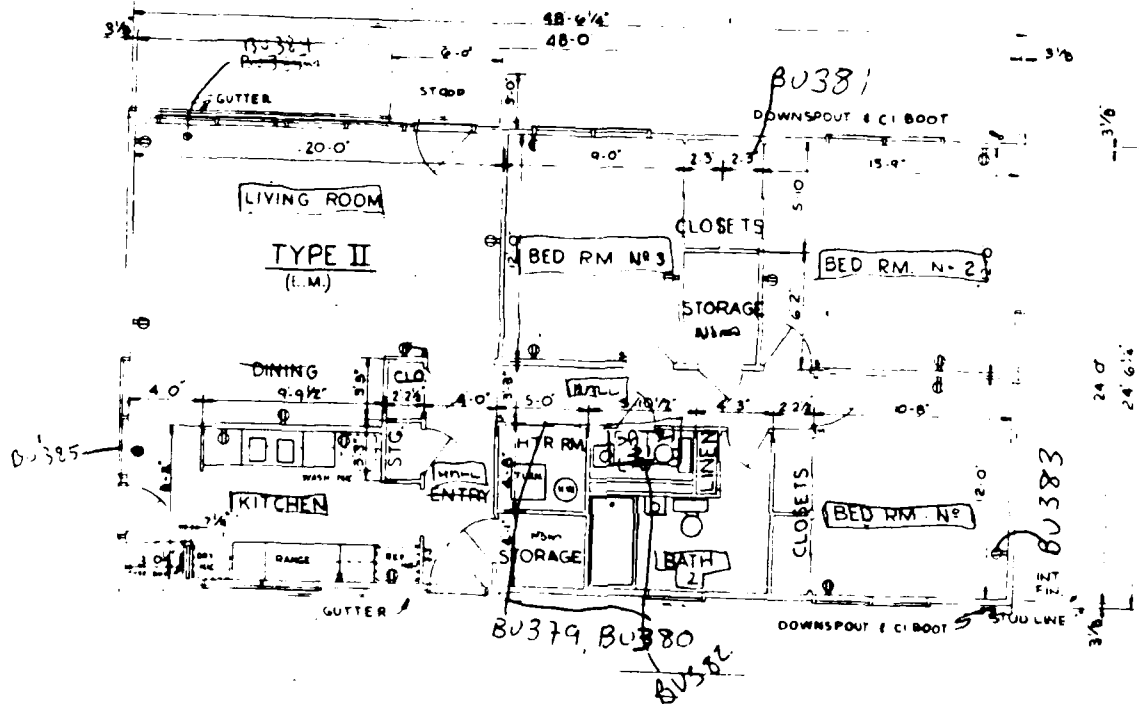
NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Gray 9"x9" floor tile Also in Kitchen, Living Room, and Bath 2
02	Green 9"x9" floor tile. Also in Living Room and Hall
03	Brown 9"x9" floor tile. Also in Bedroom 1, Bedroom 3 and Bath 1.
04	Dust in ducts
05	Joint expansion joint. Same material as in Unit 505. Not sampled here.

TECHNICIAN SIGNATURE

Michael Kindley

QUALITY ASSURANCE SIGNATURE

Michael Skofnicki



UNIT S-10
Rural Ridge Pa.

0825

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. Rural Ridge Family Housing Unit 501

FACILITY CONTACT Sandy Ruskoff TELEPHONE NUMBER (512) 777-1231

TECHNICIAN NAME Michael Skotnicki SIGNATURE Michael Skotnicki

TECHNICIAN NAME Ruf Ego SIGNATURE Ruf Ego

TIME ARRIVED 14:55 TIME DEPARTED 1:50 DATE 05 Mar 90
dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit is a three bedroom bungalow style house with vinyl siding on the outside, a tin tar and gravel on the roof. Inside floors are covered by vinyl flooring; walls and ceilings are plaster board. There is no attic in the house. All pipes observed are bare of insulation. Some pipes run in wooden or plaster board encasement which can be accessed. There is an expansion joint similar to the one sampled in Unit 505. There are no transfer chutes on outside walls although it is not possible to see under aluminum siding. Areas for the chutes are included with the areas for the rooms in which the chutes enter. Seven floor tile and four dust samples taken. There are no heating vents in Bath.

ACTIVITY CHECKLIST

Interviews Completed	<u>No</u>	Number of Samples	<u>11</u>
Drawings Reviewed	<u>No</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>0</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check ☒	SIGNATURE <u>Michael Skotnicki</u>	DATE <u>21 MAR 90</u>	dd mm yy

ASBESTOS SURVEY DATA

0827

BLDG. NO.: 51011

INSTALLATION 01415

TASK TEAM MEMBERS

Michael Kindley

R. E. Engle

W.O. No. 2104-13-01

CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Rural Ridge Family Housing, Unit 501

DATE (dd/mm/yy): 05/02/90

BLDG. DESCRIPTION: Capchart

TIME ARRIVED: 1400

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B103816-415-PIA-51011-AIFIT					KITCHEN	11013		11013A	01
2.	B103817-415-PIA-51011-AIFIT					KITCHEN	11014		11014A	02
3.	B103818-415-PIA-51011-AIFIT					LIVING ROOM	11015		11015A	03
4.	B103819-415-PIA-51011-AIFIT					LIVING ROOM	11016		11016A	04
5.	B103820-415-PIA-51011-AIFIT					BEDROOM 1	15112		11017A	05
6.	B103821-415-PIA-51011-AIFIT					BATH 1	11213		11018A	06
7.	B103822-415-PIA-51011-AIFIT					LIVING ROOM	11115		11019A	07
8.	B103823-415-PIA-51011-AITD					BEDROOM 3	11111		11111	08
9.	B103824-415-PIA-51011-AITD					BEDROOM 1	11111		11111	09
10.	B103825-415-PIA-51011-AITD					KITCHEN	11111		11111	10
11.	B103826-415-PIA-51011-AITD					LIVING ROOM	11111		11111	11
12.	11111-1-1-11-ALL					HITIRUM	11111		11020A	011

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Light brown 9" x 9" floor tile
02	Tan 9" x 9" floor tile. Also in Living Room.
03	Brown 9" x 9" floor tile. Also in Hall.
04	Dark brown streaked 9" x 9" floor tile. Also in Hall.
05	Gray 9" x 9" floor tile. Also in Bedroom 1, Bedroom 3, and Bath 1.
06	White 12" x 12" floor tile
07	Dark brown 9" x 9" floor tile
08	Dust in ductwork
09	White expansion joint. Same as in Unit 505. Not sampled here.

TECHNICIAN SIGNATURE

Michael Kindley

QUALITY ASSURANCE SIGNATURE

Michael Skofnick

APPENDIX A.2. LABORATORY DATA, ASBESTOS SAMPLES

BULK SAMPLE ANALYSIS SUMMARY

Weston W.O. No. 2104-13-01-0000

Sample Number BU370 through Sample BU392

AO LAB ID NO	CLIENT/CLIENT ID	LOCATION	MATERIAL DESCRIPTION*	DATE RECEIVED	RESULTS**					LAYERS	ANALYST
					CH	AM	CR	OT	TL		
BU370	45-PA-S05-AFT	KIT	NF, TN, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU371	45-PA-S05-AFT	HALL	NF, BR, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU372	45-PA-S05-AFT	HALL	NF, BR, 9X9 FT	03/07/90	10	ND	ND	ND	10	Yes	6072
BU373	45-PA-S05-AFT	BEDRM2	NF, GY, 9X9 FT	03/07/90	3	ND	ND	ND	3	No	6072
BU374	45-PA-S05-A	HTR RM	F, EXPAN JT	03/07/90	50	ND	ND	ND	50	Yes	6072
BU379	45-PA-S10-AFT	HALL	NF, GY, 9X9 FT	03/07/90	5	ND	ND	ND	5	Yes	6072
BU380	45-PA-S10-AFT	HALL	NF, GR, 9X9 FT	03/07/90	10	ND	ND	ND	10	Yes	6072
BU381	45-PA-S10-AFT	BEDRM2	NF, BR, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU386	45-PA-S01-AFT	KIT	NF, BR, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU387	45-PA-S01-AFT	KIT	NF, TN, 9X9 FT	03/07/90	1	ND	ND	ND	1	Yes	6072
BU388	45-PA-S01-AFT		NF, BR, 9X9 FT	03/07/90	12	ND	ND	ND	12	Yes	6072
BU389	45-PA-S01-AFT	HTR RM	NF, BR, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU390	45-PA-S01-AFT	BEDRM2	NF, GY, 9X9 FT	03/07/90	10	ND	ND	ND	10	No	6072
BU391	45-PA-S01-AFT	BATH2	NF, WH, 12X12 FT	03/07/90	1	ND	ND	ND	1	No	6072
BU392	45-PA-S01-AFT	LIV RM	NF, BR, 9X9 FT	03/07/90	12	ND	ND	ND	12	Yes	6072

* MATERIAL DESCRIPTION	FRIABLE ¹	COLOR ²		SYSTEM ³
Friable ¹ , Color ² , System ³ , Type.	F - Friable NF - Non-Friable	BK - Black BL - Blue BR - Brown GR - Green GY - Gray	RD - Red TN - Tan WH - White YL - Yellow	CHW - Chilled Water DOM - Domestic Water HHW - Heating Hot Water STM - Steam UNK - Unknown
** RESULTS				
CH - Chrysotile AM - Amosite CR - Crocidolite	OT - Other TL - Total			

Upon issue, this report may be reproduced only in full.

All analyses are performed in accordance with the methods set forth in U.S. EPA 600/M4-82-020, as amended. Weston's Optical Microscopy Laboratory is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program for asbestos fiber analysis (Laboratory Code 1254).



ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

Transmission Electron Microscopy
Asbestos Summary Report

Client: Argonne National Laboratories Weston W.O. No.: 2104-13-01-0000

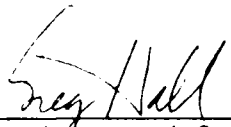
Sample Type: Dust Sampling Location: Rural Ridge

QUALITATIVE ANALYSIS

DUST WIPE SAMPLES: A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated as above and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

ANALYTICAL RESULTS

<u>SAMPLE IDENTIFICATION</u>	<u>RESULTS</u>
BU375-45-PA-S05-ATD	Positive
BU376-45-PA-S05-ATD	Negative
BU377-45-PA-S05-ATD	Positive
BU378-45-PA-S05-ATD	Positive
BU382-45-PA-S10-ATD	Negative
BU383-45-PA-S10-ATD	Positive
BU384-45-PA-S10-ATD	Negative
BU385-45-PA-S10-ATD	Positive
BU393-45-PA-S01-ATD	Positive
BU394-45-PA-S01-ATD	Positive
BU395-45-PA-S01-ATD	Negative
BU396-45-PA-S01-ATD	Positive


(Approved for Transmittal)

3/30/90
(Date)

- * This test report relates only to the specific items tested.
- ** These sample results may only be reproduced in full, and are valid only if approved for transmittal.

APPENDIX B.1. FIELD DATA, AIRBORNE ASBESTOS SAMPLING

FIELD NOTES FOR RURAL RIDGE
UNIT S-08
17 APRIL 1990

The Rural Ridge site is identical in design to the Finleyville site. The front entry has been retiled with 12"x12" gray floor tiles in the entry hall. There are clearly two different types of gray 12"x12" in the kitchen, one slightly greener than the other. The living room area has gray 9"x9" tile streaked with black and white streaks, highlighted by green with white streaked tiles in a rectangular pattern. Approximately two out of sixteen tiles are of the green variety. The remainder of the facility has the same gray with black and white streaks plus green tiles in the hall and in the bathroom (except no green in the bath). The two bedrooms in this unit have a dark tan with dark brown streaks 9"x9" tile in both bedrooms and closets. The main closet in the hall area does not have floor tile. The mechanical room, which is located to the left of the entry door, contains a heater unit and a hot-water heater. This heater unit has the same gray, very heavy woven expansion joint material observed in the other house of this type at Finleyville. No seam could be located in this material to permit collection of a sample. The return air grill of this unit is located near the heater area in the door at the entrance hall. The exterior of this building is covered by vinyl siding and has no points at which the underlying material could be examined. The roof appears to be asphalt shingles in good condition. There is no possibility of determining whether these are asbestos or fiberglass shingles without sampling. Due to the fact that this unit had not been previously sampled, dust samples were collected from the four points at which the air samples were collected; that is the kitchen, the living room, the bathroom, and the bedroom at the rear of the house. Detailed locations of the vent sampled are illustrated on the field data sheets.

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION Rural Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. S-08-LR

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☐ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER Living Room Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 93 A+B

PUMP Cal Initial 2 10.3 10.2 L/min

PUMP Cal Final 3 10.2 1800 L/min
no rate rate Sample Vol (VA)

10:17

Time Began

13:13

Time End

176

Sample Time min

L. Nelms
Technician

17 Apr 90
Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____

Date Time Mounted _____

Total Fibers Counted _____

Average Count _____ f/field

Blank Corrected Count (BCC) _____

Detection Limit (DL) _____ f/cc

Microscopic Field Area (MFA) _____ mm²

Date Time Counted _____

Total Fields Counted _____

Blank Count _____ f/field

Fiber Density _____ f/mm²

Concentration (C) _____ f/cc

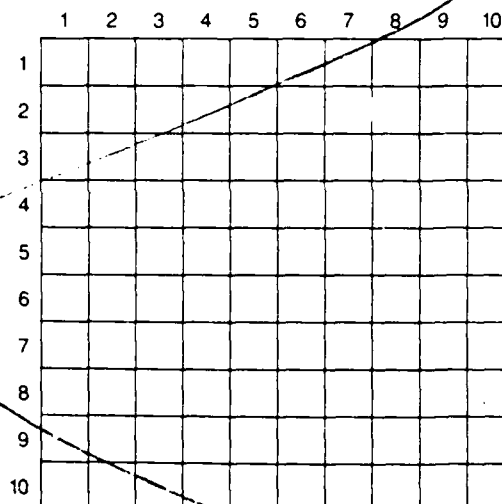
$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

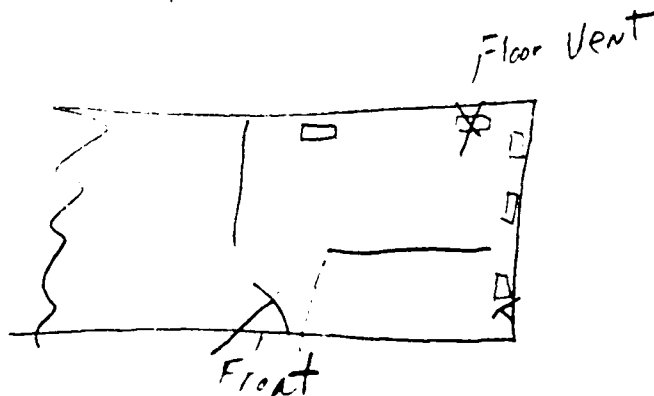
Signature _____

Date _____



NOTES/SKETCHES REMARKS

TEVA Analysis



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION Rural Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. S-08-KI

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☐ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER Kitchen Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE

(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 88 A+B

PUMP Cal Initial 2 10.2 10.0 min

PUMP Cal Final 3 9.9 1760 Sample Vol (VA)

10:16

Time Began

13:11

Time End

175

Sample Time

L. Nelms
Technician

17 Apr '90
Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____

Date Time Mounted _____

Total Fibers Counted _____

Average Count f/fg

Blank Corrected Count (BCC) _____

Detection Limit (DL) f/cc

Microscopic Field Area (MFA) mm²

Date Time Counted _____

Total Fields Counted _____

Blank Count f/fg

Fiber Density f/mm²

Concentration (C) f/cc

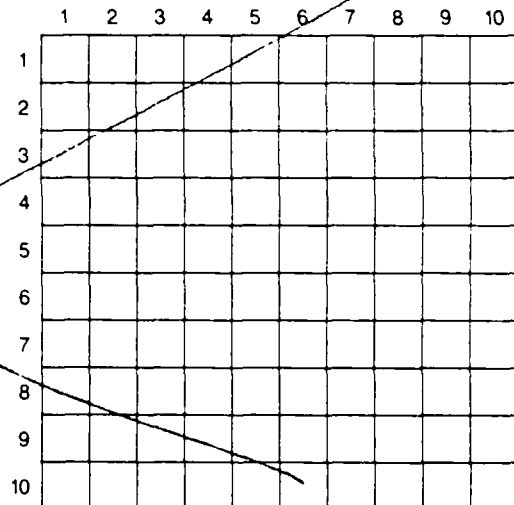
$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

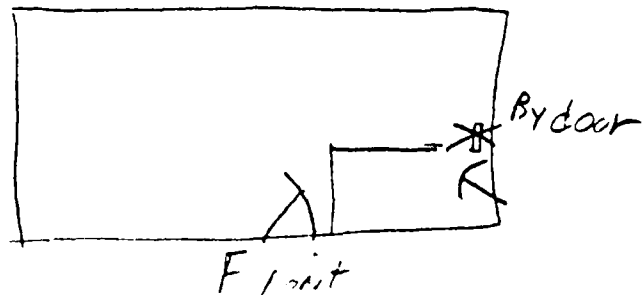
Signature _____

Date _____



NOTES/SKETCHES/REMARKS

TEM Analysis



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION RURAL Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. S-08-BR

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☐ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER 12 ft from VENT

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 82 A+B

PUMP Cal Initial 2 9.9 8.4 min

PUMP Cal Final 3 6.9 1480 rate

10:19 13:15 176 min

L. Nelson 17 Apr '90

ANALYTICAL DATA

ANALYST _____

Scope ID _____

Date Time Mounted _____

Total Fibers Counted _____

Average Count f/fd

Blank Corrected Count (BCC) _____

Detection Limit (DL) f/cc

Microscopic Field Area (MFA) mm²

Date Time Counted _____

Total Fields Counted _____

Blank Count f/fd

Fiber Density f/mm²

Concentration (C) f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

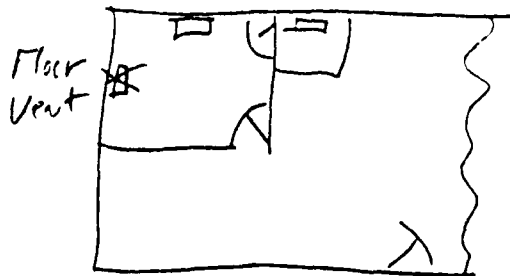
The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

NOTES/SKETCHES REMARKS

TEM Analysis
Pump flow Low at end.
End of Pump 1/2 normal flow.



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION Rural Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. 5-03-BA

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☐ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER Bathroom Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 87 A+B

PUMP Cal Initial 2 10.4 10.1 L/min

PUMP Cal Final 3 9.8 1740 Sample Vol (VA)

10:20

Time Began

13:12

Time End

172

Sample Time min

L. NELMS

Technician

17 Apr '90

Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____

Date Time Mounted _____

Total Fibers Counted _____

Average Count 1 fld

Blank Corrected Count (BCC) _____

Detection Limit (DL) 1 cc

Microscopic Field Area (MFA) mm²

Date Time Counted _____

Total Fields Counted _____

Blank Count 1 fld

Fiber Density 1 mm²

Concentration (C) 1 cc

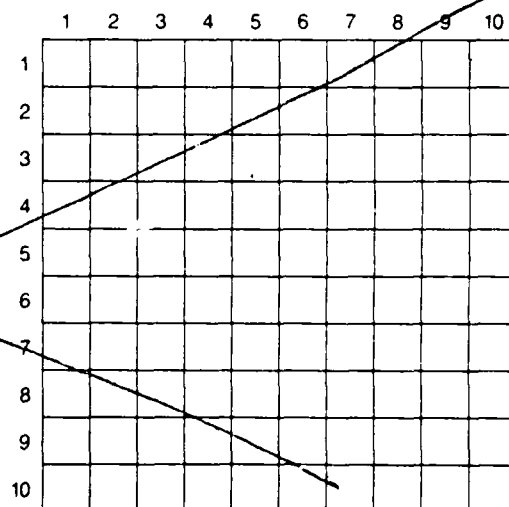
$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____

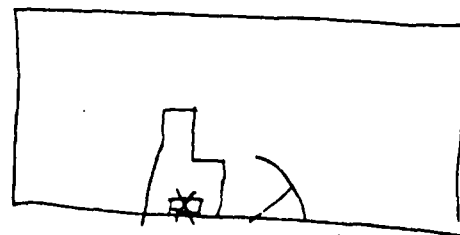
Date _____



NOTES/SKETCHES REMARKS

TEM Analysis

Band broken during sampling
Probably due to heat



Floor Vent

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION RURAL Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. S-08-OUT

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☒ BACKGROUND

☐ OTHER _____

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL, REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE

(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 92A+B

PUMP Cal Initial 2 9.2 9.8 min

PUMP Cal Final 3 10.3 1840 rate rate Sample Vol (VA)

10:05

Time Began

13:14

Time End

189

Sample Time min

L. NELMS

Technician

17 Apr '90

Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) mm² _____
 Date Time Mounted _____ Date Time Counted _____
 Total Fibers Counted _____ Total Fields Counted _____
 Average Count f/fld _____ Blank Count f/fld _____
 Blank Corrected Count (BCC) _____ Fiber Density f/mm² _____
 Detection Limit (DL) f/cc _____ Concentration (C) f/cc _____

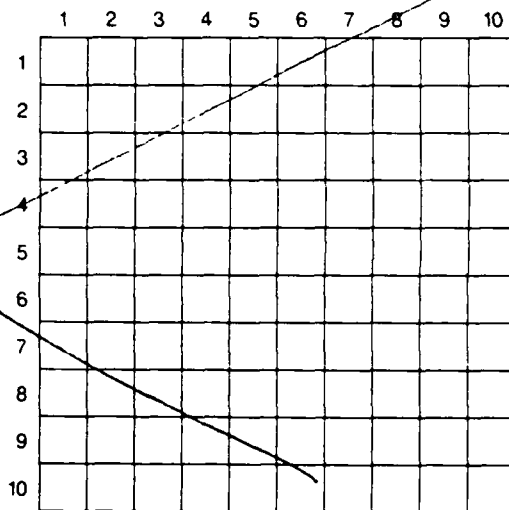
$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

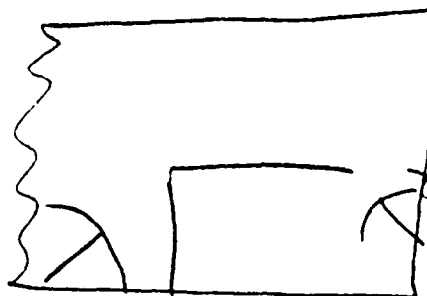
Signature _____

Date _____



NOTES/SKETCHES REMARKS

TEM Analysis



Outside window by door

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02
 PROJECT LOCATION Rural Ridge Unit 08
 WORK AREA ID NO. _____ SAMPLE NO. S-08-FB

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK Field Blank

☐ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☐ OTHER _____

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. N/A

PUMP Cal Initial N/A rate 0 L/min

PUMP Cal Final N/A rate None Sample Vol (VA) _____

10:05

Time Began

1316

Time End

191

Sample Time min

L. Nelson
Technician

17 Apr 1990
Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) mm²

Date Time Mounted _____ Date Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count f/ld _____ Blank Count f/ld _____

Blank Corrected Count (BCC) f/mm² _____ Fiber Density f/mm² _____

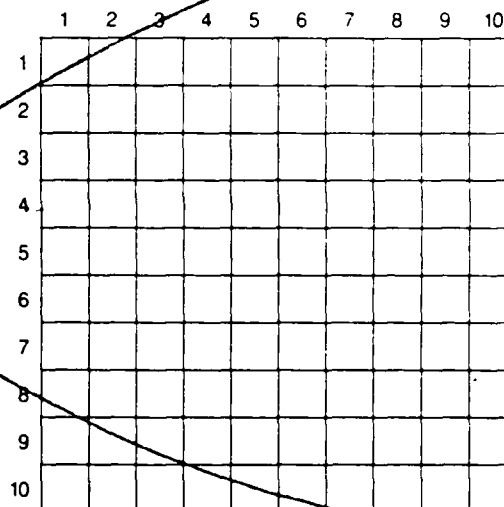
Detection Limit (DL) f/cc _____ Concentration (C) f/cc _____

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

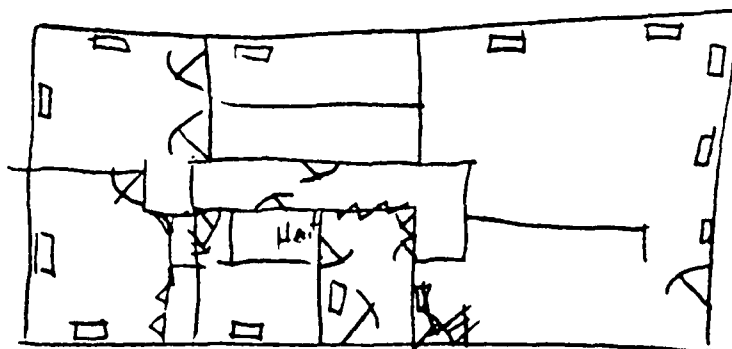
The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____



NOTES/SKETCHES REMARKS

Field Blank TEM Analysis.



APPENDIX B.2. LABORATORY DATA, AIRBORNE ASBESTOS SAMPLING



ROY F. WESTON, INC.
1635 PUMPHREY AVE
AUBURN, AL 36830
PHONE (205) 826-6100
FAX (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S08-BR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE911

Received by: Beth Hiltbold
Analyzed by: Barry Rayfield

Date Received: 04/18/90
Date Analyzed: 04/20/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1480.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.004 fibers/cc
Grid Archive No.: 0224-E-3,4

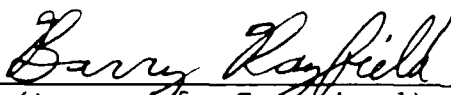
ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>$\geq$5μm</u>	<u><5μm</u>	<u>$\geq$5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:


(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.



ROY F WESTON, INC
1635 PUMPHREY AVE
AUBURN, AL 36830
PHONE (205) 826-6100
FAX (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S08-BA

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE912

Received by: Beth Hiltbold
Analyzed by: Barry Rayfield

Date Received: 04/18/90
Date Analyzed: 04/20/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1740.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.004 fibers/cc
Grid Archive No.: 0224-A-6,7

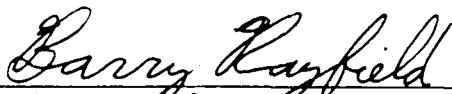
ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>$\geq$5μm</u>	<u><5μm</u>	<u>$\geq$5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:


(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.



ROY F WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE (205) 826-6100
FAX (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S08-KI

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE913

Received by: Beth Hiltbold
Analyzed by: Beth Hiltbold

Date Received: 04/18/90
Date Analyzed: 04/20/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1760.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.004 fibers/cc
Grid Archive No.: 0224 - A-8,9

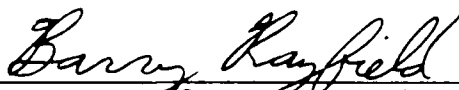
ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>$\geq$5μm</u>	<u><5μm</u>	<u>$\geq$5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:


(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.



ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S08-LR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE914

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/18/90
Date Analyzed: 04/20/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1800.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.003 fibers/cc
Grid Archive No.: 0224-B-6,7

ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>$\geq$5μm</u>	<u><5μm</u>	<u>$\geq$5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	2
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures $\geq$ 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Rayfield
(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.



ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
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FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-08-LR-DUST

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: WG487

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/19/90
Date Analyzed: 04/21/90

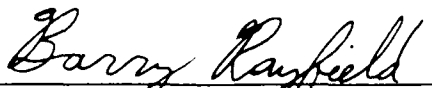
Sample Type: DUST WIPE

QUALITATIVE ANALYSIS

A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of 0.2 micrometer filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

RESULTS

Chrysotile was observed in this sample. An electron diffraction pattern (B776), electron micrograph (B777), and energy dispersive spectrum (WG487.eds) were recorded.


(Approved for Transmittal)

April 30, 1990
(Date)

This test report relates only to the specific items tested.



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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-08-BA-DUST

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: WG488

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/19/90
Date Analyzed: 04/21/90

Sample Type: DUST WIPE

QUALITATIVE ANALYSIS

A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of 0.2 micrometer filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

RESULTS

Chrysotile asbestos was detected. An energy dispersive spectrum (WG488.eds) was recorded.

Barry Rayfield
(Approved for Transmittal)

April 30, 1990
(Date)

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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-08-KI-DUST

Weston W.O. No.: 2104-12-02-0000
Weston Sample ID No.: WG489

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/19/90
Date Analyzed: 04/21/90

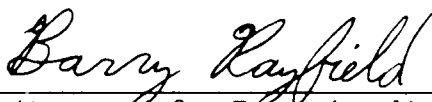
Sample Type: DUST WIPE

QUALITATIVE ANALYSIS

A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of 0.2 micrometer filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

RESULTS

No asbestos structures were detected.


(Approved for Transmittal)

April 30, 1990
(Date)

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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-08-BR-DUST

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: WG490

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/19/90
Date Analyzed: 04/21/90

Sample Type: DUST WIPE

QUALITATIVE ANALYSIS

A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of 0.2 micrometer filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

RESULTS

Chrysotile asbestos was observed in this sample. An energy dispersive spectrum (WG490.eds) was recorded.


(Approved for Transmittal)

April 30, 1990
(Date)

This test report relates only to the specific items tested.