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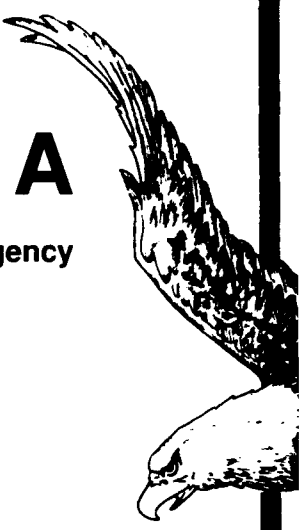

USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Report of Sampling and Analysis Results

Slatersville Army Housing Units North Smithfield, Rhode Island

August 1990

Prepared for:

U.S. Army Toxic and Hazardous Materials Agency
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Roy F. Weston, Inc. has conducted a sampling and analysis program of the Army housing property located in North Smithfield, Rhode Island. 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 SLATERSVILLE, RHODE ISLAND

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EXECUTIVE SUMMARY

The U.S. Army family housing units (FHUs) at Slatersville, Rhode Island were inspected by Roy F. Weston, Inc. (WESTON) personnel during February 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 16 single-family "Capehart" housing units were examined on 08 February to investigate the possible presence of asbestos-containing materials (ACM). Water samples were collected for asbestos determination on 23 March 1990, following a determination that the water supply mains leading to the facility were made of concrete-asbestos pipe. An assessment of airborne asbestos exposure was performed at one unit on this property on 20 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. 1002, 1004 and 1006, were considered to be representative of the other 13 units, but this was not confirmed by an examination of all the units.

Nine dust samples, seven samples of floor tile and two samples of pipe run insulation were collected by WESTON and analyzed. These analyses revealed that asbestos is present in dust accumulated within the heating ductwork and in floor tile at the three housing units examined. Asbestos was found in all nine of the dust samples by transmission electron microscopy (TEM), and in at least two samples from each unit. Asbestos was quantified at 2% or greater by polarized light microscopy (PLM) in three of the floor tile samples, and was qualitatively identified in two other samples by TEM. As defined by the Environmental Protection Agency (EPA), no asbestos was detected in the two pipe run samples.

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.

- Other suspect materials identified but not sampled, including asphalt shingles and roofing felt, should be assumed to contain asbestos and managed in place under an O&M program until they are either removed or determined to contain no asbestos.

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 been inspected previously. However, the vent in the kitchen had not been sampled during that study so a dust sample was collected from this vent. 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 <0.005 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 not detected in the dust sample collected from the kitchen duct during this follow-up study, but fibers were found in the three samples collected previously.

One asbestos fiber was identified in the sample collected from an outside water tap at Unit 1015. No other asbestos structures were found in the other two samples. The source of this asbestos is presumed to be erosion of the concrete-asbestos water main supplying these units. At the concentration found, the risks associated with ingested asbestos do not appear to be a significant concern.

SECTION 1. INTRODUCTION

SAMPLING AND ANALYSIS AT THE U.S. ARMY FAMILY HOUSING UNIT (FHU) PROPERTY SLATERSVILLE, RHODE ISLAND

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 Slatersville, Rhode Island 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 or waterborne through erosion of the concrete-asbestos water main. This study was implemented and samples were collected to evaluate any risks to occupants from these sources.

1.2 SITE DESCRIPTION

The Department of the Army's Slatersville FHU property in North Smithfield, Rhode Island consists of 16 single-family units located on 3.82 acres. The units are situated along Pound Hill Road. The areas to the south and southeast of the facility have been graded. This FHU facility is surrounded by woodlands and meadowlands.

The 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 contains a description of field activities and the findings from the asbestos samples collected from the water systems. Copies of field notes and supporting data for this effort are included in Appendix C. Section 5 is a summation of all activities and findings for Slatersville.

SECTION 2. ASBESTOS-CONTAINING MATERIALS

SECTION 2. ASBESTOS-CONTAINING MATERIALS

WESTON personnel inspected three of the 16 "Capehart" units at the Slatersville family housing facility on 08 February 1990 for the presence of suspected asbestos-containing materials (ACM). Vinyl floor tile, pipe run insulation, and dust accumulated within the heating ductwork were the only suspect materials found within the buildings that were sampled. 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 Slatersville 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 Slatersville FHU were similar in condition. Units 1002, 1004 and 1006 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. Nine dust samples, two pipe run insulation samples and seven samples of vinyl floor tiles were collected at the facility.

2.2 FIELD ACTIVITIES AND OBSERVATIONS

Each of the units was inspected to determine if suspect materials were present. The samples of the pipe fitting insulation were retrieved using a disposable coring device with a one-half inch diameter tube, designed such that the coring device also serves as the sampling container. Before the coring tool was inserted, the materials to be sampled were moistened to prevent asbestos fibers from becoming airborne. The coring device was placed in its outer sample container and secured by a tight fitting lid. The containers were labeled with a sample numbers, and shipped to the lab. The sampling tools were wiped clean with a damp cloth and all debris resulting from the sampling activities as collected and placed into plastic bags. The small bore hole was sealed with an encapsulant.

Two samples of pipe fitting insulation were taken in one unit. The pipes in the other units were not insulated. The pipe run insulation is friable, as defined in the EPA regulations, meaning that it can be crushed,

crumbled, pulverized, or otherwise reduced to a powder using hand pressure. Friable ACM are considered to be more hazardous than non-friable ACM since they are much more likely to release asbestos fibers.

Heating ductwork vents in the units were not sealed, except in the kitchens, 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, bedroom, and main bathroom in all three units.

Two colors (white and green) of 9" x 9" vinyl floor tile and one color (floral pattern) of 12" x 12" vinyl tile were sampled. All three units contained white 9" x 9" and floral 12" x 12" floor tile. Unit 1004 contained green 9" x 9" floor tile. One sample of each of the floor tile types was taken in each housing unit, producing a total of seven 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. Other suspect materials observed included asphalt shingles and roofing felt. 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 Rhode Island still abides 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 Slatersville 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.

TABLE 2.1
BULK SAMPLE SUMMARY
SLATERSVILLE FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS
Unit 1006				
AP506-36-RI-1006-ATD	Dust within ductwork	Living room	---	Positive
AP507-36-RI-1006-ATD	Dust within ductwork	Bath	---	Positive
AP508-36-RI-1006-ATD	Dust within ductwork	Bedroom 1	---	Positive
AP509-36-RI-1006-AFT	Floral pattern 12" x 12" floor tile	Kitchen	None Detected	Positive
AP510-36-RI-1006-AFT	White 9" x 9" floor tile	All rooms except kitchen	Chrysotile, 2%	
Unit 1004				
AP511-36-RI-1004-API	Pipe run insulation	Heating room	Chrysotile, <1%	
AP512-36-RI-1004-API	Pipe run insulation	Heating room	Chrysotile, <1%	
AP513-36-RI-1004-ATD	Dust within ductwork	Living room	---	Positive
AP514-36-RI-1004-ATD	Dust within ductwork	Bath	---	Positive
AP515-36-RI-1004-ATD	Dust within ductwork	Bedroom 2	---	Positive
AP516-36-RI-1004-AFT	Green 9" x 9" floor tile	Patch throughout unit	None Detected	Positive
AP517-36-RI-1004-AFT	White 9" x 9" floor tile	All rooms except kitchen	Chrysotile, 2%	
AP518-36-RI-1004-AFT	Floral pattern 12" x 12" floor tile	Kitchen	None Detected	Negative
Unit 1002				
AP519-36-RI-1002-AFT	White 9" x 9" floor tile	All rooms except kitchen	Chrysotile, 4%	
AP520-36-RI-1002-AFT	Floral pattern 12" x 12" floor tile	Kitchen	None Detected	Negative
AP521-36-RI-1002-ATD	Dust within ductwork	Living room	---	Positive
AP522-36-RI-1002-ATD	Dust within ductwork	Bath	---	Positive
AP523-36-RI-1002-ATD	Dust within ductwork	Bedroom 1	---	Positive

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
SLATERSVILLE FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
Unit 1006				
AP506-36-RI-1006-ATD	Dust within ductwork	Living room	N/A	
AP507-36-RI-1006-ATD	Dust within ductwork	Bath	N/A	
AP508-36-RI-1006-ATD	Dust within ductwork	Bedroom 1	N/A	
AP509-36-RI-1006-AFT	Floral pattern 12" x 12" floor tile	Kitchen	130	Square ft
AP510-36-RI-1006-AFT	White 9" x 9" floor tile	All rooms except kitchen	1,306	Square ft
Unit 1004				
AP511-36-RI-1004-API	Pipe run insulation	Heating room	N/A	Linear ft
AP512-36-RI-1004-API	Pipe run insulation	Heating room	N/A	
AP513-36-RI-1004-ATD	Dust within ductwork	Living room	N/A	
AP514-36-RI-1004-ATD	Dust within ductwork	Bath	N/A	
AP515-36-RI-1004-ATD	Dust within ductwork	Bedroom 2	N/A	
AP516-36-RI-1004-AFT	Green 9" x 9" floor tile	Patch throughout unit	10	Square ft
AP517-36-RI-1004-AFT	White 9" x 9" floor tile	All rooms except kitchen	1,306	Square ft
AP518-36-RI-1004-AFT	Floral pattern 12" x 12" floor tile	Kitchen	130	Square ft
Unit 1002				
AP519-36-RI-1002-AFT	White 9" x 9" floor tile	All rooms except kitchen	1,306	Square ft
AP520-36-RI-1002-AFT	Floral pattern 12" x 12" floor tile	Kitchen	130	Square ft
AP521-36-RI-1002-ATD	Dust within ductwork	Living room	N/A	
AP522-36-RI-1002-ATD	Dust within ductwork	Bath	N/A	
AP523-36-RI-1002-ATD	Dust within ductwork	Bedroom 1	N/A	

Two samples of pipe run insulation were found to contain the chrysotile type of asbestos in a friable form at a concentration no greater than <1% using the PLM technique for analysis. As defined by EPA, <1% is not considered to be an asbestos containing material. Based on these observations, the pipe run insulation should be considered to contain no asbestos.

Three of the floor tile samples were found by PLM to contain asbestos at or greater than the 2% level. Two of the samples, for which no asbestos was reported following PLM analysis, was found to contain asbestos fibers by the TEM procedure. While this result is qualitative in nature, consideration of the process through which floor tiles were manufactured leads to the conclusion that this material should be treated as ACM. No detectable asbestos fibers were found in two samples by both PLM and TEM. Thus, five of the seven floor tile samples were found to contain asbestos. The 13 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 all nine of the dust samples. These data lead to the conclusion that asbestos is found in the dust trapped by the heating ducts.

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. As defined by EPA, the pipe run insulation contain no asbestos. These units are thought to be representative of the other 13 at the site, but this was not confirmed by sampling all units.

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 analyst 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 tiles 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.

Other suspect materials noted included roofing shingles and felt, which should be managed under an O&M program. However, 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 Slatersville, Rhode Island FHU on 19 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 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 1004 was selected at the Slatersville site, since it was vacant. Although it had been sampled previously, the dust in the kitchen vent had not been sampled. Therefore, a dust sample was collected from the kitchen vent.

3.2 FIELD ACTIVITIES AND OBSERVATIONS

The sampling activities at this site were performed during the afternoon, on a warm spring day. 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 um. 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 cowling 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 a 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 field blank was prepared and a background sample of ambient outside air was taken near the entry door to the kitchen. No significant problems were encountered during the sample collection activities. After completion of air sampling, a dust sample was taken from the kitchen vent 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 expansion joint that appeared to have been in place for some time. This type of material sometimes contains asbestos. The heating ducts themselves appear to be a cementitious 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 sample was 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 limits 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 as non-asbestos or by the type of asbestos determined to be present during the analysis, as appropriate.

The results for the four samples from inside Unit 1004 are presented in Table 3.1. No asbestos fibers were detected in any of the air samples from this facility. The limit of detection for these samples is between 0.004 and 0.005 fibers per cubic centimeter (f/cc). Based on these findings, the background sample and field blank were not examined.

Asbestos was found in the three dust samples previously collected in this unit, but no asbestos was found in the sample collected from the kitchen area vent. This means that asbestos was found in nine of the ten samples of dust collected in units at this location.

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. The airborne asbestos concentration was lower than the detection limit and below the AHERA threshold. The limits of detection were <0.005 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 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.

TABLE 3.1. RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS
(ALL VALUES IN FIBERS/CC)

SAMPLE NUMBER	SAMPLE LOCATION	ASBESTOS IN DUST	ASBESTOS CONCENTRATION	ASBESTOS TYPE FOUND
SL-1004-LR	Living Room	YES	ND <0.004	ND
SL-1004-KI	Kitchen	NO	ND <0.005	ND
SL-1004-BR	Bedroom	YES	ND <0.005	ND
SL-1004-BA	Bath Room	YES	ND <0.005	ND

ND = Not Detected at the Limit of Detection Cited.
Note: The asbestos in all dust samples was chrysotile.

SECTION 4. ASSESSMENT OF ASBESTOS IN WATER

SECTION 4. ASSESSMENT OF ASBESTOS IN WATER

Sampling for asbestos fibers in drinking water at this site was conducted at the Slatersville, Rhode Island FHU by WESTON on 23 March 1990. Dr. Leonard Nelms, a Certified Industrial Hygienist (CIH) visited the site and collected the samples using standard EPA procedures. All samples were analyzed by TEM following the protocols specified by the EPA.

4.1 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 water samples collected. The urgency of this effort was driven by the finding that the water supply lines to the facility are concrete-asbestos pipe. The approach chosen required that the WESTON CIH collect water samples from three units. Those selected were Units 1002, 1011, and 1015. Arrangements were made with the DEH office to gain access through the residents at the facility.

4.2 FIELD ACTIVITIES AND OBSERVATIONS

The sampling activities at this site were performed during the morning, beginning at about 0900 hours. The residents in the identified units were contacted and entry was gained to two of the units. The lines was flushed by turning on the tap at the kitchen sink and allowing the stagnant water to flow down the drain for five minutes. At that time, two pre-cleaned 1 liter sample bottles were rinsed with the tap water, filled, capped and sealed. Sampling data was recorded and the samples placed on ice in a cooler for shipment to the laboratory. No one answered numerous knocks on the door at Unit 1015, so the field sampler decided to collect the sample from an outside tap, located near the utility room.

4.3 LABORATORY PROCEDURES AND RESULTS

The samples were shipped by common carrier to the WESTON laboratory in Auburn Alabama for analysis. The three water samples were examined using TEM, by filtering the water through a MCE filter like those used for collecting air samples. The filters were then dried and analyzed using the same procedures as described in Section 3.

The results for the three water samples from these Units are presented in Table 4.1. One chrysotile asbestos fiber was detected in the water sample from Unit 1015. This sample was the one collected outside of the facility. The limit of detection for asbestos in these samples is between 0.136 and 0.227 million structures per liter (MS/L). Based on these findings, there appears to be little concern that large quantities of asbestos are being eroded from the water supply lines and getting into the drinking water supply. The one fiber detected could have been a laboratory contaminant introduced during the filtering process or could represent a few fibers present in the water.

4.4 CONCLUSIONS AND RECOMMENDATIONS

The water samples collected indicate that asbestos fibers from the concrete-asbestos supply pipes are not being released to the water in significant quantities at this facility. No further actions are indicated at this time.

TABLE 4.1. RESULTS OF WATERBORNE ASBESTOS SAMPLING AND ANALYSIS
(ALL VALUES IN MILLION FIBERS/L)

SAMPLE NUMBER	SAMPLE LOCATION	ASBESTOS IN WATER	ASBESTOS CONCENTRATION	ASBESTOS TYPE FOUND
RJ-1002	Unit 1002	YES	0.136	Chrysotile
RJ-1011	Unit 1011	NO	ND <0.136	ND
RJ-1015	Unit 1015	NO	ND <0.227	ND

ND = Not Detected at the Limit of Detection Cited.

SECTION 5. SUMMARY OF FINDINGS

Sampling and analyses performed at the Slatersville, Rhode Island FHU reveal the presence of issues of concern from an environmental standpoint. The most significant are the detection of asbestos in nine of the ten dust samples, in both pipe insulation samples, and in five of seven samples of floor tile. However, the asbestos content of the pipe insulation was found to be <1% and the material is non-ACM according to the EPA definition.

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

- 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.

- Other suspect materials identified at the site, including asphalt shingles and roofing felt, should be assumed to contain asbestos and managed in place under an O&M program until they are either removed or determined to contain no asbestos.

- 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 1004 indicated that no detectable asbestos was being emitted into the 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.

The water samples collected and analyzed were found to contain no detectable asbestos, except for one fiber identified in the sample collected from an outside tap at Unit 1015. The source of this asbestos may be erosion of the concrete-asbestos water main, but at the concentration found the risks associated with ingested asbestos do not appear to be a significant concern.

SECTION 5. SUMMARY OF FINDINGS

APPENDIX A.1. FIELD DATA, ASBESTOS SAMPLING

0129

SITE SURVEY LOG

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

FACILITY/BLDG. NO. STATEVILLE, IL 1806 Round Hill

FACILITY CONTACT JOHN GRAFTON TELEPHONE NUMBER (308) 796-3551

TECHNICIAN NAME ROBERT LYNCH SIGNATURE Robert Lynch

TECHNICIAN NAME _____ SIGNATURE _____

TIME ARRIVED 1230 TIME DEPARTED 1250 DATE 09 Nov 90
dd mmm yy

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

This is a one story three bedroom home with tan aluminum siding. The roof has cement shingles and felt. The heating system has not been renovated. Floor vents are not sealed. There are two types of floor tile. There is no pipe insulation present. The actual address is 1806 Round Hill Rd. ~~It was~~ The ~~home~~ home is a capehart style. It was chosen based upon available drawings, maintenance records, and discussions with housing management personnel.

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	5
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	0	Exp. Assess. Form Init.	✓

Q.A. Check _____ SIGNATURE _____ DATE 1 /90
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WESTON

ASBESTOS SURVEY DATA

0131

BLDG. NO.: 1006
INSTALLATION 0136

TASK TEAM MEMBERS
ROBERT LYNCH
STAN ANDERSON

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: SCARBOROUGH FAMILY HSG
BLDG. DESCRIPTION: CAPEHART STYLE

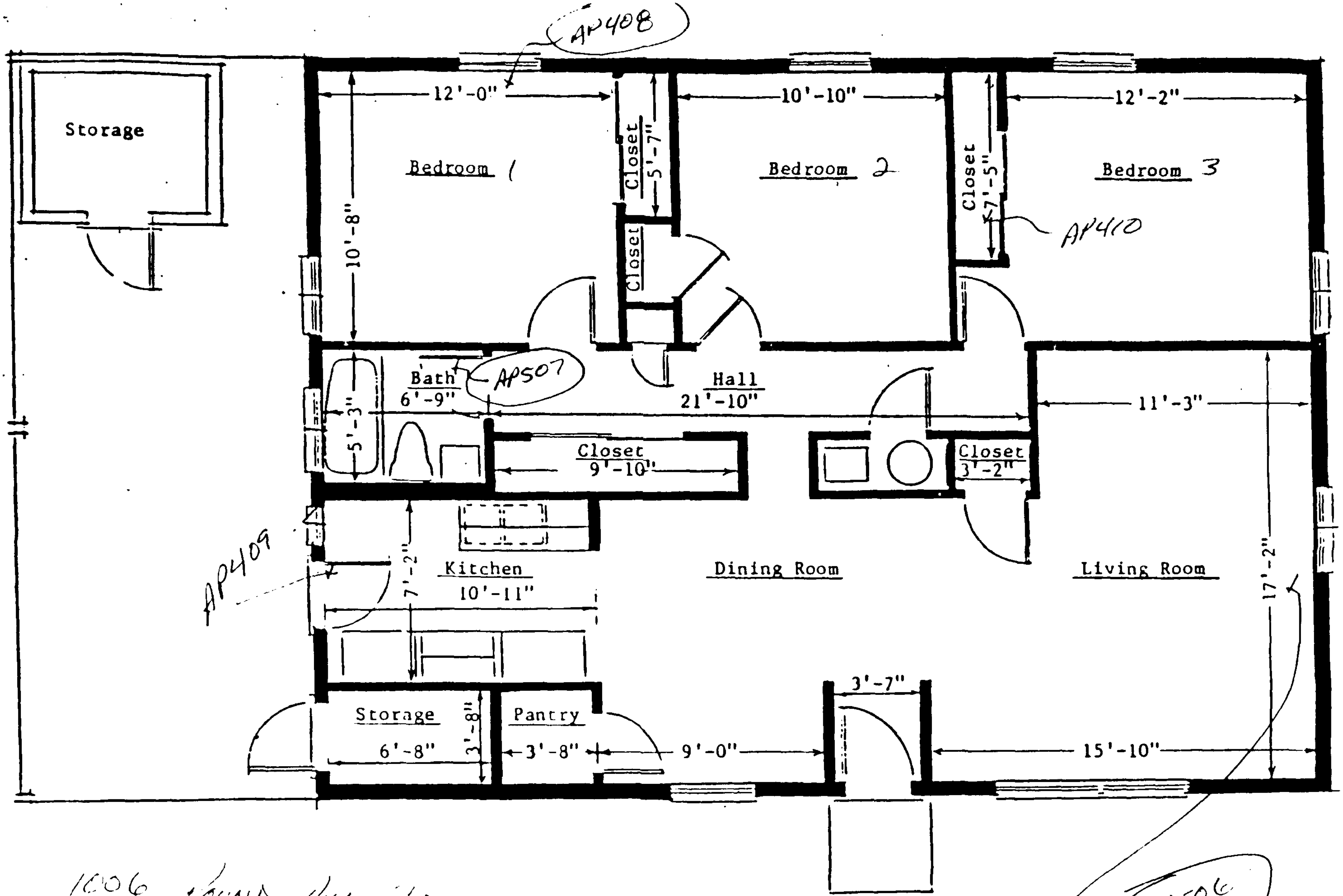
DATE (dd/mm/yy): 02/02/90
TIME ARRIVED: 1230

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	AP5106-36-RE-1006-AITD					LIVING ROOM	N/A		0990A	01
2.	AP5107-36-RE-1006-AITD					BATH	N/A		0990A	01
3.	AP5108-36-RE-1006-AITD					BEDROOM 1	N/A		0990A	01
4.	AP5109-36-RE-1006-AIFT					KITCHEN	132		0990B	02
5.	AP5110-36-RE-1006-AIFT					HALL, RMS, EXCEPT KIT	1306		0990C	03
6.										
7.										
8.										
9.										
10.										
11.										
12.										

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	dust sample from floor air vents
02	12x12 floor tile with floral pattern, in kitchen only.
03	9x9 white floor tile, in all rooms except kitchen.

TECHNICIAN SIGNATURE Robert Lynch

QUALITY ASSURANCE SIGNATURE



1006 Round Hill Rd.
Saylesville, RI

FLOOR PLAN - CAPEHART TYPE

0133

SITE SURVEY LOG

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

FACILITY/BLDG. NO. SLATERVILLE RI, 1004 ROUND HILL RD

FACILITY CONTACT JOHN GRAFTON TELEPHONE NUMBER (508) 796-3551

TECHNICIAN NAME ~~ROBERT~~ LYNCH SIGNATURE Robert Lynch

TECHNICIAN NAME _____ SIGNATURE _____

TIME ARRIVED 1250 TIME DEPARTED 1315 DATE ~~05~~ 16 JUN 90
dd mmm yy

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

This is a one story 3 bedroom home with green aluminum siding. The roof has asbestos shingles and felt. There are 3 types of floor tile. The only floor vent sealed is the kitchen. There is a small amount of air cell type insulation in the heating room. The actual address is 1004 Round Hill Rd. Slatterville, RI. This is a capehart style home, It was chosen based upon available drawings, maintenance records, and discussions with housing management personnel.

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	8
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	1 Note: Photo did not develop correctly No Photo! CLS	Exp. Assess. Form Init.	✓
Q.A. Check ____	SIGNATURE _____	DATE 1 JUL 90 (dd mmm yy)	

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WESTON

ASBESTOS SURVEY DATA

0135

BLDG. NO.: 1004
INSTALLATION 036

TASK TEAM MEMBERS
ROBERT LYNCH
STAR ANDERSON

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: SLATERSVILLE FAMILY HSG
DATE (dd/mm/yy): 08/02/90

BLDG. DESCRIPTION: CAPEHART
TIME ARRIVED: 1250

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	APS11	36	RI	1004	API	HEATING RM	1		0991A	01
2.	APS12	36	RI	1004	AII	HEATING RM	N/A		0991A	01
3.	APS13	36	RI	1004	AID	LIVING ROOM	N/A		0991B	02
4.	APS14	36	RI	1004	AID	BATH	N/A		0991B	02
5.	APS15	36	RI	1004	AID	BEDROOM 2	N/A		0991B	02
6.	APS16	36	RI	1004	AFT	PATCH	10		0991C	03
7.	APS17	36	RI	1004	AFT	ALL RMS EXCEPT KIT	1396		0991D	04
8.	APS18	36	RI	1004	AFT	KITCHEN	130		0991E	05
9.					A					
10.					A					
11.					A					
12.					A					

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	air cell type pipe insulation, less than 4" size. (less 1 l.f. present)
02	dust sample from floor vents.
03	9x9 green floor tile, used to ~~p~~ patch areas.
04	9x9 white floor tile, in all rooms except kitchen.
05	12x12 floor tile with floral pattern, in kitchen only.

TECHNICIAN SIGNATURE Robert F. Lynch
QUALITY ASSURANCE SIGNATURE

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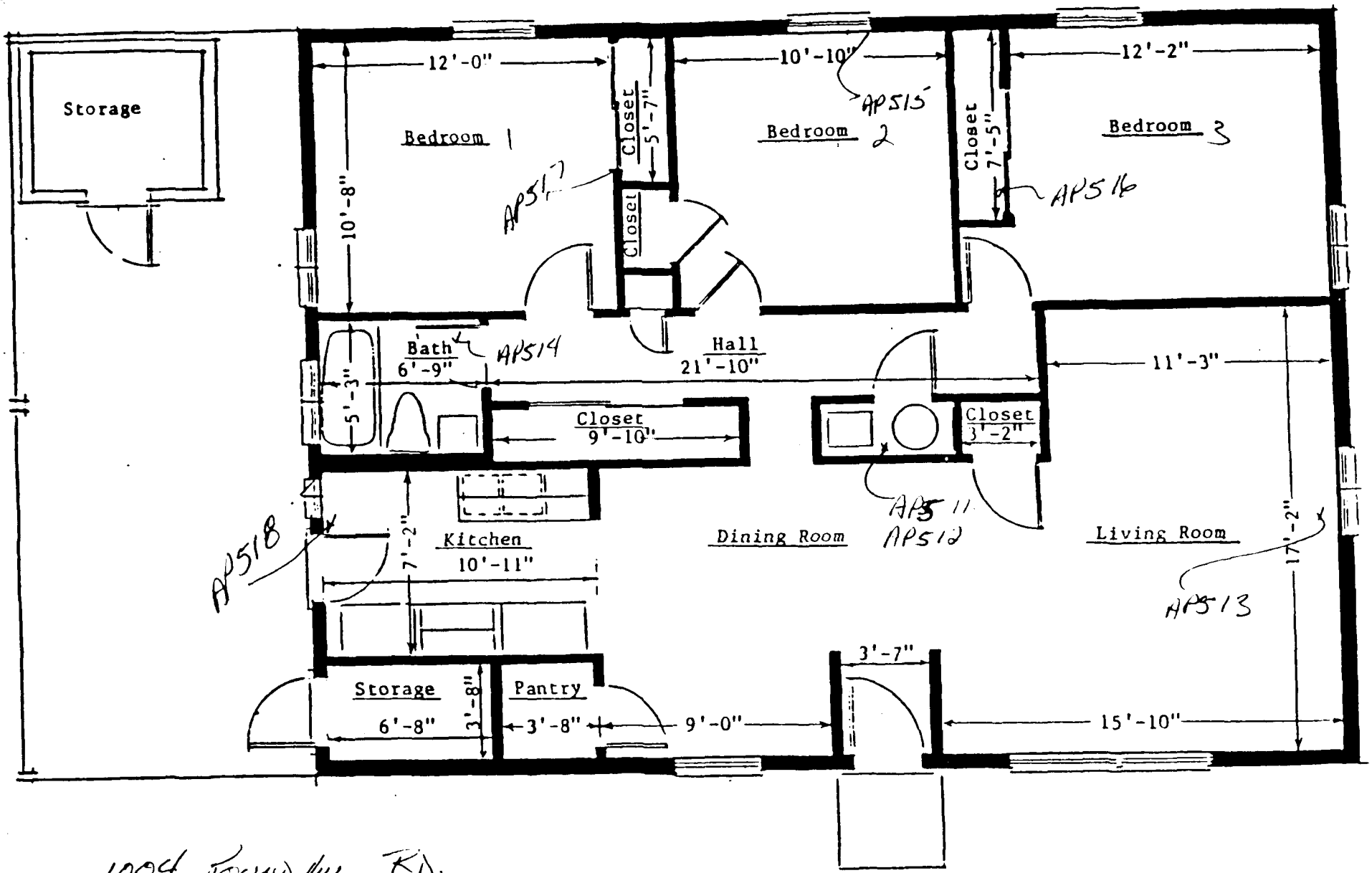
2-90

ROY F. WESTON, INC.



1004 FOUNDHILL RD.
SLATERSVILLE, RI

FLOOR PLAN - CAPEHART TYPE

0137

SITE SURVEY LOG

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

FACILITY/BLDG. NO. SLATERSVILLE, RI 1002 POUND HILL

FACILITY CONTACT JOHN G RAFTON TELEPHONE NUMBER (401) 796-3551

TECHNICIAN NAME STAN ANDERSON SIGNATURE Robert Lynch

TECHNICIAN NAME _____ SIGNATURE _____

TIME ARRIVED 0915 TIME DEPARTED 1245 DATE 08 FEB 90
dd mmm yy

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

This is a one story 3 bedroom with tan aluminum siding. The roof has asspect shingles and felt. There a two types of floor tile present. Only the vent in the kitchen has been sealed. There is no pipe insulation present. Building 1003 was originally scheduled, but occupant was not home.

This a capehart style home. It was chosen based upon available drawings, maintenance records, and discussions with housing management personnel

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	5
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	0	Exp. Assess. Form Init.	✓

Q.A. Check ____ SIGNATURE _____ DATE ____/____/90
dd mmm yy

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WESTON

ASBESTOS SURVEY DATA

0139

BLDG. NO.: 1602
INSTALLATION E136

TASK TEAM MEMBERS
ROBERT LYNCH
STAN NILSSON

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: SLATERSVILLE FAMILY HSG
BLDG. DESCRIPTION: COMMUNITY STYLE

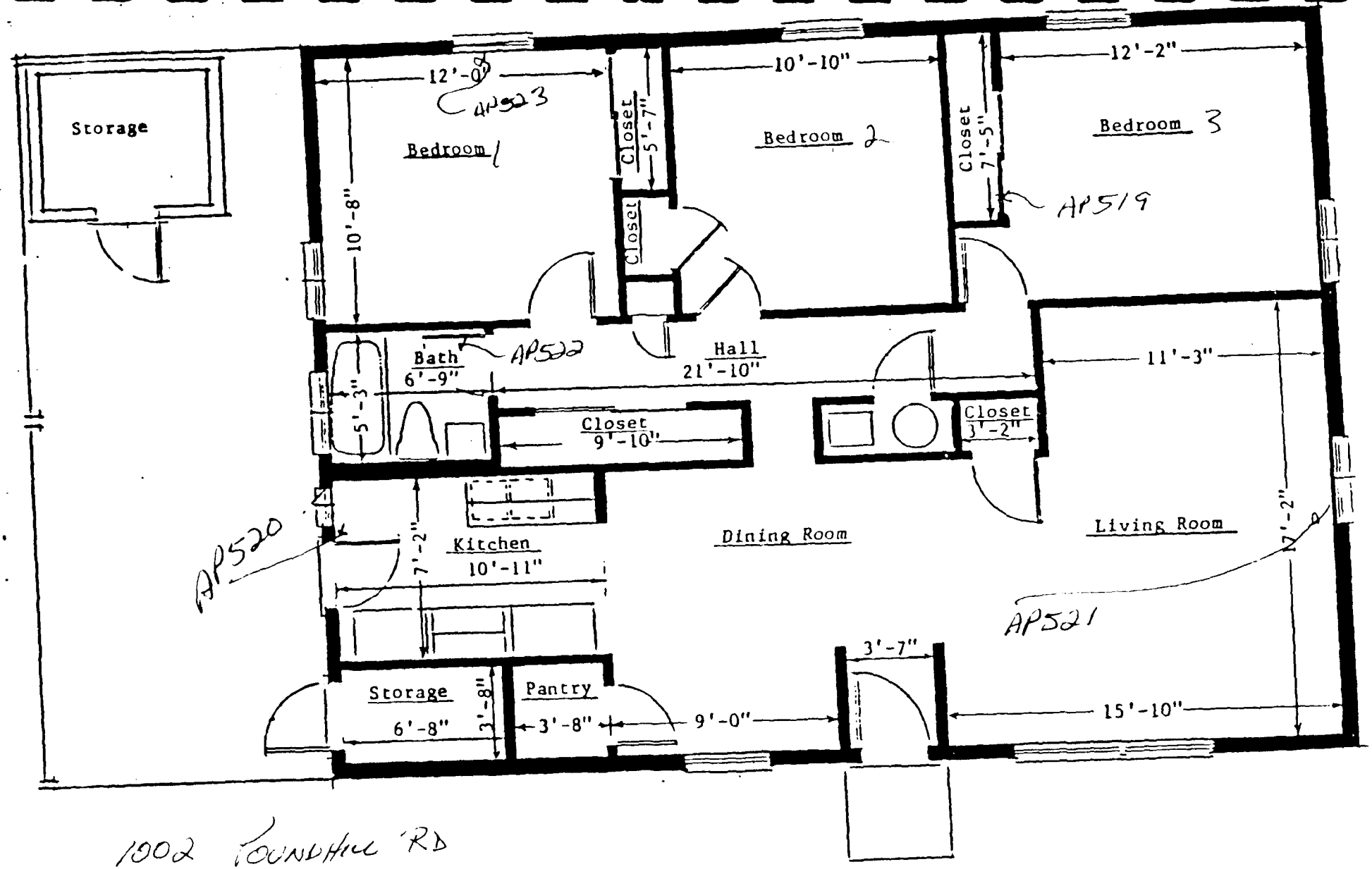
DATE (dd/mm/yy): 02/02/90
TIME ARRIVED: 1225

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	AR5119-36-RE-1092-AIGT					HALL RM EXCEPT KITCH	1306	_	0992A	C1
2.	AR5120-36-RE-1092-AIFT					KITCHEN	1310	_	0992B	C2
3.	AR5121-36-RE-1092-AITD					LIVING RM	N/A	_	0992C	C3
4.	AR5122-36-RE-1092-AITD					BATH	N/A	_	0992C	C3
5.	AR5123-36-RE-1092-AITD					BEDROOMS	N/A	_	0992C	C3
6.								_		
7.								_		
8.								_		
9.								_		
10.								_		
11.								_		
12.								_		

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
C1	9x9 white floor tile, in all rooms except kitchen.
C2	12x12 floor tile with floral pattern, in kitchen only.
C3	Dust samples from floor vents

TECHNICIAN SIGNATURE _____

QUALITY ASSURANCE SIGNATURE _____



1002 FOUNDHILL RD

SLATERSVILLE, RI

FLOOR PLAN - CAPEHART TYPE

APPENDIX A.2. LABORATORY DATA, ASBESTOS SAMPLES

BULK SAMPLE ANALYSIS SUMMARY

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

Sample Number AP509 through Sample AP520

AO LAB ID NO	CLIENT/CLIENT ID	LOCATION	MATERIAL DESCRIPTION*	DATE RECEIVED	RESULTS** CH	AM	CR	OT	TL	LAYERS	ANALYST
AP509	36-RI-1006-AFT	KITCHN	NF, 12X12 FT	02/12/90	ND	ND	ND	ND	ND	Yes	07323
AP510	36-RI-1006-AFT	ALLRMS	NF, WH, 9X9 FT	02/12/90	2	ND	ND	ND	2	Yes	07323
AP511	36-RI-1004-API	HEATRM	F, PIPE INSUL	02/12/90	<1	ND	ND	ND	<1	Yes	07323
AP512	36-RI-1004-API	HEATRM	F, PIPE INSUL	02/12/90	<1	ND	ND	ND	<1	No	07323
AP516	36-RI-1004-AFT	PATCH	NF, GR, 9X9 FT	02/12/90	ND	ND	ND	ND	ND	Yes	07323
AP517	36-RI-1004-AFT	ALLRMS	NF, WH, 9X9 FT	02/12/90	2	ND	ND	ND	2	Yes	07323
AP518	36-RI-1004-AFT	KITCHN	NF, 12X12 FT	02/12/90	ND	ND	ND	ND	ND	Yes	07323
AP519	36-RI-1002-AFT	ALLRMS	NF, WH, 9X9 FT	02/12/90	4	ND	ND	ND	4	Yes	07323
AP520	36-RI-1002-AFT	KITCHN	NF, 12X12FT	02/12/90	ND	ND	ND	ND	ND	Yes	07323

* MATERIAL DESCRIPTION

Friable[1], Color[2], System[3], Type

** RESULTS

CH - Chrysotile
AM - Amosite
CR - Crocidolite
OT - Other
TL - Total

FRIABLE[1]

F - Friable
NF - Non-Friable

COLOR[2]

BK - Black
BL - Blue
BR - Brown
GR - Green
GY - Gray
RD - Red
TN - Tan
WH - White
YL - Yellow

SYSTEM[3]

CHW - Chilled Water
DOM - Domestic Water
HHW - Heating Hot Water
STM - Steam
UNK - Unknown

All analyses are performed in accordance with the methods set forth in U.S. EPA 600/M4-82-020, as ammended. 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(s): Dust and Floor Tiles Sampling Location: Slatersville

QUALITATIVE ANALYSIS

FLOOR TILES: A 0.5 to 2.0 gram portion of each floor tile sample was ultrasonically disaggregated in four milliliters of deionized, 0.2 μm membrane filtered water. After the coarse fraction settled, a drop of the suspended, clay-sized fraction 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 with a Philips CM12 transmission electron microscope operating at 120 kilovolts accelerating voltage.

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

SAMPLE IDENTIFICATION	RESULTS
AP506-36-RI-1006-ATD	Positive
AP507-36-RI-1006-ATD	Positive
AP508-36-RI-1006-ATD	Positive
AP509-36-RI-1006-AFT	Positive
AP513-36-RI-1004-ATD	Positive
AP514-36-RI-1004-ATD	Positive

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ANALYTICAL RESULTS
(continued)

SAMPLE IDENTIFICATION	RESULTS
AP515-36-RI-1004-ATD	Positive
AP516-36-RI-1004-AFT	Positive
AP518-36-RI-1004-AFT	Negative
AP520-36-RI-1002-AFT	Negative
AP521-36-RI-1002-ATD	Positive
AP522-36-RI-1002-ATD	Positive
AP523-36-RI-1002-ATD	Positive

Barry Rayfield
(Approved for Transmittal)

3/13/90
(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

AIR MONITORING DATA

CLIENT: Argonne Nat'l Lab. WORKER ORDER NUMBER: 2104-13-02

PROJECT LOCATION: Statersville Rd. Unit 1004

WORK AREA ID NO: SAMPLE ID: SL-1004LR

SAMPLE TYPE

X

Living Rm Vent

1003 1331 208

X

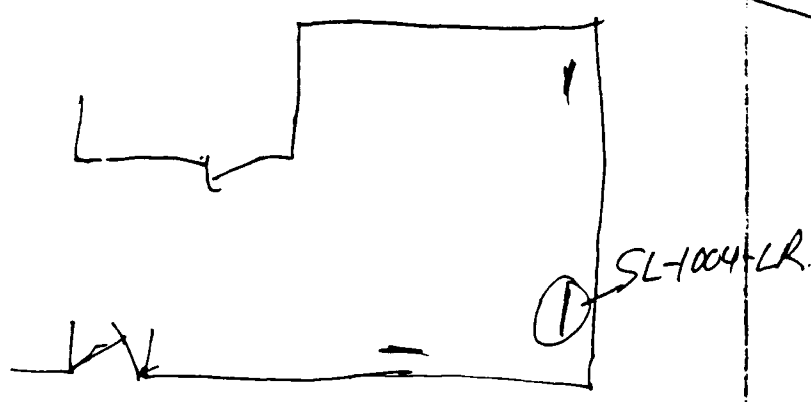
97 L. Nelms 20 Apr '90

13 10.4 10.4

14 10.3 2150

NOTES SKETCHES REMARKS

TEM



TAS-... Sheet ___ of ___

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab — WORK ORDER NUMBER 2104-13-02
PROJECT LOCATION Slatersville, RI — Unit 1004
AREA ID NO _____ — SAMPLE NO. SL 1004-K1
SAMPLE TYPE

X Kitchen Vent

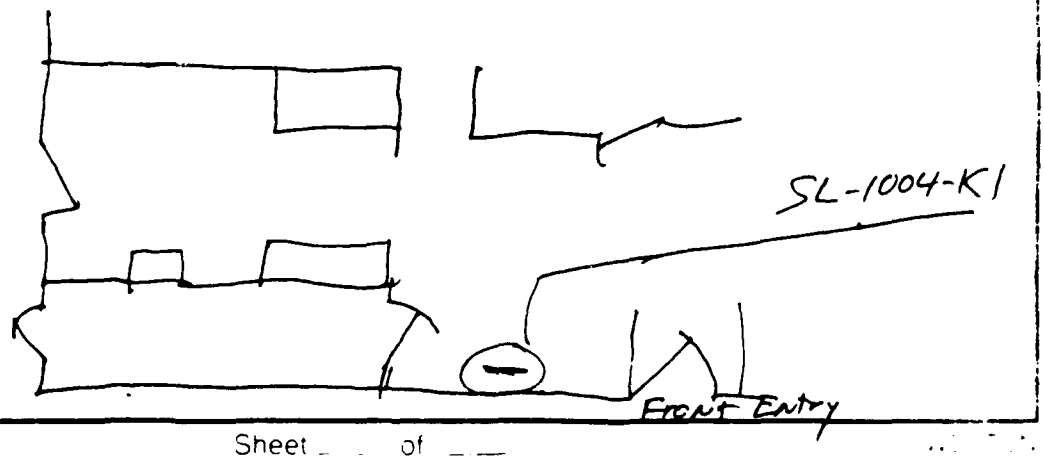
SAMPLE DATA

99	X		1002 1332	210
13	10.0	10.0	L. Nelms	20 Apr '90
14	10.0	2100		

ANALYTICAL DATA

NOTES SKETCHES REMARKS Sampled Vent in Dining Area of Kitchen. Also took Dust Sample.

TEM



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ORDER NUMBER 2104-13-02

LOCATION Slatersville, R.I. Unit 1004

SAMPLE ID BL-1004-BR

TYPE

X

X Bedroom (middle) Vent

1001 1333 212

~~78~~ 70 L. Nelms 20 Apr. '90

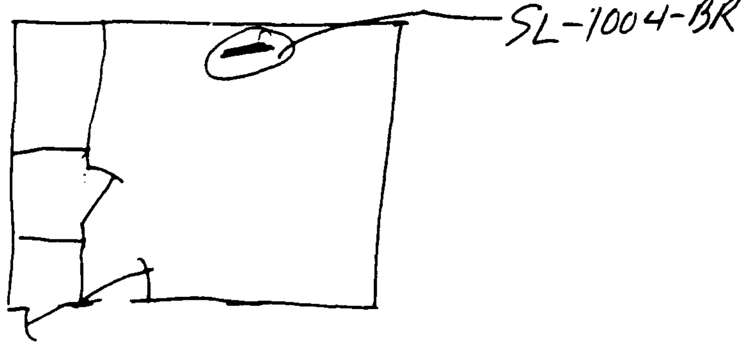
13 10.8 9.4

14 8.1 2000

REMARKS

Center BR

TEM



Sheet of

AIR MONITORING DATA

Argonne Nat'l Lab — WORK ORDER NUMBER 2104-13-02

LOCATION Slatersville RI Unit 1004

SL-1004-BA

TYPE

X

X Bathroom Vent

10:00 1334 214

X

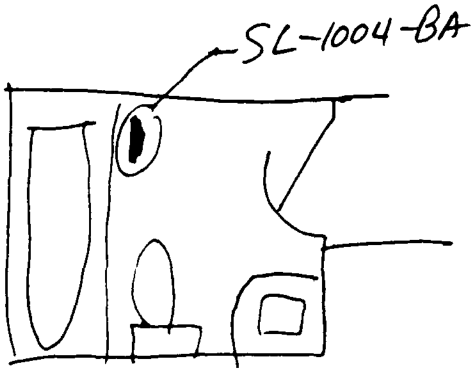
80 L. Nelms 20 Apr. '90

13 10.8 10.6

14 10.3 2260

SKETCHES REMARKS

TEM



Sheet ____ of ____

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab — ORDER NUMBER 2104-13-02

PROJECT LOCATION Slatersville RI, Unit 1004

AREA ID NO — SAMPLE ID SL-1004-OUT

SAMPLE TYPE

X

X

1005 1330 205

X

82

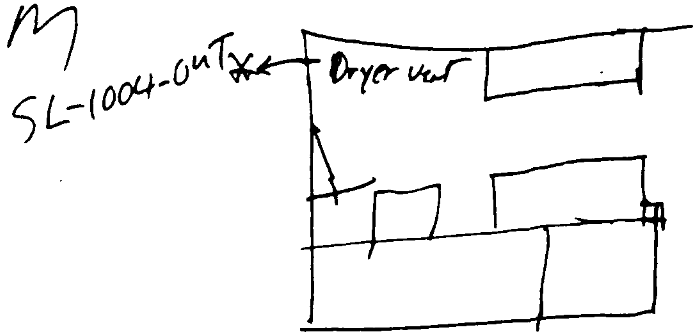
L. Nelms 20 Apr '90

7 10.0 9.9

8 9.8 2030

NOTES SKETCHES REMARKS

TEM



TAS-03 5-88
GEN TECH ASB

Sheet ___ of ___

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab. PAPERWORK NUMBER 2104-13-02

PROJECT LOCATION Slatersville RI, unit 1004

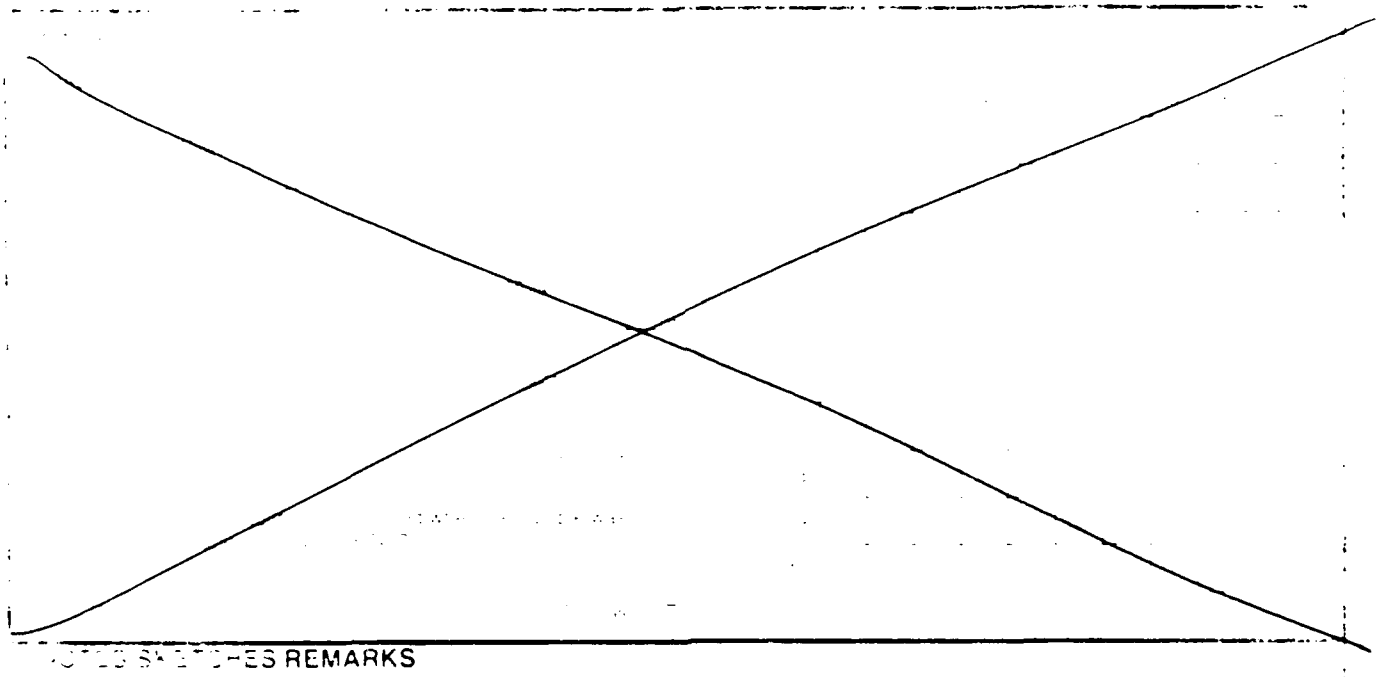
SAMPLE NO. SL 1004-FB

SAMPLE TYPE

AMBIENT X

Field Blank

		0959 1335	216
None	X	L. Nelms	20 Apr. '90
N/A			
N/A		0	



SKETCHES REMARKS

TEM

Sheet _____ of _____

APPENDIX B.2. LABORATORY DATA, AIRBORNE ASBESTOS SAMPLING

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PHONE: (205) 826-6100
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TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: SL-1004-KI

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE955

Received by: Barry Rayfield
Analyzed by: Greg Hall

Date Received: 04/23/90
Date Analyzed: 04/25/90

Filter Type: 0.45 µm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1600.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00456 fibers/cc
Grid Archive No.: 0226-B-8.9

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5µm	≥5µm	<5µm	≥5µm	Ambiguous	Non-Asbestos
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 < 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5µm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Greg Hall
(Approved for Transmittal)

June 14, 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: SL-1004-LR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE956

Received by: Barry Rayfield
Analyzed by: Greg Hall

Date Received: 04/23/90
Date Analyzed: 04/25/90

Filter Type: 0.45 µm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1600.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00456 fibers/cc
Grid Archive No.: 0226-C-6,7

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5µm	≥5µm	<5µm	≥5µm	Ambiguous	Non-Asbestos
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 < 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5µm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Greg Hall
(Approved for Transmittal)

June 14, 1990
(Date)

This test report relates only to the specific items tested.

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
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TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: SL-1004-BR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE957

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/23/90
Date Analyzed: 04/25/90

Filter Type: 0.45 µm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1600.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00456 fibers/cc
Grid Archive No.: 0226-C-8.9

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5µm	≥5µm	<5µm	≥5µm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	3
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 < 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5µm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Greg Hall
(Approved for Transmittal)

June 14, 1990
(Date)

This test report relates only to the specific items tested.

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

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: SL-1004-BA

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE958

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/23/90
Date Analyzed: 04/25/90

Filter Type: 0.45 µm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1600.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00456 fibers/cc
Grid Archive No.: 0226-D-6,7

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5µm	≥5µm	<5µm	≥5µm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	6
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 < 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5µm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5µm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5µm 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)

June 14, 1990
(Date)

This test report relates only to the specific items tested.

ROY F. WESTON, INC.
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TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: SL1004KI-DST

Weston W.O. No 2104-13-02-0000
Weston Sample ID No.: WG503

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 04/23/90
Date Analyzed: 04/26/90

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.

Barry Rayfield
(Approved for Transmittal)

April 30, 1990
(Date)

This test report relates only to the specific items tested.

APPENDIX C. ASBESTOS IN WATER SUPPORTING DATA

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

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE NATIONAL LABORATORIES
Client Sample ID: RJ1002

Weston W.O. No.: 2104-13-01-0000
Weston Sample ID No.: WA056

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 03/26/90
Date Analyzed: 04/23/90

Filter Type: 0.20 μm, 47 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0033 mm²
Sample Aliquot: 0.2500 liters
EPA Count Rule: AHERA
EPA Analysis: EPA 600/4-83-043

Filter Area: 1125 mm²
Number of Grid Squares Examined: 10
Total Area Examined: 0.0330 mm²
Detection Limit: 0.136 MS/L
Grid Archive No.: 0221-A-2,3

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<10μm	≥10μm	<10μm	≥10μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	1	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 < 10μm in length: 0.136 (millions structures/L)

Concentration of Asbestos Structures ≥ 10μm in length: ND (millions structures/L)

Total Concentration of Asbestos Structures 0.136 (millions structures/L)

Comments: An electron micrograph (B779) and an energy dispersive spectrum (WA056.eds) were recorded.

Barry Rayfield
(Approved for Transmittal)

April 24, 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 NATIONAL LABORATORIES
Client Sample ID: RJ1011

Weston W.O. No.: 2104-13-01-0000
Weston Sample ID No.: WA057

Received by: Barry Rayfield
Analyzed by: Beth Hiltbold

Date Received: 03/26/90
Date Analyzed: 04/23/90

Filter Type: 0.20 μm, 47 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0033 mm²
Sample Aliquot: 0.2500 liters
EPA Count Rule: AHERA
EPA Analysis: EPA 600/4-83-043

Filter Area: 1125 mm²
Number of Grid Squares Examined: 10
Total Area Examined: 0.0330 mm²
Detection Limit: 0.136 MS/L
Grid Archive No.: 0221-A-5, B-1

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<10μm	≥10μm	<10μm	≥10μm	Ambiguous	Non-Asbestos
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 < 10μm in length: ND (millions structures/L)

Concentration of Asbestos Structures ≥ 10μm in length: ND (millions structures/L)

Total Concentration of Asbestos Structures ND (millions structures/L)

Comments:

Barry Rayfield
(Approved for Transmittal)

April 24, 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 NATIONAL LABORATORIES
Client Sample ID: RJ1015

Weston W.O. No.: 2104-13-01-0000
Weston Sample ID No.: WA058

Received by: Barry Rayfield
Analyzed by: Barry Rayfield

Date Received: 03/26/90
Date Analyzed: 04/24/90

Filter Type: 0.20 μm, 47 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0033 mm²
Sample Aliquot: 0.1500 liters
EPA Count Rule: AHERA
EPA Analysis: EPA 600/4-83-043

Filter Area: 1125 mm²
Number of Grid Squares Examined: 10
Total Area Examined: 0.0330 mm²
Detection Limit: 0.227 MS/L
Grid Archive No.: 0225-D-7,8

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<10μm	≥10μm	<10μm	≥10μm	Ambiguous	Non-Asbestos
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	1

SUMMARY

Concentration of Asbestos Structures < 10μm in length: ND (millions structures/L)

Concentration of Asbestos Structures ≥ 10μm in length: ND (millions structures/L)

Total Concentration of Asbestos Structures ND (millions structures/L)

Comments:

Barry Rayfield
(Approved for Transmittal)

April 24, 1990
(Date)

This test report relates only to the specific items tested.