FLOOR TILE AND MASTIC REMOVAL PROJECT REPORT

NOVEMBER 1992

**INTER-AGENCY FUNDED
NON-FRIABLE ASBESTOS DEMONSTRATION PROGRAM**

Supported By The

**ASBESTOS DEVELOPMENT AND DEMONSTRATION
INITIATIVES GROUP (ADDIG)**

Through The

TULSA DISTRICT, CORPS OF ENGINEERS

MASTER

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**INTER AGENCY FUNDED NON-FRIABLE ASBESTOS DEMONSTRATION
PROGRAM SUPPORTED BY THE ASBESTOS DEVELOPMENT AND
DEMONSTRATION INITIATIVES GROUP (ADDIG) THROUGH THE
TULSA DISTRICT CORPS OF ENGINEERS**

**FLOOR TILE AND MASTIC REMOVAL
PROJECT SUMMARY REPORT
SEPTEMBER 1992**

I - SUMMARY OF RESULTS

A test program was developed and coordinated with State and Federal Regulators and carried out at Fort Sill, Oklahoma. This program was carefully designed to create the worst conditions in order to evaluate whether asbestos fibers are released when asbestos containing floor tile and mastic are removed. There were over 1,000 samples taken and analyzed during the execution of the program. The conclusions reached were based upon analysis of the critical samples using the Transmission Electron Microscope (TEM) technology. Additionally, the TEM procedures were used to evaluate personnel samples to determine whether those fibers found were asbestos or other materials. Most of the (TEM) samples were analyzed by the U.S. Environmental Protection Agency (EPA) Risk Reduction Engineering Laboratory in Cincinnati, Ohio. Based upon all data, the following are evident:

1. Based upon the current Occupational Safety and Health Administration (OSHA) regulations, the action level of 0.1 regulated fibers or structures per cubic centimeter (f/cc or s/cc) was never approached. To be regulated, current OSHA regulations require that a fiber must have both 1) a length to width ratio of at least 3 to 1 and 2) a length greater than 5

microns. The substantial increase in unregulated fiber concentrations is noted as scientific information.

2. Soaking of floor tile with amended water reduces nuisance dust and loosens the tile which makes removal of floor tile easier.

Clarification of Floor Tile in Good Condition.

In association with this study, a clarification of the requirements of the Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) was discussed with representatives of the Federal EPA. Floor tile and mastic that are in good condition and are not friable, and contain more than 1 percent asbestos are classified as Category I Asbestos Containing Materials (ACM) under the Asbestos NESHAP.

Demolition of Buildings Involving Floor Tile and Mastic

Floor tile and mastic that are Category I ACM do not have to be removed before demolition unless it is in poor condition and is friable. "In poor condition" means that the binding of the material is losing its integrity as indicated by peeling, cracking, or crumbling of the material. "Friable" means that the material can be crumbled, pulverized, or reduced to powder by hand pressure. The waste that results from the demolition of a building which contains floor tile and mastic that is not friable is not regulated by the Asbestos NESHAP when using normal demolition methods. Normal demolition methods of waste collection would include picking the waste material up with a front end loader or other similar device to load into trucks,

pushing the material into piles for more efficient loading, and reducing the size of the material so it can be loaded. It does not include the intentional compacting of the material by driving on top of the waste with a bulldozer or other similar device. Methods of waste reduction such as grinding the waste into small pieces so that it can be used for general fill or recycled is regulated by the Asbestos NESHAP.

Renovation of Buildings Involving Floor Tile and Mastic

In this situation the building owner decides to remove the asbestos-containing floor tile and mastic. Floor tile and mastic that are in poor condition and friable before removal are regulated by the NESHAP. Floor tile and mastic that will be subject to sanding, grinding, cutting, or abrading is regulated by the Asbestos NESHAP. "Grinding" means to reduce to powder or small fragments and includes mechanical chipping and drilling. Most nonfriable materials can be broken without releasing significant quantities of airborne fibers. It is only when the material is extensively damaged that the potential for significant fiber release is greatly increased. The extent of breakage that will render the ACM friable depends to some degree on the condition of the ACM prior to the abatement operation. Therefore, it is difficult to make a general statement on the level of breakage which causes ACM to become regulated. Generally, if floor tile is in good condition, is not friable, and each tile is only broken into a few pieces during removal, the asbestos removal operation would not be subject to the

regulation. A case-by-case determination must be made considering the condition of the material and the forces which have or will act upon it.

FLOOR TILE AND MASTIC REMOVAL
REPORT

AN INTER AGENCY FUNDED PROGRAM SUPPORTED BY THE ASBESTOS
DEMONSTRATION AND DEVELOPMENT INITIATIVES GROUP THROUGH
THE TULSA DISTRICT CORPS OF ENGINEERS
NOVEMBER 1991

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FLOOR TILE AND MASTIC REMOVAL

II - REFERENCES

1. Report titled, "FLOOR TILE AND MASTIC REMOVAL", prepared by Stanley Engineering, Inc. Oklahoma City, OK. dated July/August 1990.
2. Draft report titled, "EVALUATION OF TILE AND MASTIC REMOVAL AT FORT SILL", prepared by David C. Cox & Associates, Washington, D.C. dated 22 Aug 1991.

III - DISCUSSION

A. Background

This program was developed to evaluate a safe, economical method of removing non-friable asbestos. The phase under study in this report is the asbestos containing floor tile and mastic which was supported by the ADDIG and funded by various federal agencies including the Army, Navy, Air Force, Department of Defense Dependent Schools (DODDS), Department of Energy (DOE), and the Environmental Protection Agency (EPA). The Tulsa District Corps of Engineers was the agent for coordinating and executing the program. A video that provides a visual record of this program is available from the Tulsa District.

B. General

This segment of the program was designed to investigate the removal of asbestos containing Floor Tile and Mastic under conditions that would provide the greatest opportunity to have a release of fibers and to measure those releases, if any. Stanley Engineering Inc. Oklahoma City, OK., was the Architectural-Engineering (AE) consultant selected to design the program, develop the protocol, provide technical assistance during the execution of the test, take the samples, and analyze most of the samples. The EPA Risk Reduction Engineering Laboratory in Cincinnati, Ohio analyzed over 130 TEM samples, provided technical assistance and guidance, and through their consultant Mr. Cox, provided the reference draft report. The program was carried out in three buildings at Fort Sill, OK. The special characteristics of each building are provided later.

C. Industrial Hygiene and Safety Program.

Protecting the worker and the environment was always the number 1 priority during this program. The project was designed to protect the environment through the use of critical barriers and enclosures. The technicians who hand removed the tile were carefully monitored to assure they were not exposed to fibers, chemicals or extreme physical exertion. Daily meetings were held to discuss the program and to review procedures to assure that the project would remain safe.

D. Testing Program.

The testing program had been designed, coordinated and approved through the reference protocol before the program began. Testing included: Polarized Light Microscopy (PLM) for bulk samples, Phase Contrast Microscopy (PCM) and TEM procedures. This was done in order to identify any existing ACM, comply with all regulatory requirements, and measure asbestos fibers released during the removal process. The referenced Stanley Engineering report (ref.1) with the Protocol (Tab AA) provides detail on how each test procedure was used.

Buildings Selected for Testing. Building 1436 was selected as the test facility for removal of tile and mastic on a concrete floor. This tile and mastic was placed in the 1960's and contained over 20% (tile) and 5% (mastic) asbestos. The building had been a youth center and had received heavy traffic and typically was stripped and buffed every three months. A barrack (building 4387) was selected to test tile removal on wood

flooring. A storage facility (building 4375) was selected to test removal of multiple layers of floor tile and mastic. Each of these facilities and the testing performed is briefly outlined below and provided in detail in the referenced documents.

E. Discussion

Building 1436. Inside this concrete floor structure, 7 cells were constructed in order to provide ideal testing areas. This allowed the selected procedures to be repeated under controlled conditions. The cells were unventilated. They were cleaned and recleaned and a negative air machine was used to circulate air inside each cell to remove and free fiber before the initiation of removal activities. It was important to have very low fiber counts before the actual removal began in order to determine if any fibers were released during the removal process. Tile was removed from each cell, then the mastic was removed. The cells were completely recleaned and tested between the tile and the mastic removal test. The results of those tests are summarized in references 1 and 2.

Building 4387. This WWII two story, wood floor barracks structure had 12" X 12" asbestos containing floor tile (7%) and mastic (5%). The first floor of this structure was divided into two cells. One cell was used to test hand removal procedures and the second cell was used for testing during machine removal. The tile was removed along the underlying particle board which had the mastic on its surface. Results of the tests are contained in reference #1.

②
Building 4375. This concrete floor structure had two layers of tile and mastic in three adjoining rooms. These rooms were combined into one testing area in order to test machine removal of more than one layer of tile. The results of these tests are contained in the referenced reports.

IV - Findings During Tile Removal.

A. Dry Removal

①
Floor tile in cells in Building 1436, 4387, and 4375 were removed by primary inexperienced workers using hand tools. This was the most aggressive method of removing tile. Since the tile was securely glued and had very heavy traffic, the tile was broken into very small fragments. Six air samples were taken inside the cell during each phase of the program. Three of these were analyzed using the National Institute for Occupational Safety and Health (NIOSH) 7402 procedures by Stanley Engineering and three were analyzed using Asbestos Hazard Emergency Response Act of 1986 (AHERA) protocol by the EPA Risk Reduction Engineering Laboratory. The AHERA clearance procedures were used to test the area before beginning the removal and again during the execution of the program, and at the end of the program. This assured that the areas were free of asbestos fibers, or at least equal to background concentrations, prior to initiating the floor tile removal test, prior to initiating the mastic removal test after completion of the floor tile removal, and after completion of all asbestos removal for an

area. Workers were also monitored (PCM samples) as well as adjacent areas, plus, upwind and downwind samples. The results of all samples are contained in references 1 and 2. Results of the PCM indicate that very few fibers were present. The samples taken and analyzed during the removal process using the NIOSH 7402 procedures indicated a low level of asbestos fibers. The samples taken and analyzed during the AHERA procedures indicated an increase in the very small fibers. These very small fibers were found during the removal of both the tile and mastic. However, the time waited average of f/cc was well below the action level.

B. Wet Removal.

Floor tile in two cells in building 1436 were removed while wet. One cell employed a mist which contained a wetting agent and one floor was soaked for two days before the tile was removed with hand tools. Water was also used with the machine removal tests which are described below. It is significant that the fiber levels (both regulated and unregulated) in the wet tile removal test was lower than when removed dry.

C. Machine Removal.

The seven cells constructed inside building 1436 were removed once the testing was completed and the cells were clean. The tile from the remaining accessible areas inside this building was removed with a machine designed to remove tile from large areas. The machine had three rotating disc with cutting heads that cut the tile from the floor. Since the tile was so securely

attached, the tile broke into small pieces making clean up easy. A second machine that used hydraulic power to push a scraper blade was used in the second cell in building 4387 and in the cell in building 4375. Fiber levels were very low for each of these tests.

V - EPA's INTERPRETATION OF THE ASBESTOS NESHAP.

To assist the user of this report with the EPA's current interpretations of the Asbestos NESHAP, a letter from the author of the the Asbestos NESHAP is provided. Attached to this letter are 4 letters of response to various scenarios by EPA's Compliance Division.

- 1) Letter dated March 29, 1991 concerns a wet method of shot blasting removal of mastic.
- 2) Letter dated April 9, 1991 concerns categorizing the condition of mastic both prior to and during demolition.
- 3) Letter dated January 8, 1992 provides Asbestos NESHAP clarification on what constitutes crumbled, pulverized, or reduced to powder.
- 4) Letter dated March 18, 1992 concerns demolition wetting and debris disposal of nonfriable ACM.

It is anticipated that these responses will provide general compliance guidance for asbestos projects. Specific questions on compliance requirements may be addressed to the Washington office.

VI - ADDITIONAL INFORMATION.

Additional information for applications of this project data to specific projects can be obtained by contacting Mr. Richard Smith or Mr. Burl Ragland at the Tulsa District, Corps of Engineers; P.O. Box 61; Tulsa, Oklahoma 74121; Phone (918) 581-6641.

ENCLOSURE 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 29 1991

OFFICE OF
AIR AND RADIATION

Mr. Jim Sander
Manager
OCRIC, Inc.
P.O. Box 99381
San Diego, California 92169

Dear Mr. Sander:

This letter is in response to your January 24, 1991 letter in which you discussed a wet method of the shot blasting removal technique for asbestos containing mastic. Included with your letter was a video tape of the process which members of my staff and I viewed.

In a September 21, 1990 applicability determination, we stated that nonfriable material (including floor tile mastic) which is removed using abrasive forces such as grinding, sanding or other abrasive methods, is subject to the Asbestos NESHAP regulation. The shot blasting operation would cause nonfriable asbestos material (mastic) to be crumbled, pulverized, or reduced to powder, and therefore, Asbestos NESHAP work practices must be followed. This means adequately wetting the nonfriable material (mastic) before and during the shot blasting operation, keeping the shot blasted material adequately wet before collection, and disposing of the waste according to the requirements of the Asbestos NESHAP.

You have incorporated a wetting process in the shot blasting and waste collection stages of your system which appears to meet the above requirements. To the extent that those requirements are being met, this wet shot blasting system would be an acceptable method of mastic removal. Please be aware that EPA does not formally approve or endorse specific removal techniques. This letter should not be interpreted as an approval from EPA regarding OCRIC's process.

-2-

This response has been coordinated with EPA's Office of Enforcement and the Emission Standards Division of the Office of Air Quality Planning and Standards. If you have any further questions, please contact Scott Throwe or my staff at (703) 308-8699.

Sincerely,

John B. Rasnic, Acting Director
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

cc: Sims Roy, ESD (MD-13)
Elise Hoerath, OE (LE-134A)
Omayra Salgado, SSCD (EN-341W)
Tom Ripp, SSCD, (EN-341W)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

ENCLOSURE 3

APR 9 1991

OFFICE OF
AIR AND RADIATION

Mr. William Loch
Project Manager
Warren and Panzer Engineers P.C.
10 East 38th Street
New York, New York 10016

Dear Mr. Loch:

This letter is in response to your December 21, 1990 letter in which you requested clarification regarding the categorization of mastic in the Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP).

In the recently revised Asbestos NESHAP, promulgated on November 20, 1990, EPA established two categories of nonfriable asbestos containing material (ACM): Category I nonfriable ACM and Category II nonfriable ACM. As defined in 40 CFR § 61.141, "Category I nonfriable ACM means asbestos containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than 1 percent asbestos determined using the methods specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy. Category II nonfriable ACM means any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos as determined using the methods [cited above] that when dry cannot be crumbled, pulverized or reduced to powder by hand pressure."

Mastic which is in good condition, that is, it is not peeling, cracking, or crumbling, would be considered Category I nonfriable ACM. Therefore, mastic which is in good condition will not be subject to the Asbestos NESHAP unless it is subjected to sanding, grinding, cutting or abrading. In cases where floor tile is not friable and is not being removed from a building prior to demolition, we believe the mastic underneath the floor tile will be in good condition and not friable and therefore, can remain in the building during the demolition process.

However, if the demolition process involves the intentional burning of a building, all of the asbestos containing material in the building, including the floor tile mastic, must be removed in accordance with the NESHAP before the burning. In addition, it

should be noted that the condition of the mastic may be affected by the process used to remove the floor tile. Mastic should be closely inspected after floor tile removal to determine its condition. In reference to your question on the use of solvents to remove mastic, we believe the use of solvents alone would not cause the mastic to be crumbled, pulverized or reduced to powder and therefore would not be subject to the Asbestos NESHP.

This determination has been coordinated with EPA's Office of Enforcement and with the Emission Standards Division of the Office of Air Quality Planning and Standards. If you have any questions, please contact Scott Throwe of my staff at (703) 308-8699.

Sincerely,

John B. Rasnic, Acting Director
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

cc: Sims Roy, ESD (MD-13)✓
Elise Hoerath, OE, (LE-134A)
Omayra Salgado, SSCD, (EN-341W)
Tom Ripp, SSCD (EN-341W)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 8 1992

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Asbestos NESHAP Clarification on What Constitutes
Crumbled, Pulverized, or Reduced to Powder

FROM: John B. Rasnic, Director
Stationary Source Compliance Division

TO: James J. Burke, Chief
Toxics and Pesticides Branch
Region III (3AT30)

This memorandum is in response to your October 17, 1991 memorandum in which you requested a policy determination on when asbestos containing materials (ACM), which are damaged during the course of demolition and renovation, become friable ACM. Specifically, you inquired at what point does damaged nonfriable ACM, such as transite siding, become regulated. As you stated in your memorandum, the word "broken" has been deleted from the definition section because it could be mistakenly interpreted as substantially increasing the scope of the standard. Most nonfriable materials can be broken without releasing significant quantities of airborne fibers. It is only when the material is extensively damaged that the potential for significant fiber release is greatly increased.

Transite siding, which is a Category II nonfriable ACM, becomes regulated ACM if it has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material in the course of the demolition and renovation operations. There is a difference between merely breaking a transite panel, and crumbling, pulverizing or reducing it to powder. If a Category II material, such as transite, is in good condition it can be broken without causing the material to become regulated. Transite panels are typically bolted or nailed to buildings on which they are attached. The extent of breakage which would normally result from carefully removing a transite panel from a building and lowering it to the ground prior to demolition would not result in crumbling, pulverizing or reducing the panel to powder.

The extent of breakage which will render the ACM friable depends to some degree on the condition of the ACM prior to the abatement operation. This is true for both Category I and II ACM. Therefore, it is difficult to make a general statement on the level of breakage which causes ACM to be regulated. A case by case determination must be made considering the condition of the material and the forces which have or will act upon it.

Under the definition of "regulated asbestos containing material" (RACM) in the asbestos NESHAP, EPA listed sanding, grinding, cutting or abrading as work practices which when subjected to Category I ACM, would cause that material to be regulated. Similarly, we can give examples of work practices which will cause Category II ACM, such as transite, in any condition to become RACM. Any demolition operation (i.e., use of a wrecking ball; implosion; use of a bulldozer, backhoe or other heavy machinery to knock the building over) will extensively damage Category II ACM such that it is crumbled, pulverized or reduced to powder. Dropping Category II material, such as transite panels, from a building as a means of transporting it to the ground, will also cause the ACM to be regulated in most conditions. The burning of any ACM, including Category I and II, will also cause that material to become regulated. This is not meant to be an exhaustive list of work practices which will cause Category II ACM to be crumbled, pulverized or reduced to powder. It does, however, provide guidance on the type of work practices which we believe will cause Category II ACM to be subject to the asbestos NESHAP.

This determination has been coordinated with EPA's Office of Enforcement and the Emission Standards Division of the Office of Air Quality Planning and Standards. If you have any questions, please contact Scott Throwe of my staff at FTS 678-8699.

Sincerely,

John B. Rasnic, Director
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

cc: Sims Roy, ESD (MD-13)
Charles Garlow, OE (LE-134A)
Omayra Salgado, SSCD (EN-341W)
Tom Ripp, SSCD (EN-341W)
Regional Asbestos NESHAP Coordinators

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 18 1992

OFFICE OF
AIR AND RADIATION

Ms. Ann Bieller, Area Manager
Environmental Management
Southwestern Bell Telephone
Procurement Organization
500 North Broadway, Room 1400
St. Louis, Missouri 63102

Dear Ms. Bieller:

This letter is in response to your January 28, 1992 letter requesting a clarification of 40 CFR §61.150(a)(3) as it relates to §61.145(c)(1)(i) and (iv), of the Asbestos NESHAP Revision; Final Rule, dated November 20, 1990.

In your letter, you present your understanding that there are no special requirements for adequately wetting Category I or Category II nonfriable asbestos-containing material (ACM) during the course of a demolition or renovation if it does not meet the definition of regulated asbestos-containing material (RACM). You also state that this conclusion is further supported by §61.150(a)(5), until §61.150(a)(3) is taken into consideration. Section 61.150(a)(3) requires, "for facilities demolished where RACM is not removed prior to demolition according to §§61.145(c)(1)(i), (ii), (iii) and (iv) or for facilities demolished according to §61.145(c)(9), adequately wet asbestos-containing waste material at all times after demolition and keep wet during handling and loading for transport to a disposal site." You question the correctness of the §61.150(a)(3) reference to §61.145(c)(1)(i) and (iv).

Section 61.150(a)(3) correctly cites §61.145(c)(1)(i), (ii), (iii) and (iv). It is required under §61.150(a)(3) that asbestos-containing waste material be kept adequately wet. Asbestos-containing waste material as applied to demolitions and renovations includes RACM waste and materials contaminated with asbestos including disposable equipment and clothing. Category I or Category II nonfriable ACM that has been contaminated by RACM, and cannot be decontaminated (e.g., building debris in a pile contaminated with RACM) must be treated as asbestos-containing waste material. Category I or Category II ACM that does not meet the definition of RACM after a demolition or renovation, and is not contaminated with RACM, is not asbestos-containing waste material and is not subject to the wetting requirement of §61.150(a)(3).

If, after a demolition, material left in the facility according to §61.145(c)(1)(i) or (iv) is intentionally ground-up (such as by repeatedly running over the debris with a bulldozer to compact the material), then §61.150(a)(3) applies. The material must be adequately wetted and kept adequately wet during collection and transport to a site or facility operated in accordance with §61.154 or §61.155. However, if the bulldozer is moving the debris or picking it up to be put in a vehicle and inadvertently runs over Category I material, then it is not subject to the NESHAP standard.

Category I or II nonfriable ACM that is not subject to §61.150(a)(3) would still have to be disposed of in a landfill that accepts building debris, in a landfill that operates in accordance with §61.154, or at a facility that operates in accordance with §61.155. This waste material would not be allowed to go to any facility that would sand, grind, cut or abrade the non-RACM waste or otherwise turn it into RACM waste (such as a cement recycling facility). In addition, if Category I or II nonfriable ACM is sanded, ground, cut or abraded during disposal at a landfill, before it is buried, it is subject to the NESHAP.

This response has been coordinated with EPA's Office of Enforcement and with the Emission Standards Division of the Office of Air Quality Planning and Standards. If you have any questions, please contact Tom Ripp of my staff at (703)308-8727.

Sincerely,

Richard Biondi, Acting Director
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

cc: Sims Roy, ESD (MD-13)
Omayra Salgado, SSCD (EN-341W)
Scott Throwe, SSCD (EN-341W)
Charlie Garlow, OE (LE-134A)
Regional Asbestos NESHAP Coordinators

**DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
DEMONSTRATION PROJECT
REMOVAL OF ASBESTOS CONTAINING
FLOOR TILE**

**CONTRACT NO. DACA56-88-D-0054
DELIVERY ORDER NO. "3"**

PROJECT DATE: JULY/AUGUST 1990

CERTIFIED INDUSTRIAL HYGIENE SERVICES BY:

***STANLEY ENGINEERING, INC.
2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLAHOMA 73112***

**DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
DEMONSTRATION PROJECT
REMOVAL OF ASBESTOS CONTAINING FLOOR
TILE
CONTRACT NO. DACA56-88-D-0054
DELIVERY ORDER NO. "3"**

PROJECT DATE: JULY/AUGUST 1990

CERTIFIED INDUSTRIAL HYGIENE SERVICES BY:

**STANLEY ENGINEERING, INC.
2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLAHOMA 73112**

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ACKNOWLEDGMENT

The principals of Stanley Engineering, Inc., would like to thank the Tulsa District Corps of engineers for their selection, utilization, and support of Stanley Engineering, throughout the duration of this floor tile and mastic Removal Demonstration Project. Special appreciation is extended to Mr. Burl Ragland of the Tulsa District Corps of Engineers, whose efforts guided the project to completion in a timely fashion. We would also like to extend a special thank you to Mr. Bob Vandegriff of the Tulsa District Corps of Engineers, and Mr. Bob Stout of the Headquarters, U.S. Army Corps of Engineers, for their input and direction with specific regard to Industrial Hygiene aspects of the project.

Special appreciation is also extended to the staff of the United States Environmental Protection Agency (USEPA) and in particular, Mr. Sims Roy, Mr. Darl Mount, and Mr. Bruce Moore. Special appreciation is also extended to Mr. Tom Powers of the USEPA Research and Development Risk Reduction Engineering Laboratory. Mr. Powers was present for a significant portion of the project, and contributed to establishing the sample identification and nomenclatural system utilized for the project. Also, we would like to thank Mr. Roger Wilmouth and Mr. Pat Clark, whose assistance was greatly appreciated in the analysis of samples by Transmission Electron Microscopy (TEM) as well as significant participation in the data presentation programs (pre and post project). A special thank you is also extended to Ms. Jean Chesson and Dave Cox who provided statistical support for this project.

Beyond this, we would also like to take the opportunity to thank Mr. Steve Allen, Director of the Oklahoma State Department of Labor Asbestos Division and Mr. Jim Millsap of the Oklahoma State Department of Health Air Quality Service. Both these individual contributed significantly to the definition of friable/non-friable asbestos containing materials in the interpretation of its' applicability to the removal of asbestos containing floor tiles/mastic.

A very special appreciation is extended to the Fort Sill Environmental Division, who participated in the successful guidance of the project leading to a timely conclusion, the Fort Sill Asbestos Remediation Workers who established the controlled areas and participated in the removal of floor tile and mastic, and the Fort Sill Department of Master Planning, Mr. Serge Saltiel who aided in the selection of the structures. Finally, the entire staff of Stanley Engineering would like to thank Mr. Wayne Kaiser, as well as the many other individuals who provided assistance in the administration of this project, and without whose support the project would not have been possible.

Our thanks also to Mr. Rex Rudy, who provided protective garments and laundry service throughout the project as well as Mr. Jerry McKinley and Mr. Jerry Cooper of Sublett & Associates, Inc., who subsequent to the dry hand removal, demonstrated mechanized removal techniques utilizing equipment developed specifically for floor tile removal.

Our apologies to the many other persons who participated and provided valuable assistance to this project, and whom we have not named individually. Your assistance was greatly appreciated.

CERTIFIED INDUSTRIAL HYGIENIST
REGISTERED PROFESSIONAL ENGINEER
INDEPENDENT CERTIFICATION
DEMONSTRATION PROJECT
FT. SILL ARMY INSTALLATION
BUILDING 1436
FLOOR TILE REMOVAL

Stanley Engineering, Inc., a professional engineering firm licensed to practice in the State of Oklahoma, under the provisions of Article I, Chapter 245, Section 21, of the Oklahoma Session Laws, 1968, Certificate No. Ca 693, and I, Keith L. Stanley, Ph.D., P.E., C.I.H., a Registered Professional Engineer in the State of Oklahoma Session Laws, 1968, P.E., Certificate Number 12686, and C.I.H. Certificate Number 1203, acting in the capacity of an independent consultant to the Tulsa District Corps of Engineers, do hereby certify, attest, acclaim or otherwise make known to all persons with particular regard to the floor tile removal project, Building 1436, Ft. Sill Army Base, that the requirements and formalities of all applicable regulations, were followed for the duration of the project and compliance with the same achieved. All relative documentation, with regard to this project, which is identified as the Ft. Sill Building 1436 Floor Tile Removal Demonstration Project, has been closely monitored in order to verify that all regulatory agency requirements were achieved.

Dr. Keith L. Stanley, P.E., C.I.H.

Date

C.I.H. Number 1203

P.E. No. 12686

EXECUTIVE SUMMARY

Duplicate efforts to demonstrate increase airborne structure concentration from the dry hand removal of asbestos containing floor tile, has been strongly documented within this report. This documentation is reflected only through the utilization of Transmission Electron Microscopy and the AHERA Analytical Protocol. Other measurement techniques utilized to measure the presence of regulated airborne fiber concentrations, i.e., Phase Contrast Microscopy, do not document or reflect any significant increase in airborne concentrations during floor tile and mastic removal. Likewise, NIOSH 7402, analytical protocols, are superfluous to the issue since Phase Contrast Microscopy does not document elevated fiber concentrations.

Of particular importance to the documented increase in airborne asbestos structures as identified by AHERA Analytical Protocol, is the absence of significant concentrations when compared to Permissible Exposure Limits established by the Occupational Safety and Health Administration. Throughout the duration of this project, levels equal to or exceed 0.2 fiber (structures)/cc were noticeably absent.

Findings reflected within this report suggest a recommended utilization of personal protective equipment (dual cartridge High Efficiency Particle Absolute filtration, in conjunction with full face respirators) and critical barriers, in order to assure minimizing of dust migration to adjacent areas. Wet removal, when feasible, is recommended as a dust control technique, however, misting (high humidity) should be avoided due to increased respiratory demand placed on workers.

Analytical data review from all Cells which were duplicated both during floor tile and mastic removal, reflect small structure generation when analyzed by TEM. Phase Contrast Microscopy, however, which reflects the regulated fibers, does not indicate that utilization of this technique will contribute to an evaluation of floor tile removal. The following schematic reflects structure sizes as counted by the techniques utilized.

INTRODUCTION

Considerable scientific effort, over the past two years, has gone toward gaining further insight into the potential hazards of asbestos containing floor tile and mastic abatement. With specific regard to the liberation of asbestos fibers from asbestos containing floor tile and mastic during removal, debate within the scientific community has ranged from projections of no potential for exposure above acceptable Permissible Exposure Limits to projections of a necessity to address floor tile remediation by utilization of maximum respiratory protection. Other significant observations in association with floor tile and mastic, are their potential to produce elevated concentrations of airborne asbestos related to the type of "floor tile care" and debates with regard to whether or not airborne concentrations of asbestos fibers (structures) are related to breakage of floor tile during remediation or liberation of trapped "short fibers" deposited during floor tile care activities.

This project was specifically intended to address whether or not significant liberation of airborne asbestos fibers will occur in association with the removal of asbestos containing floor tile and mastic when this activity is accomplished by dry hand removal techniques within a contained area and in the absence of dilution air. In an effort to affect this scenario, seven identical enclosed areas were constructed within Building 1436, Fort Sill Lawton, Oklahoma.

The selection process and search for an appropriate structure within which this demonstration project could be accomplished included the collection and analysis of numerous floor tile samples and an on-going search which persisted for several months prior to the final selection of Building 1436. This facility contained floor tile with an asbestos content of 30% as determined by Polarized Light/Dispersion Staining Microscopy (NVLAP Certified Laboratory) and 25% as reflected by Scanning Electron Microscopy analysis and special preparation techniques. Mastic was also found to contain in excess of 20% asbestos fiber. Beyond this, the area within Building 1436 was large enough to accommodate multiple containments (7) of sufficient area to require several man hours of dry hand removal activity and multiple hours of mastic removal.

Materials of construction for each Cell were those typically utilized in asbestos remediation projects, i.e., 2"x4" frame with polyethylene sheeting (two layers of six mil). This material was utilized for walls as well as ceiling with only the floor remaining uncovered. One doorway (double flapped) exited each Cell and opened into an enclosed hallway which lead to the decontamination facility. Individual drawings depicting each Cell as well as sample locations are included within the body of this report and representative of each Cell activity.

Finally, a testing protocol was developed and was intended to allow for the measurement of any increase in airborne concentrations of asbestos which may occur between measurements identified as "Passive Background" samples and "Dry Hand Removal" samples. The entire process was then repeated for mastic removal. Analytical techniques included Phase Contrast Microscopy which was accomplished both at the site (screening) and in the Laboratory, Transmission Electron Microscopy (AHERA Analytical Protocol), and Transmission Electron Microscopy (NIOSH 7402 Analytical Protocol).

AIR MONITORING AND TESTING

The primary phase of air monitoring included sample collection in association with all workers and adjacent building occupants in order to demonstrate the absence of any impact due to the floor tile remediation project. These samples were analyzed on a daily basis at the site, by Phase Contrast Microscopy. Results of this technique, which counts all fibers equal to or greater than five microns in length, with at least a 3:1 aspect ratio, at 400X to 450X and a limit of resolution in the range of 0.25 microns in diameter, was noticeably absent of significant airborne concentrations. Routine analysis did reflect a significant presence of dust and other non fibrous materials.

Secondarily to the monitoring that was conducted to demonstrate personnel and occupant safety, as reflected above, monitoring was also conducted to reflect any impact to adjacent unoccupied spaces and the environment. On site analysis of these samples was also accomplished on a daily basis by Phase Contrast Microscopy and results were typically those of background and/or at the limit of detection for the methodology utilized. All samples were retained for confirmation in the laboratory, subsequent to their initial analysis in the field.

Monitoring specific to this demonstration project, and which was intended to reflect any significant increase in airborne fiber concentrations as demonstrated by Transmission Electron Microscopy analysis, AHERA Analytical Protocol, was directed at passive background sampling and during dry hand removal sampling. This process was repeated for mastic removal. Additional samples were collected and analyzed by TEM in order to reflect the completeness of the project, i.e., periodic aggressive sampling and clean air sampling. Incidental to the project were other building floor tile remediation peripheral projects, i.e., Building 4387 and Building 4375. Additionally, automatic removal of floor tile was also accomplished. Complete data for each of the peripheral activities is included in this report, as accomplished by Phase Contrast Microscopy, however, all results reflect a minimal presence of airborne fiber concentrations due to floor tile removal.

Samples collected specifically to reflect elevations between passive background sampling and dry hand removal sampling, were located at breathing zone height and eighteen inches apart. A total of six samples and two blanks were collected during each activities, i.e., passive background and removal. Specific locations of the samples, by cells, are reflective within the associated drawings and summaries. Samples designed with the trailing Alpha Character "E", (inclusive of blanks), were analyzed by the US Environmental Protection Agency, at their laboratory located in Cincinnati, Ohio utilizing the AHERA Analytical Protocol. Samples designated with the trailing alpha character "N" (inclusive of blanks) were analyzed by Stanley Engineering, Inc./Alpha Analytical Laboratories, utilizing the AHERA Analytical Protocol for passive background samples, and, the NIOSH 7402

methodology for the removal samples. Samples analyzed by USEPA, utilizing the AHERA analytical protocol, were subjected to statistical tests, designed to reflect any significant increases in measured concentrations of airborne asbestos structures as defined within the AHERA Analytical Protocol.

NIOSH 7402 collection, preparation and analytical methodology, was applied to samples collected during dry hand removal in order to demonstrate the percent of asbestos structures compared to non-asbestos structures. Determined percentages are then applied to Phase Contrast Microscopy (NIOSH Method 7400) results, in order to differentiate asbestos/non-asbestos fibers.

Stanley Engineering provided air monitoring and industrial hygiene oversight during the length of the project. All air monitoring was conducted in compliance with sampling requirements made by Certified Industrial Hygienist, Dr. Keith L. Stanley.

Test results are provided for review and permanent records, within the content of this report.

CONCLUSIONS

A systematic review of all data reflects the following findings:

Phase Contrast Microscopy (PCM)

Samples were collected for Phase Contrast Microscopy throughout the duration of the project and within all areas of activity and occupancy. This methodology has been developed and utilized extensively for the purpose of identifying airborne asbestos and other fibers which may be associated with asbestos remediation projects. It is recognized that Phase Contrast Microscopy generally has, as a limited resolution, 0.25 microns. Therefore, the regulated fiber, identified in association with remediation projects, where PCM is utilized as a tool of analysis, is a fiber with an aspect ratio of at least 3:1, but having as a length, 5 microns or greater.

Analytical results from all PCM do not indicate the presence of airborne asbestos fibers. Stated alternatively, the regulated fiber as related to asbestos remediation, was noticeably absent from this floor tile remediation project, wherein dry hand removal was accomplished without the support of dilution air. A worst case was created and there was no indication of elevated concentrations of total fibers (asbestos or otherwise) as identified by Phase Contrast Microscopy. It should be pointed out that there was a significant presence of dust in association with all work related samples.

Transmission Electron Microscopy (NIOSH 7402 Analytical Protocol)

The NIOSH 7402 Analytical Protocol was established as a desirable method of analysis prior to the start of the project and for the purpose of identifying and quantifying asbestos related fibers as may be present during dry hand removal of floor tile. This technique presumes the presence of significant concentrations of airborne fibers as determined by Phase Contrast Microscopy (Method 7400).

This project utilized the NIOSH 7402 Analytical Protocol, on samples collected in paralleled with samples identified for analysis by the AHERA Analytical Protocol. Samples collected for analysis by this technique, were collected only during removal activities. Each sample was first counted by Phase Contrast Microscopy and subsequently by Transmission Electron Microscopy NIOSH 7402 Analytical Protocol.

This Transmission Electron Microscopy technique, has been established to confirm only those fibers identified by Phase Contrast Microscopy, therefore, even though the

confirmation is carried out, at magnifications of 10,000X, only those fibers meeting the "regulated fiber" criteria, i.e., limited resolution of 0.25 microns in diameter, at least a 3:1 aspect ratio, and equal to or greater than 5 microns in length. Since all Phase Contrast analytical results carried out by the NIOSH 7400 Analytical technique, were low in concentrations (fibers/cc), then also, confirming results, which establish a percentage of asbestos vs non-asbestos fibers, was also low.

Finally, analytical results as accomplished by TEM NIOSH 7402 Analytical Protocol, establish the presence of regulated fibers in association with floor tile removal, to be noticeably absent from all analytical results.

Transmission Electron Microscopy AHERA Analytical Protocol

The AHERA analytical Protocol was utilized extensively in association with this floor tile remediation project. Samples were collected and subjected to this analytical technique as follows:

Aggressive Pre-start Samples:

Passive Background Samples

During Hand Removal/Floor tile Samples

Clearance/Mastic Passive Background Samples

During Mastic Removal Samples

Building Clearance Samples

This analytical technique which is carried out at 20,000X, and is designed to reflect clean air within schools following asbestos remediation projects, was applied to this project in order to achieve greater sensitivity and recognition of structures (inclusive of fibers) below those identified as the "regulated structure". A structure is defined as a clump, matrix, cluster, fiber, bundle, etc., having a 5:1 aspect ratio and a length equal to or greater than 0.5 microns. The limit of diameter resolution is generally recognized to be 0.01 microns. This technique also affords the opportunity to apply a cut size in recognition of fibers (structures) meeting the definition of the regulated fiber, i.e., 5 microns in length and with a diameter of 0.25 microns (limit of resolution PCM).

One additional difference in preparation of Transmission Electron Microscopy samples is recognized and may impact analytical results. This difference is reflected in the absence of sample ashing within the NIOSH 7402 preparation technique, whereas the AHERA analytical protocol requires ashing. The significance of this difference is that "ashing" while it is utilized to uncover or reveal small fibers trapped with the filter pores, non-asbestos fibers would be removed in the process. Since the NIOSH 7402 analytical protocol, is a discriminating technique, designed to reveal the percent of asbestos and non asbestos fibers (structures), ashing is not accomplished within the preparation technique. As a result of this difference, minor differences in results as determined by the 7402 and AHERA analytical protocol, may exist.

Results as achieved by the AHERA analytical protocol reflect a significant difference between passive background levels and during work samples, both in floor tile and mastic removal. The significance of the presence of small unregulated asbestos structures at low concentrations (refer to individual data sheets) in association with this project, cannot be determined since they are below the identified "regulated fiber" in size. Beyond this, one other conclusion may be drawn, the presence of the small "unregulated structure (fiber)" would likely result in the failure of any given area to achieve compliance with the AHERA requirements as established for schools. Stated alternatively, the criteria for clean air as determined by the AHERA Analytical Protocol, would likely not be achieved, due to the presence of small asbestos structures.

This finding emphasizes the need for additional work to establish the significance of small asbestos type fibers as they may impact the public health. At present, there are no regulations which identify limitations in concentration of small asbestos fibers as may be identified by the AHERA analytical Protocol.

ABATEMENT ORDERS:

The project was executed through a series of Abatement Orders which dictated the procedures to be followed during the Tile or Mastic Removal and the Building and Cell in which the Abatement was to take place.

Abatement Orders for the project were as follows:

ABATEMENT	DATE	BLDG	CELL	ACTIVITY	PROCEDURE
1	7/25/90	1436	6	Tile	Dry hand removal
2	7/26/90	1436	4	Tile	Dry hand removal
3	7/27/90	1436	2	Tile	Wet hand removal
4	7/28/90	1436	5	Tile	Dry hand removal
5	7/29/90	1436	3	Tile	Dry hand removal
6	7/30/90	1436	1	Tile	Dry hand removal
7	7/31/90	1436	6	Mastic	Sand Machine
8	7/31/90	1436	3	Mastic	Citric Acid
9	8/1/90	1436	2	Mastic	Sand Machine
10	8/1/90	1436	5	Mastic	Sand Machine
11	8/2/90	1436	7	Tile	Wet Removal
12	8/2/90	1436	1	Mastic	Citric Acid/Towels
13	8/3/90	1436	4	Mastic	Sand Machine
13	8/3/90	1436	7	Mastic	Citric Acid/Towels
14	8/4/90	1436	All		Final Clearances
15	8/7/90	4387	1	Tile	Dry hand removal
16	8/7/90	4387	1	Sub Flr/Mastic	Dry hand removal
17	8/9/90	4387	2	Tile/Sub Flr/Mastic	Machine Dry
18	8/9/90	1436	All	Tile/Mastic	Machine Dry
19	8/9/90	4375		2 Layers Tile	Machine Dry
20	8/23/90	4387		Pick Up Tile	
21	8/23/90	4375		Pick Up Tile	
22	8/24/90	1436		Pick Up Tile	

SAMPLE COLLECTION: Location of TEM (AIIRA) & TEM (NOSH 7402)

AIR CONDITIONERS

LAB TRAILER

PARKING LOT

DECONTAMINATION ENTRANCE

SUPPLIES

SUPPLIES

BLDG. 1435

Neg. Air unit. Located but not used.

RESTROOM

RESTROOM

BLDG. 1436

CELL 7

CELL 1

CELL 2

CELL 3

CELL 4

CELL 5

CELL 6

waste loadout holding area

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MOP RAGS, WATER PAPER TOWELS, ETC

STRAIGHT HOSE

DEHUMIDIFIER

HEPA VACUUM

HEPA FILTER

OFFICE AREA
Tables
Large bin

SECTION A - TEM AIIRA & TEM 7402 sample locations.

SECTION A

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

T.E.M. ANALYSIS

NOTE: EPA LEVELS OBTAINED DURING THE REMOVAL INCLUDE FIBERS/STRUCTURES THAT ARE NOT REGULATED BY OSHA
FT.SILL DEMONSTRATION PROJECT- CELL 3 SUMMARY

T.E.M. ANALYSIS

PEL OSHA = 0.2 F/CC (8 HR. TWA)

FT.SILL DEMONSTRATION PROJECT- CELL 1 SUMMARY

FT. SILL FLOOR TILE

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

6

ABATEMENT METHOD:

Dry Method Floor Tile Removal. Workers used...

DATE OF WORK

7/25/90

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1	<0.0036	<0.0037	<0.0034	<0.0035	0.004	0.0657	<0.0027	<0.0030
2	<0.0036	0.011	<0.0034	<0.0034	0.0025	0.1266	<0.0026	<0.0033
3	<0.0037	<0.0037	<0.0034	<0.0035	0.0022	0.1376	<0.0027	0.003
4	<0.0032	<0.0033	NSD	NSD	1/100 PC	NSD	NSD	B/NSD
5	<0.0037	0.0093						
6	NSD	NSD						
7	NSD	NSD						
8	NSD	NSD						

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

FORT SILL DEMONSTRATION PROJECT		SUMMARY OF ANALYTICAL RESULTS		ELECTRON MICROSCOPY	
CELL NUMBER	4	DATE OF WORK			
ABATEMENT METHOD: Dry Method floor tile Removal. Workers used...					
LABORATORY AND SAMPLE TYPE					
#	SEI	EPA	AGGRESSIVE	SEI	EPA
1	<0.0045	<0.0046	0.0038	0.0933	<0.0035
2	<0.0047	<0.0050	0.0029	0.1451	<0.0036
3	<0.0048	<0.0049	0.0038	0.1378	<0.0034
4		NSD	NSD	NSD	NSD
5					
6					
7					
8					

NOTES:
1 Analyzed via N.I.O.S.H. 7402 Protocol.
2 Analyzed via A.H.E.R.A. Protocol.
All results reported in fibers or structures / cc.

COMMENTS:

T.E.M. ANALYSIS

PEL OSHA = 0.2 F/CC (8 HR. TWA)

FT.SILL DEMONSTRATION PROJECT- CELL 6 SUMMARY AHERA PROTOCOL

FT. SILL FLOOR TILE

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER	5	DATE OF WORK	7/28/90
ABATEMENT METHOD: Dry Method floor tile Removal. Workers used...			

LABORATORY AND SAMPLE TYPE							
#	SEI	EPA	AGGRESSIVE	SEI	EPA	BACKGROUND	SEI
1			<0.0031			<0.004	0.0007
2			0.0029			<0.0040	0.0028
3			<0.0031			0.0159	0.0004
4						NSD	NSD
5							
6							
7							
8							

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in fibers or structures / cc.

COMMENTS:

T.E.M. ANALYSIS

PEL OSHA = 0.2 F/CC (8 HR. TWA)

FT. SILL DEMONSTRATION PROJECT- CELL 4 SUMMARY

FT. SILL FLOOR TILE

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

3

DATE OF WORK

7/29/90

ABATEMENT METHOD:

Dry Method Floor Tile Removal. Tile was removed using straight hoes. Workers wore washable AB suits, gloves & rubber boots.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1	<0.0036	<0.0037	<0.0030	<0.004	0.0025	0.1905	<0.0038	<0.0042
2	<0.0038	<0.0039	<0.0030	<0.0041	0.0013	0.176	<0.0038	0.0042
3	<0.0036	0.0075	<0.0032	<0.0041	<0.0066	0.141	<0.0039	<0.0042
4	<0.0037	0.0047	NSD	NSD	NSD	NSD	NSD	NSD
5	<0.0041	<0.0037						
6	NSD	NSD						
7	NSD	NSD						
8	NSD	NSD						

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

T.E.M. ANALYSIS

PEL OSHA = 0.2 F/CC (8 HR. TWA)

FT.SILL DEMONSTRATION PROJECT- CELL 5 SUMMARY

FT. SILL FLOOR TILE

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER 1

DATE OF WORK 7/30/90

ABATEMENT METHOD: Dry Method floor tile Removal. Workers used...

LABORATORY AND SAMPLE TYPE							
#	SEI EPA	AGGRESSIVE	SEI EPA	BACKGROUND	SEI EPA	BACKGROUND	AGGRESSIVE
1	<0.0026		<0.0033	0.0009	0.143	<0.0034	0.014
2	<0.0026		<0.0029	0.0012	0.1377	<0.0033	<0.0045
3	<0.0025		<0.0029	0.0021	0.1101	<0.0035	0.009
4	NSD		NSD	NSD	NSD	NSD	NSD
5							
6							
7							
8							

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in fibers or structures / cc.

COMMENTS:

FT.SILL DEMONSTRATION PROJECT- CELL 3 SUMMARY

S T R E E T

61

LAB 61
TRAILER

CELL 6 Phase Contrast Sample
Results ☒ Floor Tile ☐ Mastic

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

000000

waste loadout
holding area

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER

HEPA VACUUM

HEPA FILTER

BLDG.
1434

BLDG.
1436
CELL 7

BLDG.
1435

Neg. Air
unit. Located
but not used.

9'11" 11'9"
CELL 1 3'7"

13'0" WX 26'1 X 8'4" H
CELL 2

13'8" WX 26'1 X 8'4" H
CELL 3

13'0" WX 26'1 X 8'4" H
CELL 4

13'6" WX 26'1 X 8'4" H
CELL 5

13'0" WX 26'1 X 8'4" H
CELL 6

OFFICE
AREA

Large fan

Tables

2" x 4" construction

Window

R E S T R O O M

R E S T R O O M

Abatement Order: 1/7-25-90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
CELL 6	BACKGROUND	1	0.032	0.015	0.024	NA
	PERSONNELS	2	<0.004	<0.018	<0.044	0.005
	INSIDE AREA	3	0.012	0.0025	0.007	NA
	OUTSIDE AREA	4	<0.005	<0.005	<0.005	NA
	OUTSIDE BLDG.	5	0.001	<0.005	0.006	NA
	CLEARANCE	6	<0.005	<0.005	<0.005	NA
	OTHER					

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date:

BLDG. 1436

By:
KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/25/90 Analyzed 7/30/90 Reported
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: KEITH L. STANLEY, Ph.D.

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

5

0.0081

385

SAMPLING CONDITIONS: Aggressive Background Samples Taken
 Prior to C6 Abatement.

DEFINITION OF TERMS:
 C6 and Leaf Blower.

Aggressive = HEPA Unit Operating Inside

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C601N	901204	0	9	10	1320	111.111111	0.03240741	0	0	BLDG 1436 - Cell 6 East
C602N	901205	0	4	10	1303.05	49.382716	0.01459065	0	0	BLDG 1436 - Cell 6 East Center
C603N	901206	0	5	10	1280.3	61.7283951	0.01856239	0	0	BLDG 1436 - Cell 6 Center
C604N	901207	0	12	10	1475.6	148.148148	0.03865345	0	0	BLDG 1436 - Cell 6 West Center
C605N	901208	0	8	10	1268.5	98.7654321	0.02997611	0	0	BLDG 1436 - Cell 6 West
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample numbers C6001E-C6005E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY:						TOTAL= 469.135802		0		
						MEAN = 93.8271605	0.026838	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	7/25/90 Analyzed	7/25/90 Reported
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505
Analyst: KEITH L. STANLEY, Ph.D

Grid Lot I.D.	
Number of Samples Counted:	3
Grid Open Area:(mm ²)	0.0081
Filter Area:(mm ²)	385

SAMPLING CONDITIONS: Blanks taken with C6 Aggressive Background Samples Prior to Abatement.

DEFINITION OF TERMS: Aggressive = HEPA Unit Operating Inside C6 and Leaf Blower.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
C606N	901209	0	0	10		0		0		Open & Closed at Beginning of Session
C607N	901210	0	0	10		0		0		Transportation Blank
C608N	901211	0	0	10		0		0		Open & Closed at End of Session
						0		0		
						0		0		
						0		0		NOTE: EPA also analyzed under
						0		0		Sample numbers C6006E-C6008E
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:					TOTAL =	0		0		
					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: G

Any single count > 53 structures per mm² is a failure.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/27/90 Analyzed 7/30/90 Reported
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: KEITH L. STANLEY, Ph.D.

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Passive Background Samples Prior To
 Abatement.

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	ATI Structures per mm ²	ATI Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C609N	901255	0	0	10	1395	0	0	0	0	BLDG 1436 - East Inside Containment
C610N	901256	0	0	10	1395	0	0	0	0	BLDG 1436 - Center Inside Containment
C611N	901257	0	0	10	1395	0	0	0	0	BLDG 1436 - West Inside Containment
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C6009E-C6011E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY:	ALL 0 COUNTS = NSF				TOTAL=	0		0		
					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

1
0.0081
385

PASSIVE =

NOTE: EPA also analyzed under
Sample Number C6012E

Any single count > 53 structures per mm² is a failure.

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

P.A.T. Participant

PHASE CONTRAST ANALYSIS

Blank I.D. C616H Microscope : Olympus

Fibers:	1 Field Area:	0.00785
---------	---------------	---------

Fields: 100 Filter Area: 385

Blank fiber count = 490,4459

DEFINITION OF TERMS:

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Client: TULSA CORPS OF ENGINEERS

Project: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 7/27/90 Analyzed

Date: 7/30/90 Reported:

SAMPLING CONDITIONS: Samples collected during

Aggressive (Dry) Floor Tile Removal Activity

(Hand Removal) ABATEMENT ORDER #1 Bldg 1436 Cell 6

[illegible]

COMMENTS:

ANALYST: KEITH L. STANLEY, Ph.D.

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS						Electron Microscope : HITACHI 600AB					
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK						Grid Lot I. D.:					
Date: 7/27/90 Analyzed 7/30/90 Reported						Number of Samples Counted: 3					
FAX #:						Grid Open Area (mm ²): 0.0081					
						Filter Area (mm ²): 385					
SAMPLING CONDITIONS: Samples collected during Aggressive (Dry) Floor Tile Removal Activity (Hand Removal) ABATEMENT ORDER #1						DEFINITION OF TERMS:					
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C613N	901259	0.01021	10	15	9	6	40	0.0040824	185.185185	74.0740741	BLDG 1436 - East in Cell 6
C614N	901260	0.00825	10	16	11	5	31.25	0.00257719	197.530864	61.7283951	BLDG 1436 - Center of Cell 6
C615N	901261	0.00479	10	15	8	7	46.6666667	0.00223673	185.185185	86.4197531	BLDG 1436 - West in Cell 6
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos. Percent (%) Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

Microscope : HITACHI 600AB

385

PASSIVE =

NOTE: EPA also analyzed under
Sample Numbers C6065E - C6067E

Mean Number of Asbestos Structures Per Cubic Centimeter:	0
--	---

FTSILL29.XLS

CELL ☒ Phase Contrast San. Results ☒ Floor Tile ☐ Mastic

AIR CONDITIONERS

Abatement Order: 2 - 7/26/90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
C	BACKGROUND	1	0.010	<0.005	0.005
E	PERSONNELS	2	0.031	0.022	0.025
L	INSIDE AREA	3	<0.005	<0.005	<0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
4	OUTSIDE BLDG.	5	0.01	0.007	0.005
	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Minimum of Full Face Dual Cartridge Respirator Utilized.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL

Scale: NONE

Date: BLDG. 1436

By: KIS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	7/27/90 Analyzed	7/30/90 Reported
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

Analyst: KEITH L. STANLEY, Ph.D.

SAMPLING CONDITIONS: Passive Background Samples Collected Prior to BLDG 1436 Cell 4 Abatement.

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C417N	901263	0	0	10	1056	0	0	0	0	BLDG 1436 - North East Cell 4
C418N	901264	0	0	10	1014.6	0	0	0	0	BLDG 1436 - North Center Cell 4.
C419N	901265	0	0	10	991.8	0	0	0	0	BLDG 1436 - North West Cell 4
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C4017E - C4019E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY:						0	0	0	0	
All 0 counts = NFD					TOTAL=	0	0	0	0	
NFD = No Fibers Detected					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER mm ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Mean Number of Asbestos Structures Per Cubic Centimeter:	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
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19	19
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87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:	TULSA CORPS OF ENGINEERS
Project:	FT. SILL ABATEMENT PROJECT
PPE:	DUAL CARTRIDGE - FULL FACE MASK
Date:	7/27/90 Analyzed 7/30/90 Reported
FAX Number:	

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Microscope : HITACHI 600AB

Grid Lot I.D.	
Number of Samples Counted:	1
Grid Open Area:(mm^2)	0.0081
Filter Area:(mm^2)	385

SAMPLING CONDITIONS: Blank Collected with Passive Background Samples Prior to BLDG 1436 Cell 4 Abatement.

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm^2		Asbestos Structures per mm^2		COMMENTS
C420N	901266	0	0	10		0		0		Collected in Cell 4 Prior to Abatement. NOTE: EPA also analyzed under Sample Number C4020E.
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:		All 0 counts = NFD			TOTAL=	0		0		
NFD = No Fibers Detected.					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

Any single count > 53 structures per mm² is a failure.

P.A.T. Participant
PHASE CONTRAST ANALYSIS

Blank fiber count #	0
DEFINITION OF TERMS:	

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

COMMENTS:	ANALYST: KEITH L. STANLEY, Ph.D.
<p>NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.</p>	

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT								Grid Lot I. D.:			
PPE: DUAL CARTRIDGE - FULL FACE MASK								Number of Samples Counted: 3			
Date: 7/27/90 Analyzed 7/30/90 Collected								Grid Open Area (mm ²): 0.0081			
FAX #:								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected during Dry hand removal of Floor Tile in Cell 4 BLDG 1436 - ABATEMENT ORDER #2.				DEFINITION OF TERMS:							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C421N	901267	0.00605	10	47	17	30	63.8297872	0.0038617	580.246914	370.37037	BLDG 1436-North East In Cell 4
C422N	901268	0.00528	10	20	9	11	55	0.002904	246.91358	135.802469	BLDG 1436 - North Center Cell 4
C423N	901269	0.00679	10	23	10	13	56.5217391	0.0038367	283.950617	160.493827	BLDG 1436 - North West Cell 4
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: KEITH L. STANLEY, Ph.D.					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%). Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/3/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

3

Grid Open Area:(mm²)

0.0081

Filter Area:(mm²)

385

SAMPLING CONDITIONS: Cell 4 Clearances After ABATEMENT
 ORDER #2. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 4 Mastic Abatement.

DEFINITION OF TERMS:
 test.

PASSIVE = No activity in cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C4125N	901485	0	1	10	1356	12.345679	0.00350523	0	0	NE Cell 4 - Clean Sample
C4126N	901486	0	1	10	1310.8	12.345679	0.0036261	0	0	N Center Cell 4 - Clean Sample
C4127N	901487	0	0	10	1378.6	0	0	0	0	NW Cell 4 - Some silicon dust present
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C4125E - C4127E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD					TOTAL=	24.691358		0		
NFD = No Fibers Detected					MEAN =	8.23045267	0.00237711	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Grid Lot I.D.
Number of Samples Counted:
Grid Open Area:(mm²)
Filter Area:(mm²)

1
0.0081
385

PASSIVE = No activity in cell during

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Any single count > 53 structures per mm² is a failure.

AIR CONDITIONERS

Abatement Order: 4 - 7/28/90

Unit	Sample Type	Loc.	Results		
			Max.	Min.	Avg. TWA B
C	BACKGROUND	1	0.006	<0.006	<0.006
E	PERSONNELS	2	<0.006	<0.006	<0.006
L	INSIDE AREA	3	<0.006	<0.006	<0.006
L	OUTSIDE AREA	4	<0.006	<0.006	<0.006
5	OUTSIDE BLDG.	5	0.01	0.01	0.01
	CLEARANCE	6	<0.006	<0.006	<0.006
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: 0.01 Results for outside the building were within the Clean Room of the decontamination unit and due to the use of paper towels for drying.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL

Scale: NONE

Date:

BLDG. 1436

By: KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:	TULSA CORPS OF ENGINEERS	NVLAP NUMBER - - 1568	Microscope : HITACHI 600AB
Project:	FT. SILL ABATEMENT PROJECT	2700 N.W. 39th Street	Grid Lot I.D.
PPE:	DUAL CARTRIDGE - FULL FACE MASK	Oklahoma City, OK 73112	Number of Samples Counted: 3
Date:	7/28/90 Collected 7/30/90 Analyzed	(405) 948-6505	Grid Open Area:(mm ²) 0.0081
FAX Number:		Analyst: JAMES R. GAYLOR	Filter Area:(mm ²) 385

SAMPLING CONDITIONS: Passive Background Samples Collected Prior to BLDG 1436 - Cell 5 Abatement.

DEFINITION OF TERMS: PASSIVE = HEPA vacuumed then Leaf Blower Used to Agitate Air. No activity for 30 Minutes before Samples Were Collected.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C533N	901331	0	0	10	1539.9	0	0	0	0	BLDG 1436 - Cell 5 East
C534N	901332	1	1	10	1586	12.345679	0.0029969	12.345679	0.0029969	BLDG 1436 - Cell 5 Center
C535N	901333	0	0	10	1522.2	0	0	0	0	BLDG 1436 - Cell 5 West
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C5033E - C5035E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 Counts = NFD					TOTAL=	12.345679		12.345679		
NFD = No Fibers Detected					MEAN =	4.11522634	0.00099897	4.11522634	0.00099897	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

4.11522634

Mean Number of Asbestos Structures Per Cubic Centimeter:

0.00099897

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:	3
Grid Open Area:(mm ²)	0.0081
Filter Area:(mm ²)	385

DEFINITION OF TERMS:

Blower Used to Agitate Air. No activity for 30 Minutes before Samples Were Collected.

NOTE: EPA also analyzed under
Sample Number C5036E

Mean Number of Asbestos Structures Per Square Millimeter:	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
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34	34
35	35
36	36
37	37
38	38
39	39
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69	69
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77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Any single count > 53 structures per mm² is a failure.

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

Client: TULSA CORPS OF ENGINEERS
Project: FT. STILL ABATEMENT PROJECT
PPE: DUAL CARTRIDGE - FULL FACE MASK
Date: 7/28/90 Collected
Date: 7/30/90 Analyzed
SAMPLING CONDITIONS: Samples collected
during Aggressive (Dry) Floor Tile Removal Activity
(Hand Removal) ABATEMENT ORDER #4 Bldg 1436 Cell 5

P.A.T. Participant PHASE CONTRAST ANALYSIS

Blank I.D.	C540N Microscope : Olympus	
Fibers:	0 Field Area:	0.00785
Fields:	100 Filter Area:	385

Blank fiber count #	0
DEFINITION OF TERMS:	

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

[illegible]

COMMENTS:

ANALYST: JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT								Grid Lot I. D.:			
PPE: DUAL CARTRIDGE - FULL FACE MASK								Number of Samples Counted: 3			
Date: 7/28/90 Collected 7/30/90 Analyzed								Grid Open Area (mm ²): 0.0081			
FAX #:								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected during Aggressive (Dry) Floor Tile Removal Activity (Hand Removal) ABATEMENT ORDER #4 Bldg 1436 Cell 5				DEFINITION OF TERMS:							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C537N	901327	0.00102	10	4	1	3	75	0.00076725	49.382716	37.037037	BLDG 1436 - East Cell 5
C538N	901328	0.00458	10	27	10	17	62.962963	0.00288307	333.333333	209.876543	BLDG 1436 - Center Cell 5
C539N	901329	0.00136	10	16	11	5	31.25	0.00042531	197.530864	61.7283951	BLDG 1436 - West Cell 5
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%) which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/1/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Cell 5 Clearances After ABATEMENT
 ORDER #4. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 5 Mastic Abatement.

DEFINITION OF TERMS: PASSIVE = No activity inside cell during
 passive test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C589N	901505	0	0	10	1417.5	0	0	0	0	BLDG 1436 - North East - Cell 5
C590N	901506	0	0	10	1372.5	0	0	0	0	BLDG 1436 - North Center - Cell 5
C591N	901507	0	0	10	1350	0	0	0	0	BLDG 1436 -North West - Cell 5
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C5089E - C5091E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD						TOTAL=	0	0	0	
NSD = No Structures Detected						MEAN =	0	0	0	0

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

FTSILL40.XLS

S T R E E T

CELL ☒ Phase Contrast Sample
Results ☒ Floor Tile ☐ Mastic

LAB
TRAILER

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

waste loadout
holding area

●●●●●●

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOSE

DEHUMIDIFIER A

HEPA VACUUM B

HEPA FILTER C

BLDG.
1434

BLDG.
1436
CELL 7

BLDG.
1435

Neg. Air
unit. Located
but not used.

CELL 1

CELL 2

CELL 3

CELL 4

CELL 5

CELL 6

RESTROOM

RESTROOM

OFFICE
AREA

Large
fan

Tables

win-
dow

2" x 4" construction

E. R.

SHOWER

RR

CLEAN ROOM MOVEMENT

AIR

CONDITIONERS

Abatement Order: 5 - 7/29/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
CELL 3	BACKGROUND	1	0.006	<0.005	<0.005	
	PERSONNELS	2	0.041	0.028	0.034	0.01
	INSIDE AREA	3	<0.005	<0.005	<0.005	
	OUTSIDE AREA	4	<0.005	<0.005	<0.005	
	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005	
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER					

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: DCFF (HEPA) Utilized by personnel.

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date:

BLDG. 1436

By:
KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/28/90 Collected 7/30/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

5

0.0081

385

SAMPLING CONDITIONS: Aggressive Background Samples
 Collected Before BLDG 1436 Cell 3 Abatement.

DEFINITION OF TERMS:
 test period. Each hour the air was stirred with a leaf blower for 5 minutes.

AGGRESSIVE = Negative air ran for entire
 test period. Each hour the air was stirred with a leaf blower for 5 minutes.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C345N	901315	0	1	12	1107.8	10.2880658	0.00357547	0	0	BLDG 1436- North East in Cell 3
C346N	901316	0	0	12	1045	0	0	0	0	BLDG 1436 - North East Center in Cell 3
C347N	901317	0	1	12	1115.1	10.2880658	0.00355206	0	0	BLDG 1436 - North Center in Cell 3
C348N	901318	0	1	12	1077.3	10.2880658	0.0036767	0	0	BLDG 1436 - North West Center in Cell 3
C349N	901319	0	2	10	1152.9	24.691358	0.00824544	0	0	BLDG 1436 - North West in Cell 3
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample numbers C3045E - C3049E
						0	0	0	0	
						0	0	0	0	
SUMMARY:					TOTAL =	55.555556		0		
					MEAN =	11.111111	0.00380993	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

Client: TULSA CORPS OF ENGINEERS

Project:	FT. SILL ABATEMENT PROJECT
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PPE:	DUAL CARTRIDGE - FULL FACE MASK
------	---------------------------------

Date:	7/28/90 Collected	7/30/90 Analyzed
-------	-------------------	------------------

FAX Number:

NVLAP NUMBER - - 1568

2700 N.W. 39th Street

Oklahoma City, OK 73112

• (405) 948-6505

Analyst: JAMES R. GAYLOR

SAMPLING CONDITIONS: Blanks collected with Aggressive Background Samples Prior to BLDG 1436 - Cell 3 Abatement.

DEFINITION OF TERMS:

test period. Each hour the air was stirred with a leaf blower for 5 minutes.

Client	Alpha	Asbestos	Total	Grid		All		Asbestos		COMMENTS
Sample Number	Lab Number	Structures Counted	Structures Counted	Openings Counted		Structures per mm^2		Structures per mm^2		
C350N	901320	0	0	10		0		0		Open and Closed at Beginning of Session
C351N	901321	0	0	10		0		0		Transportation Blank
C352N	901322	0	0	10		0		0		Open and Closed at End of Session
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:		All 0 Counts = NFD			TOTAL=	0		0		
NFD = No Fibers Detected					MEAN =	0		0		

ASBESTOS STRUCTURES PER m ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

Any single count > 53 structures per mm² is a failure.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/29/90 Collected 7/30/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Passive Background Samples collected
 Prior to BLDG 1436 - Cell 3 Abatement.

DEFINITION OF TERMS: PASSIVE = HEPA vacuumed then Leaf
 Blower Used to Agitate Air. Negative air ran for 15 minutes.
 No activity for 30 minutes before samples collected.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C353N	901323	0	0	10	1570.8	0	0	0	0	BLDG 1436 - East Cell 3
C354N	901324	0	2	10	1594.6	24.691358	0.00596148	0	0	BLDG 1436 - Central Cell 3
C355N	901325	0	0	10	1469.4	0	0	0	0	BLDG 1436 - West Cell 3
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C3041E - C3043E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
NOTE: Passive Background sample numbers inadvertently changed with Abatement Sample #s.						TOTAL= 24.691358		0		
						MEAN = 8.23045267	0.00198716	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm²)

0.0081

385

NVLAP NUMBER - - 1568

2700 N.W. 39th Street

Oklahoma City, OK 73112

(405) 948-6505

Analyst: JAMES R. GAYLOR

SAMPLING CONDITIONS: Blank collected with Passive Background
Samples Prior to BLDG 1436 - Cell 3 Abatement.

DEFINITION OF TERMS:

Blower Used to Agitate Air. Negative air ran for 15 minutes.

No activity for 30 minutes before samples collected.

NOTE: Passive Sample #s Inadvertently changed with Abatement Sample numbers.

Mean Number of Asbestos Structures Per Square Millimeter:	0
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Any single count > 53 structures per mm² is a failure.

P.A.T. Participant PHASE CONTRAST ANALYSIS

Blank fiber count # 0

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

[illegible]

ANALYST: KEITH L. STANLEY, Ph.D.

Certified Industrial Hygiene, Environmental Engineering, Laboratory Services

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS						Electron Microscope : HITACHI 600AB					
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK						Grid Lot I. D.:					
Date: 7/29/90 Collected 7/31/90 Analyzed						Number of Samples Counted: 3					
FAX #:						Grid Open Area (mm ²): 0.0081					
2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505						Filter Area (mm ²): 385					
SAMPLING CONDITIONS: Samples collected during Aggressive (Dry) Floor Tile Removal Activity (Hand Removal) ABATEMENT ORDER # 5 BLDG 1436 Cell 3						DEFINITION OF TERMS: Aggressive = Tile removed with straight hoes.					
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C341N	901311	0.00552	10	11	6	5	45.4545455	0.00251045	135.802469	61.7283951	BLDG 1436 - East Cell 3
C342N	901312	0.00337	10	10	6	4	40	0.001348	123.45679	49.382716	BLDG 1436 - Center Cell 3
C343N	901313	0.00663	10	0	0	0	0	0	0	0	BLDG 1436 - West Cell 3
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated . Cell 3 Passive Background and Abatement Sample Numbers were inadvertently changed.											(Signature)
COMMENTS:						ANALYST: KEITH L. STANLEY					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos. Percent (%) Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Microscope : HITACHI 600AB

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/31/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Cell 3 Clearances After ABATEMENT
 ORDER #5. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 3 Mastic Abatement.

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C373N	901529	0	0	10	1247.4	0	0	0	0	NE Cell 3 Very low particulate loading.
C374N	901530	0	0	11	1134	0	0	0	0	BLDG 1436 - North Center Cell 3
C375N	901531	0	0	11	1109.2	0	0	0	0	BLDG 1436 - North West Cell 3
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C3073E - C3075E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD					TOTAL=	0	0	0	0	
NSD = No Structures Detected					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	7/31/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Grid Lot I.D.	
Number of Samples Counted:	1
Grid Open Area:(mm^2)	0.0081
Filter Area:(mm^2)	385

SAMPLING CONDITIONS: Blank collected with Clearances of Cell 3 after ABATEMENT ORDER #5. Sample also serves as Blank with Passive Background Samples Prior to Bldg 1436 - Cell 3 Mastic Abatement.

DEFINITION OF TERMS

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
C376N	901532	0	0	11		0		0		All 0 counts = NSD
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		NOTE: EPA also analyzed under
						0		0		Sample Number C3076E
						0		0		
						0		0		
						0		0		
SUMMARY:	All 0 counts = NSD				TOTAL=	0		0		
NSD= No Structures Detected					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:	0
---	---

Any single count > 53 structures per mm² is a failure.

CELL ☐ Phase Contrast ☒ Mastic
Results ☒ Floor Tile ☐

AIR CONDITIONERS

LAB
TRAILER

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

Abatement Order: 6 - 7/30/90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
C	BACKGROUND	1	<0.005	<0.005	<0.005
E	PERSONNELS	2	0.048	0.019	0.033
L	INSIDE AREA	3	<0.005	<0.005	<0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
1	OUTSIDE BLDG.	5	0.006	0.006	0.006
	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: FFDC (HEPA) PPE UTILIZED.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

A.H.E.R.A. Analytical Protocol (Blank Test)

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Grid Lot I.D.

1

0.0081

385

DEFINITION OF TERMS:

PASSIVE =

NOTE: EPA also analyzed under
Sample Number C1060E

Mean Number of Asbestos Structures Per Square Millimeter: 0

Any single count > 53 structures per mm² is a failure.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/30/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB
 Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Passive Background Samples Collected
 Prior to BLDG 1436 - Cell 1 Abatement.

DEFINITION OF TERMS: PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C157N	901545	0	0	10	1812	0	0	0	0	BLDG 1436 - North East Cell 1
C158N	901546	0	0	10	1812	0	0	0	0	BLDG 1436 - North Center Cell 1
C159N	901547	0	0	10	1878.6	0	0	0	0	BLDG 1436 - North West Cell 1
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C1057E - C1059E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD						TOTAL = 0	0	0	0	
NFD = No Fibers Detected						MEAN = 0	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

P.A.T. Participant PHASE CONTRAST ANALYSIS

Client: TULSA CORPS OF ENGINEERS

Project: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 7/30/90 Collected

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples Collected During
Aggressive (Dry) Hand Removal of Floor Tile in Cell 1
ABATEMENT ORDER # 6 - BLDG 1436 Cell 1

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Blank I.D. C161N Microscope : Olympus

Fibers:	0 Field Area:	0.00785
---------	---------------	---------

Fields: 100 Filter Area: 385

Blank fiber count = 0

DEFINITION OF TERMS:

[illegible]

NOTE: C161N and C164N (Blank) were inadvertently switched.

Report reflects corrected listings.

ANALYST: JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS						Electron Microscope : HITACHI 600AB					
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK						2700 N. W. 39th Street					
Date: 7/30/90 Collected 8/6/90 Analyzed						Oklahoma City, OK 73112					
FAX #:						(405) 948-6505					
SAMPLING CONDITIONS: Samples collected during Aggressive (Dry) Hand Removal of Floor Tile ABATEMENT ORDER # 6 - BLDG 1436 Cell 1						DEFINITION OF TERMS: AGGRESSIVE =					
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C162N	901550	0.00180	10	19	9	10	52.6315789	0.00094684	234.567901	123.45679	BLDG 1436 - Cell 1 Central
C163N	901551	0.00290	10	9	5	4	44.4444444	0.00129067	111.111111	49.382716	BLDG 1436 - Cell 1 West
C164N	901552	0.00327	10	9	3	6	66.6666667	0.002178	111.111111	74.0740741	BLDG 1436 - Cell 1 East
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated . C161N and C164N (Blank) were inadvertently switched. Report reflects corrected listings.											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%), Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/2/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB
 Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Cell 1 Clearances After ABATEMENT
 ORDER #6. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 1 Mastic Abatement.

DEFINITION OF TERMS: PASSIVE = No activity in cell during test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C1105N	901517	0	0	10	1398	0	0	0	0	Bldg 1436 - East Cell 1
C1106N	901518	0	1	10	1421.3	12.345679	0.00334418	0	0	Bldg 1436 - Center Cell 1
C1107N	901519	0	0	10	1363	0	0	0	0	Bldg 1436 - West Cell 1
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C1105E - C1107E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD						TOTAL= 12.345679		0		
NFD = No Fibers Detected						MEAN = 4.11522634	0.00111473	0	0	

ASBESTOS STRUCTURES PER mm ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Mean Number of Asbestos Structures Per Cubic Centimeter: 0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/2/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area: (mm²)

Filter Area:(mm^2)

1

0.0081

385

SAMPLING CONDITIONS: Blank collected with Clearances of Cell 1 after ABATEMENT ORDER #6. Sample also serves as Blank with Passive Background Samples Prior to Bldg 1436 - Cell 1 Mastic Abatement.

DEFINITION OF TERMS:

PASSIVE = No activity in cell during test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm^2		Asbestos Structures per mm^2		COMMENTS
C1108N	901520	0	0	10		0		0		All 0 counts=NFD (No Fibers Detected)
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:	All 0 counts = NFD				TOTAL=	0		0		
NFD = No Fibers Detected.					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Any single count > 53 structures per mm² is a failure.

FORT SILL DEMONSTRATION PROJECT								
SUMMARY OF ANALYTICAL RESULTS								
ELECTRON MICROSCOPY								
CELL NUMBER	6	ABATEMENT METHOD: Mastic Removal using Sand Machine with Wet Masonry Sand.						
DATE OF WORK	7/31/90							
LABORATORY AND SAMPLE TYPE								
#	SEI AGGRESSIVE	EPA AGGRESSIVE	SEI BACKGROUND	EPA BACKGROUND	SEI (See Note 1) REMOVAL	EPA (See Note 2) REMOVAL	SEI CLEARANCE	EPA CLEARANCE
1			<0.0027	<0.0030		0.0512		
2			<0.0026	<0.0033	0.0002	0.0437		
3			<0.0027	0.003		0.0675		
4			NSD	NSD		NSD		
5								
6								
7								
8								
NOTES: 1 Analyzed via N.I.O.S.H. 7402 Protocol. 2 Analyzed via A.H.E.R.A. Protocol. All results reported in Fibers or Structures / cc.								
COMMENTS:								

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

5

DATE OF WORK

8/1/90

ABATEMENT METHOD:

Mastic removed using grinding machine with stones on it. Sand was put on floor and water applied to it.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1	<0.0034	<0.0046	<0.0034	0.0044	0.0005	0.1887		
2	<0.0034	0.0135	<0.0035	<0.0045	0.0003	0.2213		
3	<0.0038	0.0046	<0.0035	<0.0035	0.0005	0.258		
4	<0.0033	0.0133	NSD	NSD	4/100 PC	NSD		
5	0.0034	0.009						
6	NSD	NSD						
7	NSD	NSD						
8	NSD	NSD						

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

2

DATE OF WORK

8/1/90

ABATEMENT METHOD:

Mastic was removed using grinding machine with stones on it. Sand was put on floor, then water applied to it.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1			<0.0038	0.009	<0.0003	0.0849		
2			<0.0036	0.0488	0.0003	0.1105		
3			<0.0037	0.0092	<0.0001	0.1138		
4			NSD	NSD	NSD	NSD		
5								
6								
7								
8								

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

4

ABATEMENT METHOD:

Mastic removed using Sand.

DATE OF WORK

8/3/90

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1			<0.0035	0.0046	0.0094	1.1519		
2			<0.0036	<0.0045	0.0102	0.6935		
3			<0.0034	0.0045	0.004	0.9288		
4			NSD	NSD	NSD	NSD		
5								
6								
7								
8								

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

A.H.E.R.A. Analytical Protocol (Blank Test)

1
0081
385

Analyst: JAMES R. GAYLOR

PASSIVE =

Any single count > 53 structures per mm² is a failure.

STANLEY ENGINEERING, INC. ENVIRONMENTAL MEASUREMENTS

		TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)									
		N.I.O.S.H. 7402 METHOD		N.V.L.A.P. -1568							
Client: TULSA CORPS OF ENGINEERS		2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505		Electron Microscope : HITACHI 600AB							
Project: FT. SILL ABATEMENT PROJECT				Grid Lot I. D.:							
PPE: DUAL CARTRIDGE - FULL FACE MASK				Number of Samples Counted: 3							
Date: 7/31/90 Collected 8/6/90 Analyzed				Grid Open Area (mm ²): 0.0081							
FAX #:				Filter Area (mm ²): 385							
SAMPLING CONDITIONS: Samples collected during Aggressive Removal of Tile Mastic in Cell 6 ABATEMENT ORDER #7 - BLDG 1436 Cell 6		DEFINITION OF TERMS: Mastic removed by Sand Machine using Wet Masonry Sand.									
A N A L Y T I C A L R E S U L T S											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C669N	901541	0.00021	10	0	0	0	0	0	0	0	REPREP - C6 East
C670N	901542	0.00062	10	13	8	5	38.4615385	0.00023692	160.493827	61.7283951	BLDG 1436 - Cell 6 Center
C671N	901543	0.00022	10	0	0	0	0	0	0	0	OVERLOADED - C6 West
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%) which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	7/31/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

Analyst: JAMES R. GAYLOR

SAMPLING CONDITIONS: Cell 6 Clearances After ABATEMENT
ORDER #1. Samples also serve as Passive Background Samples
Collected Prior to BLDG 1436 - Cell 6 Mastic Abatement

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C665N	901493	0	0	10	1782	0	0	0	0	BLDG 1436 - Cell 6 East
C666N	901494	0	0	10	1812	0	0	0	0	BLDG 1436 - Cell 6 Center
C667N	901495	0	0	10	1752	0	0	0	0	BLDG 1436 - Cell 6 West
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C6065E - C6067E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY:					All 0 counts = NFD		0	0	0	
NFD = No Fibers Detected					TOTAL =		0	0	0	0
					MEAN =		0	0	0	0

ASBESTOS STRUCTURES PER m ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter	Count
0	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1
34	1
35	1
36	1
37	1
38	1
39	1
40	1
41	1
42	1
43	1
44	1
45	1
46	1
47	1
48	1
49	1
50	1
51	1
52	1
53	1
54	1
55	1
56	1
57	1
58	1
59	1
60	1
61	1
62	1
63	1
64	1
65	1
66	1
67	1
68	1
69	1
70	1
71	1
72	1
73	1
74	1
75	1
76	1
77	1
78	1
79	1
80	1
81	1
82	1
83	1
84	1
85	1
86	1
87	1
88	1
89	1
90	1
91	1
92	1
93	1
94	1
95	1
96	1
97	1
98	1
99	1
100	1
101	1
102	1
103	1
104	1
105	1
106	1
107	1
108	1
109	1
110	1
111	1
112	1
113	1
114	1
115	1
116	1
117	1
118	1
119	1
120	1
121	1
122	1
123	1
124	1
125	1
126	1
127	1
128	1
129	1
130	1
131	1
132	1
133	1
134	1
135	1
136	1
137	1
138	1
139	1
140	1
141	1
142	1
143	1
144	1
145	1
146	1
147	1
148	1
149	1
150	1
151	1
152	1
153	1
154	1
155	1
156	1
157	1
158	1
159	1
160	1
161	1
162	1
163	1
164	1
165	1
166	1
167	1
168	1
169	1
170	1
171	1
172	1
173	1
174	1
175	1
176	1
177	1
178	1
179	1
180	1

Mean Number of Asbestos Structures Per Cubic Centimeter	
0-1	1
2-3	2
4-5	3
6-7	4
8-9	5
10-11	6
12-13	7
14-15	8
16-17	9
18-19	10
20-21	11
22-23	12
24-25	13
26-27	14
28-29	15
30-31	16
32-33	17
34-35	18
36-37	19
38-39	20
40-41	21
42-43	22
44-45	23
46-47	24
48-49	25
50-51	26
52-53	27
54-55	28
56-57	29
58-59	30
60-61	31
62-63	32
64-65	33
66-67	34
68-69	35
70-71	36
72-73	37
74-75	38
76-77	39
78-79	40
80-81	41
82-83	42
84-85	43
86-87	44
88-89	45
90-91	46
92-93	47
94-95	48
96-97	49
98-99	50
100-101	51
102-103	52
104-105	53
106-107	54
108-109	55
110-111	56
112-113	57
114-115	58
116-117	59
118-119	60
120-121	61
122-123	62
124-125	63
126-127	64
128-129	65
130-131	66
132-133	67
134-135	68
136-137	69
138-139	70
140-141	71
142-143	72
144-145	73
146-147	74
148-149	75
150-151	76
152-153	77
154-155	78
156-157	79
158-159	80
160-161	81
162-163	82
164-165	83
166-167	84
168-169	85
170-171	86
172-173	87
174-175	88
176-177	89
178-179	90
180-181	91
182-183	92
184-185	93
186-187	94
188-189	95
190-191	96
192-193	97
194-195	98
196-197	99
198-199	100
200-201	101
202-203	102
204-205	103
206-207	104
208-209	105
210-211	106
212-213	107
214-215	108
216-217	109
218-219	110
220-221	111
222-223	112
224-225	113
226-227	114
228-229	115
230-231	116
232-233	117
234-235	118
236-237	119
238-239	120
240-241	121
242-243	122
244-245	123
246-247	124
248-249	125
250-251	126
252-253	127
254-255	128
256-257	129
258-259	130
260-261	131
262-263	132
264-265	133
266-267	134
268-269	135
270-271	136
272-273	137
274-275	138
276-277	139
278-279	140
280-281	141
282-283	142
284-285	143
286-287	144
288-289	145
290-291	146
292-293	147
2	

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

P.A.T. Participant PHASE CONTRAST ANALYSIS

Blank I.D.	C672N Microscope :	Olympus
Fibers:	0 Field Area:	0.00785
Fields:	100 Filter Area:	385

Blank fiber count = 0

DEFINITION OF TERMS: AGGRESSIVE =
Mastic removed by Sand Machine using
Wet Masonry Sand.

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Client: TULSA CORPS OF ENGINEERS

Project: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 7/31/90 Collected

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples collected during

Aggressive Removal of Tile Mastic in Cell 6

ABATEMENT ORDER # 7 - BLDG 1436 Cell 6

[illegible]

COMMENTS:

ANALYST: JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

CELL 5 Phase Contrast Sa. ple
Results ☐ Floor Tile ☒ Mastic

Abatement Order: 10 - 8/01/90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
C	BACKGROUND	1	<0.005	<0.005	<0.005
E	PERSONNELS	2	<0.005	<0.005	<0.005
L	INSIDE AREA	3	<0.005	<0.005	<0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
5	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005
m	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: FFDC (HEPA) Utilized by Personnel.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/1/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

3

0.0081

385

SAMPLING CONDITIONS: Cell 5 Clearances After ABATEMENT
ORDER #4. Samples also serve as Passive Background Samples
Collected Prior to Bldg 1436 - Cell 5 Mastic Abatement.

DEFINITION OF TERMS:
passive test.

PASSIVE = No activity inside cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	ATP Volume (Liters)	All Structures per m ²	All Structures per cc	Asbestos Structures per m ²	Asbestos Structures per cc	COMMENTS
C589N	901505	0	0	10	1417.5	0	0	0	0	BLDG 1436 - North East - Cell 5
C590N	901506	0	0	10	1372.5	0	0	0	0	BLDG 1436 - North Center - Cell 5
C591N	901507	0	0	10	1350	0	0	0	0	BLDG 1436 -North West - Cell 5
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C5089E - C5091E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD					TOTAL=	0	0	0	0	
NSD = No Structures Detected					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER m ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Mean Number of Asbestos Structures Per Cubic Centimeter:	0
--	---

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

0.0081

385

DEFINITION OF TERMS:
Passive Test.

PASSIVE = No activity inside Cell during

SUMMARY: All 0 counts = NSD
NSD = No Structures Detected

Mean Number of Asbestos Structures Per Square Millimeter:	0
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Any single count > 53 structures per mm² is a failure.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Microscope : HITACHI 600AB

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/1/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.
 Number of Samples Counted: 5
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Aggressive Background Samples
 Collected in Cell 5 Prior to Abatement.

DEFINITION OF TERMS:

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C581N	901533	0	3	11	1252.8	33.6700337	0.01034719	0	0	North East in Cell 5
C582N	901534	0	0	11	1274.4	0	0	0	0	North East Center in Cell 5
C583N	901535	0	0	10	1252.8	0	0	0	0	North Center Cell 5
C584N	901536	0	0	11	1317.6	0	0	0	0	North West Center in Cell 5.
C585N	901537	1	2	11	1274.4	22.4466891	0.00678121	11.2233446	0.00339061	North West in Cell 5
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed
						0	0	0	0	Sample Numbers C5081E - C5085E
						0	0	0	0	
SUMMARY:					TOTAL=	56.1167228		11.2233446		
					MEAN =	11.2233446	0.00342568	2.24466891	0.00067812	

ASBESTOS STRUCTURES PER mm ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:	2.24466891
Mean Number of Asbestos Structures Per Cubic Centimeter:	0.00067812

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

STANLEY ENGINEERING, INC. ENVIRONMENTAL MEASUREMENTS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/1/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Grid Lot I.D.	
Number of Samples Counted:	3
Grid Open Area:(mm ²)	0.0081
Filter Area:(mm ²)	385

Analyst:

SAMPLING CONDITIONS: Blanks collected with Aggressive Background Samples in Cell 5 Prior to Abatement.

DEFINITION OF TERMS:

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
C586N	901538			10		0		0		Open & Closed at Beginning of Session
C587N	901539			10		0		0		Transportation Blank
C588N	901540			10		0		0		Open & Closed at End of Session
						0		0		
						0		0		
						0		0		
						0		0		NOTE: EPA also analyzed under
						0		0		Sample Numbers C5086E - C5088E
						0		0		
						0		0		
						0		0		
SUMMARY:					TOTAL=	0		0		
					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Any single count > 53 structures per mm² is a failure.

STANLEY ENGINEERING, INC. ENVIRONMENTAL MEASUREMENTS

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

P.A.T. Participant

PHASE CONTRAST ANALYSIS

Blank I-D. C5104H Microscope : Olympus

Fiber#:	4 Field Area:	Q.00785
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Fields: 100 Filter Area: 389

Blank fiber count # 1961.783

DEFINITION OF TERMS: Mastic removed using grinding machine with stones on it.

Sand was put on floor and water applied to it.

Client: TULSA CORPS OF ENGINEERS

PROJECT: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 8/1/90 Collected

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples collected during

Mastic Abatement of Bldg 1436 - Cell 5.

ABATEMENT ORDER # 10

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

[illegible]

COMMENTS:

ANALYST:

JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK								Grid Lot I. D.:			
Date: 8/1/90 Collected 8/6/90 Analyzed								Number of Samples Counted: 3			
FAX #:								Grid Open Area (mm ²): 0.0081			
								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected during Mastic Abatement of Bldg 1436 - Cell 5. ABATEMENT ORDER #10.				DEFINITION OF TERMS: Mastic removed using grinding machine with stones. Sand and water put on floor.							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C5101N	901513	0.00060	10	6	1	5	83.3333333	0.00050333	74.0740741	61.7283951	North East Cell 5
C5102N	901514	0.00030	10	10	0	10	100	0.000297	123.45679	123.45679	North Center Cell 5
C5103N	901515	0.00063	10	5	1	4	80	0.0005008	61.7283951	49.382716	North West Cell 5
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%) which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

AIR CONDITIONERS

waste loadout holding area

Abatement Order: 9 8-1-90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
C	BACKGROUND	1	<0.005	<0.005	<0.005
E	PERSONNELS	2	<0.005	<0.005	<0.005
L	INSIDE AREA	3	<0.005	<0.005	<0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005
	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

MINIMUM OF FULL FACE DUAL CARTRIDGE RESPIRATORS USED CELLS 2 AND 5 WERE ABATED AT THE SAME TIME

Stanley Engineering, Inc. - OKC/Tulsa		
Location:	Scale: NONE	
FT. SILL		
Date:	BLDG. 1436	By: KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/1/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Cell 2 Clearances After ABATEMENT
 order #3. Samples also serve as Passive Background Samples
 Collected Prior to BLDG 1436 - Cell 2 Mastic Abatement.

DEFINITION OF TERMS:
 inside cell during passive test.

PASSIVE = No activity

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C293N	901501	0	0	10	1236.25	0	0	0	0	NE Cell 2 - All 0 counts = NSD
C294N	901502	0	0	10	1311.5	0	0	0	0	N Center Cell 2 - All 0 counts =NSD
C295N	901503	0	0	10	1290	0	0	0	0	NW Cell 2 - All 0 counts = NSD
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	Note: EPA also analyzed under
						0	0	0	0	Sample Numbers C2093E - C2095E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD						TOTAL=	0	0	0	
NSD = No Structures Detected						MEAN =	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/1/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area: (mm²)

Filter Area:(mm²)

1
0.0081
385

SAMPLING CONDITIONS: Blank collected with Clearances of Cell 2 after ABATEMENT ORDER #3. Sample also serves as Blank with Passive Background Samples Prior to BLDG 1436 - Cell 2 Mastic Abatement.

DEFINITION OF TERMS:
inside cell during passive test.

PASSIVE = No activity

Client	Alpha	Asbestos	Total	Grid		All		Asbestos		COMMENTS
Sample	Lab	Structures	Structures	Openings		Structures		Structures		
Number	Number	Counted	Counted	Counted		per mm^2		per mm^2		
C296N	901504	0	0	10		0		0		All 0 counts=NSD (No Structures Detected)
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:		All 0 counts = NSD		TOTAL=		0	0			
NSD = No Structures Detected				MEAN =		0	0			

ASBESTOS STRUCTURES PER m ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:	0
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Any single count > 53 structures per mm² is a failure.

[illegible]

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE, FULL FACE MASK								Grid Lot I. D.:			
Date: 8/1/90 Collected 8/6/90 Analyzed								Number of Samples Counted: 3			
FAX #:								Grid Open Area (mm ²): 0.0081			
								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected during Mastic Abatement in Bldg 1436, Cell 2. ABATEMENT ORDER #9.				DEFINITION OF TERMS: Mastic was removed by using grinding machine with stones on it. Sand & water on floor.							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C297N	901509	0.00000	10	4	0	4	100	0	49.382716	49.382716	North East in Cell 2
C298N	901510	0.00026	10	1	0	1	100	0.000263	12.345679	12.345679	North Center in Cell 2
C299N	901511	0.00000	10	2	1	1	50	0	24.691358	12.345679	North West in Cell 2
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them Into Asbestos/Non Asbestos. Percent (%) which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

CELL ☒ Phase Contrast ☐ Triple
Results ☐ Floor Tile ☒ Mastic

AIR CONDITIONERS

Abatement Order: 13 - 08/03/90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg.
C	BACKGROUND	1	<0.005	<0.005	TWA 8
E	PERSONNELS	2	<0.13	<0.02	<0.005
L	INSIDE AREA	3	0.01	<0.005	0.007
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
4	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005
M	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: FFDC (HEPA) Were used by personnel.

Cell 7 and 4 were accomplished together - Personnel represent both.

Stanley Engineering, Inc. - OKC/Tulsa

Location:

FT. SILL

Date:

BLDG. 1436

By: KIS

Scale: NONE

LAB TRAILER

waste loadout holding area

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:		TULSA CORPS OF ENGINEERS		NVLAP NUMBER - - 1568		Microscope : HITACHI 600AB				
Project:		FT. SILL ABATEMENT PROJECT		2700 N.W. 39th Street		Grid Lot I.D.				
PPE:		DUAL CARTRIDGE - FULL FACE MASK		Oklahoma City, OK 73112		Number of Samples Counted: 3				
Date:		8/3/90 Collected 8/6/90 Analyzed		(405) 948-6505		Grid Open Area:(mm ²) 0.0081				
FAX Number:				Analyst: JAMES R. GAYLOR		Filter Area:(mm ²) 385				
SAMPLING CONDITIONS: Cell 4 Clearances After ABATEMENT ORDER #2. Samples also serve as Passive Background Samples Collected Prior to Bldg 1436 - Cell 4 Mastic Abatement.				DEFINITION OF TERMS: PASSIVE = No activity in cell during test.						
Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C4125N	901485	0	1	10	1356	12.345679	0.00350523	0	0	NE Cell 4 - Clean Sample
C4126N	901486	0	1	10	1310.8	12.345679	0.0036261	0	0	N Center Cell 4 - Clean Sample
C4127N	901487	0	0	10	1378.6	0	0	0	0	NW Cell 4 - Some silicon dust present
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD						TOTAL = 24.691358		0		
NFD = No Fibers Detected						MEAN = 8.23045267		0.00237711		0
ASBESTOS STRUCTURES PER mm ²						Mean Number of Asbestos Structures Per Square Millimeter: 0				
Mean <= 70						Mean >70				
PASS						FAIL				
						Mean Number of Asbestos Structures Per Cubic Centimeter: 0				
Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.										

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Microscope : HITACHI 600AB

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/3/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR

Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Cell 4 Clearances After ABATEMENT
 ORDER #2. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 4 Mastic Abatement.

DEFINITION OF TERMS:
 test.

PASSIVE = No activity in cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C4125N	901485	0	1	10	1356	12.345679	0.00350523	0	0	NE Cell 4 - Clean Sample
C4126N	901486	0	1	10	1310.8	12.345679	0.0036261	0	0	ON Center Cell 4 - Clean Sample
C4127N	901487	0	0	10	1378.6	0	0	0	0	ONW Cell 4 - Some silicon dust present
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C4125E - C4127E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD					TOTAL=	24.691358		0		
NFD = No Fibers Detected					MEAN =	8.23045267	0.00237711	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Grid Lot I.D.

11

0.0081

385

Analyst: JAMES R. GAYLOR

DEFINITION OF TERMS:

test.

NOTE: EPA also analyzed under
Sample Number C4128E

Mean Number of Asbestos Structures Per Square Millimeter:	0
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Any single count > 53 structures per mm² is a failure.

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

P.A.T. Participant

PHASE CONTRAST ANALYSIS

Blank I.D. C4136N Microscope : Olympus

Fibers:	0 Field Area:	0.00785
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Fields: 100 Filter Area: 385

Blank fiber count # 0

DEFINITION OF TERMS: Mastic removed using Sand.

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Client: TULSA CORPS OF ENGINEERS

Project: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 8/3/90 Collected

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples collected during

Mastic Abatement of Bldg 1436 Cell 4.

ABATEMENT ORDER #13.

[illegible]

COMMENTS:

ANALYST:

JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD	N.V.L.A.P. -1568										
Client: TULSA CORPS OF ENGINEERS	2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505										
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK											
Date: 8/3/90 Collected 8/6/90 Analyzed											
FAX #:											
Electron Microscope : HITACHI 600AB											
Grid Lot I. D.:											
Number of Samples Counted: 3											
Grid Open Area (mm ²): 0.0081											
Filter Area (mm ²): 385											
SAMPLING CONDITIONS: Samples collected during Mastic Abatement of Bldg 1436 Cell 4. ABATEMENT ORDER #13.											
DEFINITION OF TERMS: Mastic removed using Sand.											
A N A L Y T I C A L R E S U L T S											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C4133N	901481	0.01006	10	15	1	14	93.3333333	0.00938933	185.185185	172.839506	North East Cell 4
C4134N	901482	0.01460	10	10	3	7	70	0.0102165	123.45679	86.4197531	North Center Cell 4
C4135N	901483	0.00406	10	5	0	5	100	0.004056	61.7283951	61.7283951	North West Cell 4
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											
COMMENTS: ANALYST: JAMES GAYLOR (Signature)											
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%) Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

STANLEY ENGINEERING, INC. ENVIRONMENTAL MEASUREMENTS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6905				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT								Grid Lot I. D.:			
PPE: DUAL CARTRIDGE - FULL FACE MASK								Number of Samples Counted: 3			
Date: 8/3/90 Collected 8/6/90 Analyzed								Grid Open Area (mm ²): 0.0081			
FAX #:								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected during Mastic Abatement of Bldg 1436 Cell 4. ABATEMENT ORDER #13.				DEFINITION OF TERMS: Mastic removed using Sand.							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C4133N	901481	0.01006	10	15	1	14	93.3333333	0.00938933	185.185185	172.839506	North East Cell 4
C4134N	901482	0.01460	10	10	3	7	70	0.0102165	123.45679	86.4197531	North Center Cell 4
C4135N	901483	0.00406	10	5	0	5	100	0.004056	61.7283951	61.7283951	North West Cell 4
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%), Which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

2

DATE OF WORK

7/27/90

ABATEMENT METHOD:

Samples collected During Floor Tile Removal

Activity Under Mist (Wet) Conditions.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1			<0.0033	<0.0041	<0.0003	0.0817	<0.0038	0.009
2			0.0034	0.0042	0.0011	0.0342	<0.0036	0.0488
3			<0.0033	<0.0043	<0.0002	0.0847	<0.0037	0.0092
4			NSD	NSD	NSD	NSD	NSD	NSD
5								
6								
7								
8								

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

2

DATE OF WORK

7/27/90

ABATEMENT METHOD:

Samples collected During Floor Tile Removal

Activity Under Mist (Wet) Conditions.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1			<0.0033	<0.0041	<0.0003	0.0817	<0.0038	0.009
2			0.0034	0.0042	0.0011	0.0342	<0.0036	0.0488
3			<0.0033	<0.0043	<0.0002	0.0847	<0.0037	0.0092
4			NSD	NSD	NSD	NSD	NSD	NSD
5								
6								
7								
8								

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

FORT SILL DEMONSTRATION PROJECT

SUMMARY OF ANALYTICAL RESULTS

ELECTRON MICROSCOPY

CELL NUMBER

7

DATE OF WORK

8/2/90

ABATEMENT METHOD:

Floor Tile soaked in water and asbestos surfactant (soap) for 3 days. Tile was then removed with straight hoe.

LABORATORY AND SAMPLE TYPE

#	SEI	EPA	SEI	EPA	SEI	EPA	SEI	EPA
	AGGRESSIVE	AGGRESSIVE	BACKGROUND	BACKGROUND	(See Note 1) REMOVAL	(See Note 2) REMOVAL	CLEARANCE	CLEARANCE
1			<0.0031	<0.0040	0.0027	0.1034	<0.0030	<0.0038
2			<0.0038	<0.0039	0.0036	0.056	<0.0029	<0.0038
3			<0.0038	<0.0039	<0.0099	0.0354	<0.0029	<0.0038
4			NSD	NSD	NSD	NSD	NSD	NSD
5								
6								
7								
8								

NOTES:

1 Analyzed via N.I.O.S.H. 7402 Protocol.

2 Analyzed via A.H.E.R.A. Protocol.

All results reported in Fibers or Structures / cc.

COMMENTS:

CELL 2 Phase Contrast Sample
Results ☒ Floor Tile ☐ Mastic

Abatement Order: 3 - 7-27-90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
C	BACKGROUND	1	<0.005	<0.005	NA
E	PERSONNELS	2	<0.005	<0.005	<0.005
L	INSIDE AREA	3	<0.005	<0.005	<0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
2	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005
	CLEARANCE	6	No Clearances Inside Cell due to Moisture Also results do not indicate the need.		
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Full Face Dual Cartridge Respirator (HEPA) Utilized.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/27/90 Collected 7/28/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Passive Background Samples Collected
 Prior to Cell 2 Abatement.

DEFINITION OF TERMS: PASSIVE = HEPA vacuumed then Leaf
 Blower Used to Agitate Air. Negative air run for 20 min. Air then
 Allowed to Settle for 30 minutes before Samples were collected.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C225N	901302	0	0	10	1441.8	0	0	0	0	BLDG 1436-North East Cell 2
										Some Silica Found - No Fibers
C226N	901303	1	1	10	1393.6	12.345679	0.00341065	12.345679	0.00341065	BLDG 1436-North Center Cell 2
										Silica Dust Present.
C227N	901304	0	1	10	1425.7	12.345679	0.00333386	0	0	BLDG 1436 - North West Cell 2
										Very Clean Sample
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C2025E - C2027E
						0	0	0	0	
SUMMARY:					TOTAL =	24.691358		12.345679		
					MEAN =	8.23045267	0.00224817	4.11522634	0.00113688	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

4.11522634

Mean Number of Asbestos Structures Per Cubic Centimeter:

0.00113688

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:		TULSA CORPS OF ENGINEERS		NVLAP NUMBER - - 1568		Microscope.: HITACHI 600AB		
Project:		FT. SILL ABATEMENT PROJECT		2700 N.W. 39th Street		Grid Lot I.D.		
PPE:		DUAL CARTRIDGE - FULL FACE MASK		Oklahoma City, OK 73112		Number of Samples Counted: 1		
Date:		7/27/90 Collected 7/28/90 Analyzed		(405) 948-6505		Grid Open Area:(mm ²) 0.0081		
FAX Number:				Analyst: JAMES R. GAYLOR		Filter Area:(mm ²) 385		
SAMPLING CONDITIONS: Blank collected with Passive Background Samples Prior to BLDG 1436 Cell 2 Abatement.				DEFINITION OF TERMS: PASSIVE = HEPA vacuumed then Leaf Blower Used to Agitate Air. Negative air run for 20 min. Air then Allowed to Settle for 30 minutes before Samples were collected.				
Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²	Asbestos Structures per mm ²	COMMENTS
C228N	901305	0	0	10		0	0	All 0 counts = NFD (No Fibers Detected) NOTE: EPA also analyzed under Sample Number C2028E
						0	0	
						0	0	
						0	0	
						0	0	
						0	0	
						0	0	
						0	0	
						0	0	
						0	0	
SUMMARY:		No Fibers Detected		TOTAL=		0	0	
				MEAN =		0	0	
ASBESTOS STRUCTURES PER mm ²				Mean Number of Asbestos Structures Per Square Millimeter:				0
Mean <= 18		Mean >18		Any single count > 53 structures per mm ² is a failure.				
PASS		FAIL						

P.A.T. Participant
PHASE CONTRAST ANALYSIS

Date: 7/28/90 Analyzed

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Blank fiber count = 0

[illegible]

ANALYST: JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505				Electron Microscope : HITACHI 600AB			
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK								Grid Lot I. D.:			
Date: 7/27/90 Collected 7/28/90 Analyzed								Number of Samples Counted: 3			
FAX #:								Grid Open Area (mm ²): 0.0081			
								Filter Area (mm ²): 385			
SAMPLING CONDITIONS: Samples collected During Floor Tile Removal Activity Under Mist (Wet) Conditions. ABATEMENT ORDER #3 - BLDG 1436				DEFINITION OF TERMS:							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C229N	901306	0.00055	10	2	2	0	0	0	24.691358	0	BLDG 1436 - NE CELL 2
C230N	901307	0.00108	10	1	0	1	100	0.001084	12.345679	12.345679	BLDG 1436-N CENTER CELL 2
C231N	901308	0.00057	10	3	3	0	0	0	37.037037	0	BLDG 1436-NW CELL 2
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated . Filters desiccated 24 hours prior to TEM Prep.											(Signature)
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos. Percent (%) which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:	TULSA CORPS OF ENGINEERS	NVLAP NUMBER - - 1568	Microscope : HITACHI 600AB
Project:	FT. SILL ABATEMENT PROJECT	2700 N.W. 39th Street	Grid Lot I.D.
PPE:	DUAL CARTRIDGE - FULL FACE MASK	Oklahoma City, OK 73112	Number of Samples Counted: 3
Date:	8/1/90 Collected 8/6/90 Analyzed	(405) 948-6505	Grid Open Area:(mm ²) 0.0081
FAX Number:		Analyst: JAMES R. GAYLOR	Filter Area:(mm ²) 385

SAMPLING CONDITIONS: Cell 2 Clearances After ABATEMENT order #3. Samples also serve as Passive Background Samples Collected Prior to BLDG 1436 - Cell 2 Mastic Abatement.

DEFINITION OF TERMS: PASSIVE = No activity inside cell during passive test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C293N	901501	0	0	10	1236.25	0	0	0	0	NE Cell 2 - All 0 counts = NSD
C294N	901502	0	0	10	1311.5	0	0	0	0	N Center Cell 2 - All 0 counts =NSD
C295N	901503	0	0	10	1290	0	0	0	0	NW Cell 2 - All 0 counts = NSD
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	Note: EPA also analyzed under
						0	0	0	0	Sample Numbers C2093E - C2095E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD					TOTAL=	0	0	0	0	
NSD = No Structures Detected					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER mm ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:	0
Mean Number of Asbestos Structures Per Cubic Centimeter:	0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:	TULSA CORPS OF ENGINEERS		NVLAP NUMBER - - 1568	Microscope : HITACHI 600AB			
Project:	FT. SILL ABATEMENT PROJECT		2700 N.W. 39th Street	Grid Lot I.D.			
PPE:	DUAL CARTRIDGE - FULL FACE MASK		Oklahoma City, OK 73112	Number of Samples Counted: 1			
Date:	8/1/90 Collected	8/6/90 Analyzed	(405) 948-6505	Grid Open Area:(mm ²) 0.0081			
FAX Number:			Analyst: JAMES R. GAYLOR	Filter Area:(mm ²) 385			
SAMPLING CONDITIONS: Blank collected with Clearances of Cell 2 after ABATEMENT ORDER #3. Sample also serves as Blank with Passive Background Samples Prior to BLDG 1436 - Cell 2 Mastic Abatement.			DEFINITION OF TERMS: PASSIVE = No activity inside cell during passive test.				
Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	All Structures per mm ²	Asbestos Structures per mm ²	COMMENTS
C296N	901504	0	0	10	0	0	All 0 counts=NSD (No Structures Detected)
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
					0	0	
SUMMARY:		All 0 counts = NSD		TOTAL=	0	0	
NSD = No Structures Detected				MEAN =	0	0	
ASBESTOS STRUCTURES PER mm ²				Mean Number of Asbestos Structures Per Square Millimeter:			
Mean <= 18		Mean >18					
PASS		FAIL		Any single count > 53 structures per mm ² is a failure.			

S T R E E T

CELL ☒ Phase Contrast Sample
Results ☒ Floor Tile ☐ Mastic

Abatement Order: 11 - 8/2/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
CELL 7	BACKGROUND	1	<0.005	<0.005	<0.005	
	PERSONNELS	2	0.035	<0.005	<0.005	0.008
	INSIDE AREA	3	<0.005	<0.005	<0.005	
	OUTSIDE AREA	4	<0.005	<0.005	<0.005	
	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005	
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER					

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: FFDC (HEPA) Were Utilized by Personnel

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date: BLDG. 1436

By:
KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/2/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Passive background samples collected
 in Bldg 1436 - Cell 7 prior to abatement.

DEFINITION OF TERMS:
 test.

PASSIVE = No activity inside cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	ATP Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C7109N	901525	0	0	10	1557.6	0	0	0	0	Bldg 1436 - South East Cell 7
C7110N	901526	0	0	8	1557.6	0	0	0	0	Bldg 1436 - South Center Cell 7
C7111N	901527	0	0	8	1584	0	0	0	0	Bldg 1436 - North East Cell 7
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Number C7109E - C7111E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD					TOTAL=	0		0		
NSD = No Structures Detected					MEAN =	0	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

385

PASSIVE = No activity inside cell during

NOTE: EPA also analyzed under
Sample Number C7112E

Any single count > 53 structures per mm² is a failure.

[illegible]

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS						2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505					
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK											
Date: 8/2/90 Collected 8/6/90 Analyzed											
FAX #:						Electron Microscope : HITACHI 600AB					
						Grid Lot I. D.:					
						Number of Samples Counted: 3					
						Grid Open Area (mm ²): 0.0081					
						Filter Area (mm ²): 385					
SAMPLING CONDITIONS: Samples collected during tile removal in Bldg 1436, Cell 7. ABATEMENT ORDER #11.						DEFINITION OF TERMS: Floor tile soaked in water and asbestos surfactant for 3 days then removed with hoe.					
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C7117N	901553	0.00533	10	2	1	1	50	0.0026655	24.691358	12.345679	South East Cell 7
C7118N	901554	0.00361	10	1	0	1	100	0.003614	12.345679	12.345679	South Center Cell 7
C7119N	901555	0.00994	10	0	0	0	0	0	0	0	North East Cell 7
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .										(Signature)	
COMMENTS:						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%), which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/3/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

3

Grid Open Area:(mm²)

0.0081

Filter Area:(mm²)

385

SAMPLING CONDITIONS: Cell 7 Clearances After ABATEMENT
 ORDER #11. Samples also serve as Passive Background Samples
 Collected Prior to BLDG 1436 - Cell 7 Mastic Abatement.

DEFINITION OF TERMS:
 test.

PASSIVE = No activity inside cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C7121N	901489	0	0	10	1593	0	0	0	0	Bldg 1436 - South Cell 7
C7122N	901490	0	0	10	1620	0	0	0	0	Bldg 1436 - Center Cell 7
C7123N	901491	0	0	10	1620	0	0	0	0	Bldg 1436 - North Cell 7
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C7121E - C7123E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD						TOTAL=	0	0	0	
NSD = No Structures Detected						MEAN =	0	0	0	0

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/3/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area:(mm²)

Filter Area:(mm^2)

1
0.0081

385

SAMPLING CONDITIONS: Blank collected with Clearances of Cell 7 after ABATEMENT ORDER #11. Sample also serves as Blank with Passive Background Samples Prior to BLDG 1436 - Cell 7 Mastic Abatement.

DEFINITION OF TERMS:
test.

PASSIVE = No activity inside cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
C7124N	901492	0	0	10		0		0		All 0 counts=NSD (No Structures Detected) NOTE: EPA also analyzed under Sample Number C7124E
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:		All 0 counts = NSD			TOTAL=		0		0	
		NSD = No Structures Detected			MEAN =		0		0	

ASBESTOS STRUCTURES PER m ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter: 0

Any single count > 53 structures per mm² is a failure.

CELL ☒ Phase Contrast *Su...*
Results ☐ Floor Tile ☒ Mastic

AIR CONDITIONERS

Abatement Order: 8 7-31-90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg.
C	BACKGROUND	1	<0.005	<0.005	<0.005
E	PERSONNEL	2	<0.005	<0.005	<0.005
L	INSIDE AREA	3	0.005	<0.005	0.005
L	OUTSIDE AREA	4	<0.005	<0.005	<0.005
3	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005
	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

A MINIMUM OF FULL FACE DUAL CARTRIDGE RESPIRATORS USED.

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 7/31/90 Collected 8/6/90 Analyzed
 FAX Number:

NVLAP NUMBER - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505

Analyst: JAMES R. GAYLOR

Microscope : HITACHI 600AB
 Grid Lot I.D.
 Number of Samples Counted: 3
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Cell 3 Clearances After ABATEMENT
 ORDER #5. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 3 Mastic Abatement.

DEFINITION OF TERMS:

PASSIVE =

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C373N	901529	0	0	10	1247.4	0	0	0	0	ONE Cell 3 Very low particulate loading.
C374N	901530	0	0	11	1134	0	0	0	0	BLDG 1436 - North Center Cell 3
C375N	901531	0	0	11	1109.2	0	0	0	0	BLDG 1436 - North West Cell 3
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C3073E - C3075E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD						TOTAL=	0	0	0	
NSD = No Structures Detected						MEAN =	0	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

385

Analyst: JAMES R. GAYLOR

PASSIVE =

NOTE: EPA also analyzed under
Sample Number C3076E

Any single count > 53 structures per mm² is a failure.

P.A.T. Participant PHASE CONTRAST ANALYSIS

```
Blank I.D.      C380N Microscope : Olympus
Fibers:         0 Field Area:      0.00785
Fields:         100 Filter Area:    385
```

Blank fiber count # 0

DEFINITION OF TERMS:

Mastic removed by Sand Machine using

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples collected during

Aggressive Removal of Tile Mastic in Cell 3

ABATEMENT ORDER #8 - BLDG 1436 Cell 3

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

[illegible]

COMMENTS:

ANALYST: KEITH L. STANLEY, Ph.D.

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/co) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD	N.V.L.A.P. -1568										
Client: TULSA CORPS OF ENGINEERS	2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 248-6505										
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK											
Date: 7/31/90 Collected 8/20/90 Analyzed											
FAX #:											
Electron Microscope : HITACHI 600AB											
Grid Lot I. D.:											
Number of Samples Counted: 3											
Grid Open Area (mm ²): 0.0081											
Filter Area (mm ²): 385											
SAMPLING CONDITIONS: Samples collected during Aggressive removal of Tile Mastic in Cell 3 ABATEMENT ORDER #8 - BLDG 1436 Cell 3											
DEFINITION OF TERMS: Mastic removed by Sand Machine											
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C377N	901497	0.00228	10	4	0	4	100	0.002277	49.382716	49.382716	C3 - North East
C378N	901498	0.00055	10	1	0	1	100	0.000551	12.345679	12.345679	C3 - North Center
C379N	901499	0.00114	10	2	0	2	100	0.001139	24.691358	24.691358	C3 - North West
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated . COMMENTS: Small additional asbestos fibers were seen on Samples C377N and C379N.											
ANALYST: JAMES GAYLOR											
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%) which is Then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol **(Initial Screening Test)**

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/3/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area: (mm²)

Filter Area:(mm²)

3

0.0081

385

SAMPLING CONDITIONS: Cell 7 Clearances After ABATEMENT
ORDER #11. Samples also serve as Passive Background Samples
Collected Prior to BLDG 1436 - Cell 7 Mastic Abatement.

DEFINITION OF TERMS:
test.

PASSIVE = No activity inside cell during

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (liters)	All Structures per m ²	All Structures per cc	Asbestos Structures per m ²	Asbestos Structures per cc	COMMENTS
C7121N	901489	0	0	10	1593	0	0	0	0	Bldg 1436 - South Cell 7
C7122N	901490	0	0	10	1620	0	0	0	0	Bldg 1436 - Center Cell 7
C7123N	901491	0	0	10	1620	0	0	0	0	Bldg 1436 - North Cell 7
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C7121E - C7123E
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NSD					TOTAL=	0		0		
NSD = No Structures Detected					MEAN =	0	0	0	0	0

ASBESTOS STRUCTURES PER mm ²	
Mean <= 70	Mean >70
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:	0
---	---

Mean Number of Asbestos Structures Per Cubic Centimeter: 0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

A.H.E.R.A. Analytical Protocol (Blank Test)

Grid Lot I.D.

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Number of Samples Counted:	1
Grid Open Area:(mm^2)	0.0081
Filter Area:(mm^2)	385

Analyst: JAMES R. GAYLOR

DEFINITION OF TERMS:
test.

PASSIVE = No activity inside cell during

SUMMARY:	All 0 counts = NSD	TOTAL=	0	0
NSD = No Structures Detected		MEAN =	0	0

Mean Number of Asbestos Structures Per Square Millimeter: 0

Any single count > 53 structures per mm² is a failure.

SUMMARY OF AIR SAMPLING RESULTS

N.I.O.S.H. 7400 METHOD (Latest Revision)

Client: TULSA CORPS OF ENGINEERS

Project: FT. SILL ABATEMENT PROJECT

PPE: DUAL CARTRIDGE - FULL FACE MASK

Date: 8/3/90 Collected

Date: 8/6/90 Analyzed

SAMPLING CONDITIONS: Samples collected during
Mastic Abatement of Bldg 1436 Cell 7.

ABATEMENT ORDER #13

2700 N. W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Blank I.D. C7132H Microscope : Olympus

Fibers:	0 Field Area:	0.00785
---------	---------------	---------

Fields: 100 Filter Area: 385

Blank fiber count # 0

DEFINITION OF TERMS: Mastic removed with Citric Acid and Towels.

[illegible]

COMMENTS:

ANALYST: JAMES R. GAYLOR

NOTE: Stanley Engineering, Inc. certifies to the accuracy of all fiber counts. Calculations accomplished in order to arrive at fiber concentrations (f/cc) and based on collection data provided by others must be attested to by others. Phase Contrast Microscopy (PCM) is accomplished at 400X and is limited to fibers of .25 microns in diameter. This method is non specific for asbestos and counts all fibers resolved. T.E.M. Analysis is specific for asbestos fibers.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD						N.V.L.A.P. -1568					
Client: TULSA CORPS OF ENGINEERS			2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6905			Electron Microscope : HITACHI 600AB					
Project: FT. SILL ABATEMENT PROJECT											
PPE: DUAL CARTRIDGE - FULL FACE MASK						Grid Lot I. D.:					
Date: 8/3/90 Collected 8/6/90 Analyzed						Number of Samples Counted: 3					
FAX #:						Grid Open Area (mm ²): 0.0081					
						Filter Area (mm ²): 385					
SAMPLING CONDITIONS: Samples collected during Mastic Abatement of Bldg 1436 Cell 7. ABATEMENT ORDER #13			DEFINITION OF TERMS: Mastic removed using Citric Acid and Towels.								
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C7129N	901477	0.00508	10	7	0	7	100	0.005078	86.4197531	86.4197531	South Cell 7
C7130N	901478	0.00136	10	7	0	7	100	0.001359	86.4197531	86.4197531	Center Cell 7
C7131N	901479	0.00447	10	2	0	2	100	0.004468	24.691358	24.691358	North Cell 7
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											
COMMENTS:										ANALYST: JAMES GAYLOR	
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos. Percent (%) which is then applied to the original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

(Signature)

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client:	TULSA CORPS OF ENGINEERS	NVLAP NUMBER - - 1568	Microscope : HITACHI 600AB
Project:	FT. SILL ABATEMENT PROJECT	2700 N.W. 39th Street	Grid Lot I.D.
PPE:	DUAL CARTRIDGE - FULL FACE MASK	Oklahoma City, OK 73112	Number of Samples Counted: 3
Date:	8/2/90 Collected 8/6/90 Analyzed	(405) 948-6505	Grid Open Area:(mm ²) 0.0081
FAX Number:		Analyst: JAMES R. GAYLOR	Filter Area:(mm ²) 385

SAMPLING CONDITIONS: Cell 1 Clearances After ABATEMENT
 ORDER #6. Samples also serve as Passive Background Samples
 Collected Prior to Bldg 1436 - Cell 1 Mastic Abatement.

DEFINITION OF TERMS: PASSIVE = No activity in cell during test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	ATP Volume (liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
C1105N	901517	0	0	10	1398	0	0	0	0	Bldg 1436 - East Cell 1
C1106N	901518	0	1	10	1421.3	12.345679	0.00334418	0	0	Bldg 1436 - Center Cell 1
C1107N	901519	0	0	10	1363	0	0	0	0	Bldg 1436 - West Cell 1
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	
						0	0	0	0	NOTE: EPA also analyzed under
						0	0	0	0	Sample Numbers C1105E - C1107E
						0	0	0	0	
						0	0	0	0	
SUMMARY: All 0 counts = NFD					TOTAL=	12.345679		0		
NFD = No Fibers Detected					MEAN =	4.11522634	0.00111473	0	0	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

PASS

Mean >70

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

0

Mean Number of Asbestos Structures Per Cubic Centimeter:

0

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Microscope : HITACHI 600AB

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/2/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Analyst: JAMES R. GAYLOR

Grid Lot I.D.	
Number of Samples Counted:	1
Grid Open Area:(mm ²)	0.0081
Filter Area:(mm ²)	385

SAMPLING CONDITIONS: Blank collected with Clearances of Cell 1 after ABATEMENT ORDER #6. Sample also serves as Blank with Passive Background Samples Prior to Bldg 1436 - Cell 1 Mastic Abatement.

DEFINITION OF TERMS:

PASSIVE = No activity in cell during test.

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
C1108N	901520	0	0	10		0		0		All 0 counts=NFD (No Fibers Detected)
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		NOTE: EPA also analyzed under
						0		0		Sample Number C1108E
						0		0		
						0		0		
SUMMARY:	All 0 counts = NFD				TOTAL=	0		0		
NFD = No Fibers Detected.					MEAN =	0		0		

ASBESTOS STRUCTURES PER m ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

Any single count > 53 structures per mm² is a failure.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)											
N.I.O.S.H. 7402 METHOD				N.V.L.A.P. -1568							
Client: TULSA CORPS OF ENGINEERS				2700 N. W. 39th Street Oklahoma City, OK 73112 (405) 948-6505			Electron Microscope : HITACHI 600AB				
Project: FT. SILL ABATEMENT PROJECT							Grid Lot I. D.:				
PPE: DUAL CARTRIDGE - FULL FACE MASK							Number of Samples Counted: 3				
Date: 8/2/90 Collected 8/6/90 Analyzed							Grid Open Area (mm ²): 0.0081				
FAX #:							Filter Area (mm ²): 385				
SAMPLING CONDITIONS: Samples collected during Mastic Abatement in Bldg 1436 Cell1. ABATEMENT ORDER #12.				DEFINITION OF TERMS: Mastic removed by FS workers using Rite Stuff to melt mastic.							
ANALYTICAL RESULTS											
Client Sample Number	Alpha Labs Number	Reference Phase Count (f/cc)	Grid Openings Counted	Total Fiber Count	Non Asbestos Fiber Count	Asbestos Fiber Count	Percent Asbestos (%)	Adjusted Count Asbestos (f/cc)	Total Fibers (f/mm ²)	Asbestos Fibers (f/mm ²)	COMMENTS:
C1113N	901521	0.01188	10	9	5	4	44.444444	0.00527778	111.111111	49.382716	North East Cell 1
C1114N	901522	0.00644	10	5	1	4	80	0.0051544	61.7283951	49.382716	North Center Cell 1
C1115N	901523	0.01289	10	1	1	1	100	0.012885	12.345679	12.345679	North West Cell 1
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
				0			0	0	0	0	
Note: Results Apply Only to The Sample Numbers Indicated .											
COMMENTS:						(Signature)					
						ANALYST: JAMES GAYLOR					
The N.I.O.S.H. 7402 T.E.M. Analytical Protocol is Utilized to Confirm Phase Contrast Microscopy (PCM) Elevated Counts. The Procedure Distinguishes Fibers of .25 Microns in Diameter & > 5 Microns in Length, Classifies them into Asbestos/Non Asbestos, Percent (%), which is then Applied to the Original PCM Count. This Procedure Differs in Sample Preparation Technique (i.e. Ashing is Not Employed).											

S T R E E T

First final Build. 1436
 CELL ☐ Phase Contrast San. Results ☐ Floor Tile ☐ Mastic

LAB TRAILER

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION ENTRANCE

SUPPLIES

SUPPLIES

waste loadout holding area

1 2 3 4 5 6
 A N

MOP RAGS, WATER
 PAPER TOWELS,
 ECT

STRAIGHT HOSE

DEHUMIDIFIER A

HEPA VACUUM B

HEPA FILTER C

Abatement Order: 15 - 08/03/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
BLDG 1436 F	BACKGROUND	1	See Cell 8 Floor Tile Removal			
	PERSONNELS	2	NA	NA	NA	NA
	INSIDE AREA	3	See Clearance Below			
	OUTSIDE AREA	4	<0.005	<0.005	<0.005	
	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005	
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER TEM (AHERA)	A/N	<0.005	<0.005	<0.005	

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: TEM Clearance was accomplished using AHERA Protocol PC then TEM

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Initial Screening Test)

Client: TULSA CORPS OF ENGINEERS
 Project: FT. SILL ABATEMENT PROJECT
 PPE: DUAL CARTRIDGE - FULL FACE MASK
 Date: 8/3/90 Collected 8/6/90 Analyzed
 FAX Number:
 NVLAP NUMBER - - 1568
 2700 N.W. 39th Street
 Oklahoma City, OK 73112
 (405) 948-6505
 Analyst: JAMES R. GAYLOR
 Microscope : HITACHI 600AB
 Grid Lot I.D.
 Number of Samples Counted: 11
 Grid Open Area:(mm²) 0.0081
 Filter Area:(mm²) 385

SAMPLING CONDITIONS: Final Clearances - All Cells in Bldg 1436

DEFINITION OF TERMS:

Client Sample Number	Alpha Lab Number	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted	Air Volume (Liters)	All Structures per mm ²	All Structures per cc	Asbestos Structures per mm ²	Asbestos Structures per cc	COMMENTS
F137N	901450	0	2	10	1837	24.691358	0.00517484	0	0	East of Containment
F138N	901451	1	1	10	1930.5	12.345679	0.0024621	12.345679	0.0024621	South of Containment
F139N	901452	0	0	8	1903.25	0	0	0	0	South of Building (Outside)
F140N	901453	0	0	10	1711.5	0	0	0	0	Office
F141N	901454	0	0	8	1840	0	0	0	0	North of Building (outside)
F142N	901455	0	2	8	1363	30.8641975	0.00871806	0	0	Center of Cell 4
F143N	901456	2	3	8	1322.1	46.2962963	0.01348164	30.8641975	0.00898776	West End of Cell 6
F144N	901457	0	0	9	1392	0	0	0	0	South Hallway
F145N	901458	0	2	8	1322.4	30.8641975	0.00898572	0	0	West End of Cell 1
F146N	901459	0	0	8	1271.2	0	0	0	0	North End of Hall
F147N	901460	0	2	8	1338	30.8641975	0.00888095	0	0	Inside Cell 7
SUMMARY: All 0 counts = NFD					TOTAL=	175.925926	43.2098765			
NFD = No Fibers Detected					MEAN =	15.993266	0.00433666	3.92817059	0.0010409	

ASBESTOS STRUCTURES PER mm²

Mean <= 70

Mean >70

PASS

FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

3.92817059

Mean Number of Asbestos Structures Per Cubic Centimeter:

0.0010409

Note: Analysis Pertain to Structure Density Results Only. Calculation are Based on Data Provided by Others.

TRANSMISSION ELECTRON MICROSCOPY (T.E.M.)

A.H.E.R.A. Analytical Protocol (Blank Test)

Client:	TULSA CORPS OF ENGINEERS	
Project:	FT. SILL ABATEMENT PROJECT	
PPE:	DUAL CARTRIDGE - FULL FACE MASK	
Date:	8/3/90 Collected	8/6/90 Analyzed
FAX Number:		

NVLAP NUMBER - - 1568
2700 N.W. 39th Street
Oklahoma City, OK 73112
(405) 948-6505

Microscope : HITACHI 600AB

Grid Lot I.D.

Number of Samples Counted:

Grid Open Area: (mm²)

Filter Area:(mm^2)

3

0.0081

385

Analyst: JAMES R. GAYLOR

SAMPLING CONDITIONS: Blanks collected with final clearances of all cells in Bldg 1436.

DEFINITION OF TERMS:

Client	Alpha Lab	Asbestos Structures Counted	Total Structures Counted	Grid Openings Counted		All Structures per mm ²		Asbestos Structures per mm ²		COMMENTS
F148N	901461	0	0	8		0		0		Open and closed at beginning of Session
F149N	901462	0	0	8		0		0		Transportation Blank
F150N	901463	0	0	8		0		0		Open and Closed at End of Session
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
						0		0		
SUMMARY:	All 0 counts = NFD				TOTAL=	0		0		
NFD = No Fibers Detected					MEAN =	0		0		

ASBESTOS STRUCTURES PER mm ²	
Mean <= 18	Mean >18
PASS	FAIL

Mean Number of Asbestos Structures Per Square Millimeter:

Any single count > 53 structures per mm^2 is a failure.

S T R E E T

MACHINE REMOVAL OF FLOOR TILE AND MASTIC

LAB
TRAILER

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

1 0 0 1 0 0

A N

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER

A

HEPA VACUUM

B

HEPA FILTER

C

BLDG.
1434

BLDG.
1436

BLDG.
1435

Neg. Air
unit. Located
but not used.

Critical Barriers
established

R E S T R O O M

R E S T R O O M

OFFICE
AREA

Large fan

Tables

Abatement Order: 19 - 08/09/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
B L D G	BACKGROUND	1	<0.005 FROM TEM	<0.005 (AHERA FINDALS OF 08/03/90)	<0.005	
	PERSONNELS	2	<0.005	<0.005	<0.005	<0.005
	INSIDE AREA	3				
1 4 3 6	OUTSIDE AREA	4				
	OUTSIDE BLDG.	5				
	CLEARANCE	6	<0.005	<0.005	<0.005	
M R	OTHER TEM (AHERA)	A/N				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: Both f tile and mastic removed by machine

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date:

BLDG. 1436

By:

KLS

S T R E E T

BUILDING 1436 FINAL CLEAN UP OF MACHINE REMOVED FLOOR TILE

LAB
TRAILER

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

BLDG.
1434

BLDG.
1436

BLDG.
1435

Neg. Air
unit. Located
but not used.

R
E
S
T
R
O
O
M

R
E
S
T
R
O
O
M

OFFICE
AREA

1 2 3 4 5 6
A S

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER

HEPA VACUUM

HEPA FILTER

Abatement Order: 22 - 08/25/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
B L D G 1 4 3 6 F C 2	BACKGROUND	1	<0.005	<0.005	<0.005	
	PERSONNELS	2				
	INSIDE AREA	3				
	OUTSIDE AREA	4				
	OUTSIDE BLDG.	5				
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER TEN (AHERA)	A/N				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: Both f tile and mastic removed by machine

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date: BLDG. 1436

By:
KLS

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C5218	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-1-90	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPH AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC5213	10 / 100	HALLWAY INSIDE CONTAINMENT	2011	8 : 51	18 : 15	6 6.4 6.2	564	3496.8	BDL	NA	0.001402556	YES
2 PC5214	6 / 100	CELL III	2012	8 : 51	18 : 15	6 6 6	564	3384	BDL	NA	0.001449308	YES
3 PC5215	5 / 100	OFFICE	1	9 : 30	18 : 21	6.2 6 6.1	531	3239.1	BDL	NA	0.001514142	YES
4 PC5216	3 / 100	SOUTH OF CONTAINMENT	93	9 : 30	18 : 21	6 5.8 5.9	531	3132.9	BDL	NA	0.001565469	YES
5 PC5217	21 / 100	CLEAN ROOM	CR1	9 : 35	18 : 21	6.2 6.2 6.2	526	3261.2	0.003158	0.003460	0.001503881	NO
6 PC5218	0 / 100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
7	/			:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-1-90 C5219-C5224 PASSIVE THRU ABATEMENT

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/IND. DU. IR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:NA	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-28-90	PER MM^2	: 0	FILTER AREA (MM^2)	: . 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC5020	0 /100	LEON OSBURN	P6	12 : 30	13 : 50	1.4 1 1.2	80	96	BDL	NA	0.051088110	YES
2 PC5021	0 /100	BRIAN KAISER 441-68-5814	P7	13 : 50	14 : 30	1.6 1.6 1.6	40	64	BDL	NA	0.076632165	YES
3 PC5022	1.5 /100	GABOR SZEKELY	P6	13 : 50	14 : 30	1 1 1	40	40	BDL	NA	0.122611465	YES
4 PC5023	1 /100	ALAN BUSCHE	P2	14 : 14	15 : 21	2 2 2	67	134	BDL	NA	0.036600437	YES
5 PC5024	0 /100	BOB STOUT	P1	14 : 12	15 : 11	2 2 2	59	118	BDL	NA	0.041563208	YES
6 PC5025	1 /100	BURL RAGLAND	P3	14 : 52	15 : 59	2 1.9 1.9	67	130.65	BDL	NA	0.037538910	YES
7 PC5026	0 /100	BOB VANDEGRIFF	P4	15 : 18	16 : 15	2 2 2	57	114	BDL	NA	0.043021566	YES
8 PC5027	0 /100	BRIAN KAISER 441-68-5814	P1	15 : 30	15 : 54	2 1.7 1.8	24	44.4	BDL	NA	0.110460779	YES
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PERSONAL 7-28-90 PC 5020 ABATEMENT
 FLOOR TILE WAS REMOVED WITH STRAIGHT HOES. ALL WORKERS WORE FFDC RESPIRATORS,
 WASHABLE AB SUITS, GLOVES, AND BOOTS.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

* = BELOW DETECTION LIMIT

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/IND...DL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:464	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/P
PROJECT:	:FT. SILL - BEFORE & DURING ABATEMENT	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-26-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
457	7 /100	EAST OF CONTAINMENT	ER1	8 : 36	18 : 0	5.4 5.8 5.6	564	3158.4	BDL	NA	0.001552830	YES
458	8 /100	SOUTH OF CONTAINMENT	93	8 : 33	18 : 1	6.2 5.2 5.7	568	3237.6	BDL	NA	0.001514843	YES
459	7 /100	OUTSIDE BLDG. ON PATIO (SOUTH)	3	8 : 46	18 : 3	6 5.2 5.6	557	3119.2	BDL	NA	0.001572345	YES
460	28 /100	OFFICE AREA	2017	8 : 50	18 : 5	5 4.2 4.6	555	2553	0.005378	0.006219	0.001921057	NO
461	6 /100	OUTSIDE TRAILER (NORTH)	288	8 : 54	18 : 10	5 5.6 5.3	556	2946.8	BDL	NA	0.001664333	YES
462	58 /100	INSIDE TRAILER (NORTH)	T1	8 : 56	18 : 7	7.2 7 7.1	551	3912.1	0.007271	0.008346	0.001253663	NO
463	68 /100	CLEAN ROOM	CR1	8 : 59	18 : 14	6.2 5.5 5.8	555	3246.75	0.010271	0.011876	0.001510574	NO
464	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
465	11. /100	HALLWAY BY CELL 6	2012	9 : 23	12 : 50	6 7.2 6.6	207	1366.2	0.004128	NA	0.003589854	NO
466	12 /100	CELL 6	2011	9 : 24	12 : 51	6.2 6.6 6.4	207	1324.8	0.004442	NA	0.003702037	NO
467	10 /100	HALLWAY BY CELL 6	2012	12 : 50	16 : 40	7.2 5.4 6.3	230	1449	BDL	NA	0.003384719	YES
468	16 /100	CELL 5	2011	12 : 51	16 : 40	6.6 8 7.3	229	1671.7	0.004694	NA	0.002933815	NO
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: PUMPS RAN BEFORE AND DURING THE ABATEMENT PERIOD

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY / SEI

AIRBORNE ASBESTOS SUMMARY/INDIVID. AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C4075	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FORT SILL - BUILDING 1436 - FLOOR TILE	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN / S.E.I.	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-26-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
C4069 *	6 /100	NORTHEAST INSIDE CELL 4	2019	16 : 45	6 : 15	6.2 4.6 5.4	810	4374	BDL	NA	0.001121275	YES
C4070	8 /100	NORHT CENTER INSIDE CELL 4	2021	16 : 45	6 : 15	6.2 5.2 5.7	810	4617	BDL	NA	0.001062260	YES
C4071	11 /100	NORTHWEST INSIDE CELL4	2013	16 : 45	6 : 16	6 4.8 5.4	811	4379.4	0.001231	0.002081	0.001119892	NO
C4072	7.5 /100	SOUTHWEST INSIDE CELL 4	2012	16 : 45	6 : 16	6 6 6	811	4866	BDL	NA	0.001007903	YES
C4073	8 /100	HALLWAY BY CELL 4	6	16 : 46	6 : 18	6 5.6 5.8	812	4709.6	BDL	NA	0.001041374	YES
C4074	5 /100	CELL 5	2011	16 : 47	6 : 19	6 5.6 5.8	812	4709.6	BDL	NA	0.001041374	YES
C4075	0 /100	BLANK		:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR
	/			:	:		1440	0	ERR	ERR	ERR	ERR

COMMENTS: THESE WERE PUT ON AFTER ABATEMENT IN CELL 4.

* SAMPLE #C4069 WAS VERY DUSTY.

CLEARANCES

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:4080	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FT. SILL - DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:0	MIDNITE (0 OR 1):	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:JULY 26 & 27, 1990	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:JULY 27, 1990	TOTAL:	: 0	FILTER PORE SIZE:	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM	STOP	AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L.
4076	7 /100	EAST OF CONTAINMENT	ER1	18 : 38	8 : 15	6.5	6	6.2	817	5106.25	BDL	NA	0.000960481	YES
4077	4 /100	SOUTH OF CONTAINMENT	93	18 : 38	8 : 7	6.8	5.4	6.1	809	4934.9	BDL	NA	0.000993831	YES
4078	9 /100	OFFICE AREA	2017	18 : 37	7 : 59	6	5.2	5.6	802	4491.2	BDL	NA	0.001092015	YES
4079	15 /100	CLEAN ROOM	CR1	18 : 41	7 : 54	7.4	5	6.2	793	4916.6	0.001496	0.002472	0.000997530	NO
4080	0 /100	BLANK		:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR
	/			:	:			0	1440	0	ERR	ERR	ERR	ERR

COMMENTS: BUILDING 1436
 PHASE CONTRAST MICROSCOPY

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY / SEI

AIRBORNE ASBESTOS SUMMARY/IN...ID. AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	: 0	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-26-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-30-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
PC4009	12 /100	GABOR SZEKELY 446-84-8119	P7	11 : 55	14 : 46	1.3 1.8 1.5	171	265.05	0.022204	NA	0.018503899	NO
2 PC40010	9 /100	BOB STOUT 564-62-0686	11524	13 : 15	14 : 45	1.6 1.2 1.4	90	126	BDL	NA	0.038924274	YES
3 PC40011	6 /100	BURL RAGLAND 447-38-1989	P7	13 : 41	14 : 22	1.5 1.1 1.3	41	53.3	BDL	NA	0.092016108	YES
4 PC4012	7 /100	ALLEN BUSCHE	11524	14 : 1	14 : 57	2 1.8 1.9	56	106.4	BDL	NA	0.046094535	YES
5 PC4013	5.5 /100	DOUGLAS BELL 441-64-9320	P7	14 : 38	15 : 20	1.2 1 1.1	42	46.2	BDL	NA	0.106157112	YES
6 PC4014	15 /100	BOB VADEGRIF	11524	15 : 5	17 : 20	1.8 1.7 1.7	135	236.25	0.031139	NA	0.020759613	NO
7	/			:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: LIST OF PERSONS WHO REMOVED THE TILE FROM THE FLOOR IN CELL IV.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

Keith Stanley

AIRBORNE ASBESTOS SUMMARY/IN... AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FT. SILL - CELL #4 - BUILDING 1436
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :AUGUST 3, 1990
 DATE ANALYZED: :AUGUST 3, 1990

BLANK I.D.: :****
 FIBERS: :
 OBSERVED- : 0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
4273	23 /100	NORTH EAST IN CELL 4	3	12 : 18	15 : 25	6	6	6	187	1122	0.010053	NA	0.004371175	NO
4274	27 /100	NORTH CENTER IN CELL 4	LM1	12 : 18	15 : 25	6	5.6	5.8	187	1084.6	0.012209	0.004756	0.004521905	NO
4275	22 /100	NORTH WEST CELL 4	GL1	12 : 18	15 : 25	6	5.8	5.9	187	1103.3	0.009779	NA	0.004445262	NO
4276	14 /100	SOUTH CENTER CELL 4	15	12 : 18	15 : 25	6	5.6	5.8	187	1084.6	0.006330	NA	0.004521905	NO
4277	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
4278	1 /100	HALLWAY NORTH	2012	12 : 26	15 : 36	6	5.8	5.9	190	1121	BDL	NA	0.004375074	YES
4279	0 /100	HALLWAY SOUTH	2011	12 : 27	15 : 37	6	6.2	6.1	190	1159	BDL	NA	0.004231629	YES
4280	1 /100	OFFICE	1	12 : 28	15 : 40	6	5.8	5.9	192	1132.8	BDL	NA	0.004329500	YES
4281	2 /100	NORTH OF CONTAINMENT INSIDE	93	12 : 29	15 : 39	6	5.8	5.9	190	1121	BDL	NA	0.004375074	YES
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR
	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: SAMPLES 4281 THRU 4286 WERE NOT USED
 CLEARANCE
 CELLS 4 & 7

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/IND. DU IR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:0	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-3-90	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC4059	3.5 /100	BRIAN KISER	P1	9 : 50	11 : 15	2 2.2 2.1	85	178.5	BDL	NA	0.027475958	YES
2 PC4060	/	VOID		:	:		0	0	ERR	ERR	ERR	ERR
3 PC4061	3 /100	GABOR SZEKELY	P3	9 : 52	10 : 10	2 2 2	18	36	BDL	NA	0.136234961	YES
4 PC4062	0 /100	LARRY MATTOCKS	P4	9 : 52	10 : 20	2 2 2	28	56	BDL	NA	0.087579617	YES
5 PC4063	2 /100	BRIAN KISER	P1	13 : 30	15 : 0	2.2 2 2.1	90	189	BDL	NA	0.025949516	YES
6 PC4064	1 /100	MARTIN BROWN	P2	13 : 30	15 : 0	2.2 2 2.1	90	189	BDL	NA	0.025949516	YES
7	/			:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: PERSONAL 8-3-90 PC4059-PC4062 ABATEMENT (CELLS 4&7)
 SAMPLE # PC4060 FILTER MISSING

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:Corps of Engineers	BLANK I.D.:	: 0	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:Ft. Sill - Demonstration	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:Leon Osburn/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7/23/90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7/24/90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM) AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C601	39 /100	Inside Containment - West End	2013	12 : 4	15 : 21	7	7.5	7.2	197	1428.25	0.013392	0.005496	0.003433893	NO
2 C602	41 /100	Inside Containment - Center	2019	12 : 6	15 : 22	7	8	7.5	196	1470	0.013679	0.005585	0.003336366	NO
3 C603	4 /100	South of Containment	2020	12 : 17	15 : 26	7	8.5	7.7	189	1464.75	BDL	NA	0.003348324	YES
4 C604	6 /100	Office Area	2017	12 : 25	15 : 27	7	8	7.5	182	1365	BDL	NA	0.00359301	YES
5 C605	30 /100	Hall Inside Containment	2012	12 : 29	15 : 29	7	8.5	7.7	180	1395	0.010547	0.003955	0.003515740	NO
6 C606	34 /100	North of Containment Area	2011	12 : 31	15 : 31	7	7.5	7.2	180	1305	0.012777	0.004791	0.003758205	NO
7	/			:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	0 / 0	0	0	0 : 0	0 : 0	0	0	0	0	0	ERR	ERR	ERR	ERR
15	0 / 0	0	0	0 : 0	0 : 0	0	0	0	0	0	ERR	ERR	ERR	ERR
16	0 / 0	0	0	0 : 0	0 : 0	0	0	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: Passive background monitoring. No activity during sample period. No respiratory protection required during sample period.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: Keith L. Stanley/SEI

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C619	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-23-90	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-24-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C607P	5 /100	AREA SOUTH OF CONTAINMENT	2020	16 : 0	19 : 14	6.8 8.4 7.6	194	1474.4	BDL	NA	0.003326409	YES
2 C608P	6 /100	OFFICE	2017	16 : 4	19 : 12	7.1 7.2 7.1	188	1344.2	BDL	NA	0.003648607	YES
3 C609P	84 /100	HALL	2012	16 : 17	19 : 17	6.7 9.4 8.0	180	1449	0.028431	0.010661	0.003384719	NO
4 C610P	41 /100	INSIDE C5	2011	16 : 18	19 : 18	7 8 7.5	180	1350	0.014895	0.005585	0.003632932	NO
5 C611P	90. /100	INSIDE C6 WEST	2013	16 : 25	19 : 17	6.8 9.2 8	172	1376	0.032256	0.011558	0.003564286	NO
6 C612P	51 /100	INSIDE C6 CENTER	2019	16 : 26	19 : 17	6.9 8.8 7.8	171	1342.35	0.018633	0.006638	0.003653636	NO
7 C613P	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: TEST AREA WAS WET WIPED AND MOPPED. WATER WAS REMOVED FROM FLOOR WITH WET VAC.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

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 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C619	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-24-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-24-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.O.L
C614P	21 /100	AREA/SOUTH OF CONTAINMENT	93	10 : 18	16 : 10	6.2 6.8 6.5	352	2288	0.004501	0.003301	0.002143557	NO
C615P	11 /100	AREA/OFFICE	2017	10 : 27	16 : 13	6.8 0.6 3.7	346	1284.525	0.004199	NA	0.003818110	NO
C616P	VOID/	VOID SAMPLE * **		:	:	0	0	0	ERR	ERR	ERR	ERR
C617P	41 /100	INSIDE LABORATORY TRAILER	288	10 : 55	16 : 19	5.8 7.6 6.7	324	2170.8	0.009263	0.006252	0.002259286	NO
C618P	84 /100	INSIDE CELL VI CENTER	2019	11 : 0	16 : 24	6.8 6.4 6.6	324	2138.4	0.019265	0.013004	0.002293517	NO
C619P	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: THIS IS ONLY BACKGROUND TESTING. THERE IS NOTHING GOING ON IN CELL VI AT THIS TIME.

CELL I, II, III, V ARE BEING CLEANED.

* FILTER DAMAGED--CAUSE UNKNOWN **HEAVY RAIN SHOWER BETWEEN 14:45 AND 15:15

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS
PROJECT:	:FORT SILL--DEMONSTRATION
SAMPLED BY:	:LEON OSBURN/SEI
DATE COLLECTED:	:7-24-90
DATE ANALYZED:	:7-27-90

BLANK I.D.:	:C624P
FIBERS:	:
OBSERVED-	: 0
PER MM^2	: 0
TOTAL	: 0

MICROSCOPE:	:OLYMPUS
FIELD AREA (MM^2)	: 0.00785
MIDNITE (0 OR 1)	: 0
FILTER AREA (MM^2)	: 385
FILTER PORE SIZE	:0.8u

RESPIRATORY PROTECTION:	:NA
ASPD=AIR SUPPLIED PD	:
DCHM=DUAL CART. HALF MASK	:
FFDC=FULL FACE DUAL CART.	:
PAPR=POWERED AIR PURIFYING	:

[illegible]

COMMENTS: SAMPLES TAKEN DURING AGGRESSIVE TESTING. NO PPE REQUIRED.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

4127 S. HARVARD
TULSA, OKLAHOMA

AIHA QUALIFIED

CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES

AIRBORNE ASBESTOS SUMMARY/IND1

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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OKLAHOMA CITY, OKLA. 73112
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TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
PROJECT: :FORT SILL--DEMONSTRATION
SAMPLED BY: :LEON OSBURN/SEI
DATE COLLECTED: :7-25-90
DATE ANALYZED: :7-27-90

BLANK I.D.: :C619
FIBERS: :
OBSERVED- : 0
PER MM² : 0
TOTAL : 0

MICROSCOPE: :OLYMPUS
FIELD AREA (MM²) : 0.00785
MIDNITE (0 OR 1) : 0
FILTER AREA (MM²) : 385
FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :NA
ASPD=AIR SUPPLIED PD :
DCHM=DUAL CART. HALF MASK :
FFDC=FULL FACE DUAL CART. :
PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C629	4 /100	EAST ROOM	ER1	4 : 15	9 : 30	6.4 6 6.2	315	1953	BDL	NA	0.002511243	YES
2 C630	0 /100	SOUTH OF CELL VI	93	4 : 16	9 : 22	6 6 6	306	1836	BDL	NA	0.002671273	YES
3 C631	2 /100	OFFICE	2017	4 : 17	8 : 42	6 5.8 5.9	265	1563.5	BDL	NA	0.003136845	YES
4 C632	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
5	/			:	:		0	0	ERR	ERR	ERR	ERR
6	/			:	:		0	0	ERR	ERR	ERR	ERR
7	/			:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: SAMPLING DURING PASSIVE TEST. NO PPE REQUIRED

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C642P	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:KEITH STANLEY/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1):	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM) AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C633P	4 /100	AREA EAST OF CONTAINMENT	ER1	9 : 32	16 : 11	6	5.8	5.9	399	2354.1	BDL	NA	0.002083368	YES
2 C634P	8 /100	AREA SOUTH OF CONTAINMENT	93	9 : 22	15 : 45	6	6	6	383	2298	BDL	NA	0.002134229	YES
3 C635P	VOID/100	OUTSIDE BUILDING ON PATIO (SOUTH)	3	9 : 28	16 : 16	6	6	6	408	2448	BDL	NA	0.002003455	YES
4 C636P	6 /100	OFFICE AREA	2017	9 : 19	16 : 16	5.7	5.8	5.7	417	2397.75	BDL	NA	0.002045442	YES
5 C637P	7 /100	OUTSIDE TRAILER (NORTH)	288	9 : 35	16 : 16	7	5.8	6.4	401	2566.4	BDL	NA	0.001911026	YES
6 C638P	14 /100	INSIDE TRAILER (NORTH)	T1	9 : 37	16 : 16	7.8	7.8	7.8	399	3112.2	0.002206	0.001833	0.001575881	NO
7 C639P	71 /100	CLEAN ROOM	CR1	9 : 42	17 : 17	7.8	5.8	6.8	455	3094	0.011254	0.010668	0.001585151	NO
8 C640P	11 /100	CELL V	2011	10 : 30	16 : 16	6	6.2	6.1	346	2110.6	0.002556	NA	0.002323727	NO
9 C641P	58 /100	HALLWAY OF CONTAINMENT (OUTSIDE CELL VI)	2012	10 : 30	16 : 16	6	7	6.5	346	2249	0.012648	0.009117	0.002180728	NO
10 C642P	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: THESE FILTERS WERE RUN WITH AN OPEN FACED.
 RAINED ON THE OUTSIDE PUMPS TODAY. (ON & OFF ALL DAY)

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

[Handwritten signatures]

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:656	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FT. SILL - AFTER ABATEMENT	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:0	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
643	12. /100	EAST OF CONTAINMENT - CELL 6	ER1	16 : 14	8 : 36	6 5.4 5.7	982	5597.4	0.001095	0.002240	0.000876203	NO
644	14. /100	SOUTH OF CONTAINMENT - C6	93	16 : 4	8 : 34	6 6.2 6.1	990	6039	0.001136	0.002345	0.000812130	NO
645	9 /100	OUTSIDE BLDG. ON PATIO (SOUTH)	3	16 : 9	8 : 45	6 4.8 5.4	996	5378.4	BDL	NA	0.000911880	YES
646	10 /100	OFFICE AREA	2017	16 : 1	8 : 49	6 5.6 5.8	1008	5846.4	BDL	NA	0.000838885	YES
647	17 /100	OUTSIDE TRAILER (NORTH)	288	16 : 56	8 : 54	5.8 6 5.9	958	5652.2	0.001475	0.002944	0.000867707	NO
648	12. /100	INSIDE TRAILER (NORTH)	T1	16 : 51	8 : 55	7.8 7.2 7.5	964	7230	0.000847	0.001702	0.000678348	NO
649	7 /100	CELL 6	NP	16 : 39	6 : 37	4.2 5.8 5	838	4190	BDL	NA	0.001170515	YES
650	14. /100	HALLWAY BY CELL 6	2012	16 : 39	6 : 37	7 7.8 7.4	838	6201.2	0.001146	0.002002	0.000790888	NO
651	9 /100	HALLWAY OF CONTAINMENT (OUTSIDE CELL 6)	NP	16 : 40	6 : 37	5 6 5.5	837	4603.5	BDL	NA	0.001065376	YES
652	8 /100	CELL 6	NP	16 : 39	6 : 37	4.2 5 4.6	838	3854.8	BDL	NA	0.001272299	YES
653	11 /100	CELL 6	NP	16 : 43	6 : 37	5 5.8 5.4	834	4503.6	0.001197	0.002081	0.001089008	NO
654	7 /100	CELL 5	2011	16 : 45	6 : 37	6 6.4 6.2	832	5158.4	BDL	NA	0.000950771	YES
6008	0 /100	BURL RAGLAND: 447-38-1989	P7	16 : 50	17 : 35	2 1.7 1.8	1485	2747.25	BDL	NA	0.001785224	YES
655	11 /100	CLEAN ROOM	CR1	17 : 10	8 : 59	5.8 6.2 6	949	5694	0.000947	0.001873	0.000861338	NO
656	0 /100	BLANK		:	:	0	1440	0	ERR	ERR	ERR	ERR
	/			:	:	0	1440	0	ERR	ERR	ERR	ERR

COMMENTS: AFTER ABATEMENT IN CELL 6

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY / SEI

AIRBORNE ASBESTOS SUMMARY/INDIVID. AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:N/A	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:N/A	MIDNITE (0 OR 1):	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-25-90	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-27-90	TOTAL:	: 0	FILTER PORE SIZE:	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
6001	1.5 /100	GABOR SZEKELY: 446-84-8119	P6	10 : 15	11 : 15	1.6 1.6 1.6	60	96	BDL	NA	0.051088110	YES
6002	3 /100	LEON OSBURN: 442-50-8638	P7	10 : 20	13 : 6	1.6 1.6 1.6	166	265.6	BDL	NA	0.018465582	YES
6003	1 /100	ALAN BUSCHE: 445-56-7173	P6	11 : 15	12 : 26	1.6 1.6 1.6	71	113.6	BDL	NA	0.043173051	YES
6004	1.5 /100	BOB STOUT: 564-62-0686	11524	11 : 40	12 : 45	2 2 2	65	130	BDL	NA	0.037726604	YES
6005	1 /100	BOB VANDEGRIFF	P6	12 : 51	13 : 51	1.6 1.8 1.7	60	102	BDL	NA	0.048082927	YES
6006	1 /100	BURL RAGLAND	P7	13 : 18	14 : 12	1.9 1.8 1.8	54	99.9	BDL	NA	0.049093679	YES
6007	1 /100	BRYAN KISER	11524	14 : 5	14 : 45	2 1.8 1.9	40	76	BDL	NA	0.06453235	YES
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: ALISON MYERS

Alison Myers

AIRBORNE ASBESTOS SUMMARY/1.00 DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:	MIDNITE (0 OR 1)	:	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-30-90	PER MM^2	:	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-31-90	TOTAL	:	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC6046	2 /100	GABOR SZEKELY	P1	10 : 15	12 : 55	2.2 2.2 2.2	160	352	BDL	NA	0.013933121	YES
2 PC6047	4.5 /100	LEON OSBURN	P2	10 : 15	15 : 10	2.2 2.4 2.3	295	678.5	BDL	NA	0.007228384	YES
3 PC6048	/	VOID		:	:				ERR	ERR	ERR	ERR
4 PC6049	3 /100	BURL RAGLAND	P4	11 : 38	13 :	2.4 2.4 2.4	82	196.8	BDL	NA	0.024921029	YES
5 PC6050	/	VOID		:	:				ERR	ERR	ERR	ERR
6	/			:	:				ERR	ERR	ERR	ERR
7	/			:	:				ERR	ERR	ERR	ERR
8	/			:	:				ERR	ERR	ERR	ERR
9	/			:	:				ERR	ERR	ERR	ERR
10	/			:	:				ERR	ERR	ERR	ERR
11	/			:	:				ERR	ERR	ERR	ERR
12	/			:	:				ERR	ERR	ERR	ERR
13	/			:	:				ERR	ERR	ERR	ERR
14	/			:	:				ERR	ERR	ERR	ERR
15	/			:	:				ERR	ERR	ERR	ERR
16	/			:	:				ERR	ERR	ERR	ERR

COMMENTS: PC6050-VOID NO FILTER

off to pump at unk. time. Void sample.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :CLEANUP (CLEANUP) 1436
 SAMPLED BY: :LEON OSBURN / SEI
 DATE COLLECTED: :AUGUST 24, 1990
 DATE ANALYZED: :AUGUST 25, 1990

BLANK I.D.: :N/A
 FIBERS: :
 OBSERVED- :N/A
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :DCHM
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
6015	6 /100	SOUTH	2017	4 : 50	12 : 45	6 6 6	475	2850	BDL	NA	0.001720862	YES
6016	4 /100	CENTER	8	4 : 50	12 : 45	6 5.7 5.8	475	2778.75	BDL	NA	0.001764987	YES
6017	2 /100	NORTH	2021	4 : 50	12 : 45	6 5.9 5.9	475	2826.25	BDL	NA	0.001735323	YES
6018	5 /100	CLEAN ROOM	2019	4 : 45	12 : 55	6 6 6	490	2940	BDL	NA	0.001668183	YES
6019	3 /100	NORTH OF BUILDING	3	4 : 40	13 : 15	6 5.8 5.9	515	3038.5	BDL	NA	0.001614105	YES
6020	/	VOID (NOT USED)		:	:	0	0	0	ERR	ERR	ERR	ERR
6021P	2 /100	GABOR SZEKELY	P-1	4 : 47	12 : 45	2 2 2	478	956	BDL	NA	0.005130186	YES
6022P	4.5 /100	BURL RAGLAND	P-2	4 : 47	12 : 45	2 2 2	478	956	BDL	NA	0.005130186	YES
6023P	TD /TC	LEON OSBURN	P-3	4 : 47	12 : 45	2 2 2	478	956	ERR	ERR	0.005130186	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: LOG #912002 - PHASE CONTRAST MICROSCOPY - BUILDING 1436: FLOOR TILE WAS PLACED
 INSIDE 6 MIL AB BAGS SEALED WITH DUCT TAPE THEN PLACED INSIDE A SECOND 6 MIL AB BAG
 SEALED WITH DUCT TAPE. WORKERS WORE DCHM RESP., DISPOSABLE AB SUITS, RUBBER BOOTS AND GLOVES.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

* = BELOW DETECTION LIMIT

ANALYST: ALISON MYERS / SEI

Alison Myers

AIRBORNE ASBESTOS SUMMARY/INDIV. - AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1236	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-1-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L.
1	PC1233	5 /100 OFFICE	1	6 : 40	10 : 25	2.5 6 4.2	225	956.25	BDL	NA	0.005128845	YES
2	PC1234	3 /100 NORTH (OUTSIDE AREA)	93	6 : 41	10 : 26	2.6 6.2 4.4	225	990	BDL	NA	0.004953998	YES
3	PC1235	7 /100 CLEAN ROOM	CR1	6 : 42	10 : 30	3 6.2 4.6	228	1048.8	BDL	NA	0.004676257	YES
4	PC1236	0 /100 BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
5				:	:	0	0	0	ERR	ERR	ERR	ERR
6				:	:	0	0	0	ERR	ERR	ERR	ERR
7				:	:	0	0	0	ERR	ERR	ERR	ERR
8				:	:	0	0	0	ERR	ERR	ERR	ERR
9				:	:	0	0	0	ERR	ERR	ERR	ERR
10				:	:	0	0	0	ERR	ERR	ERR	ERR
11				:	:	0	0	0	ERR	ERR	ERR	ERR
12				:	:	0	0	0	ERR	ERR	ERR	ERR
13				:	:	0	0	0	ERR	ERR	ERR	ERR
14				:	:	0	0	0	ERR	ERR	ERR	ERR
15				:	:	0	0	0	ERR	ERR	ERR	ERR
16				:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-1-90 C1233-C1236 PASSIVE
 NO ACTIVITY INSIDE CELL AT THIS TIME.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/1m DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1245	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1):	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-2-90	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL:	: 0	FILTER PORE SIZE:	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
PC1240	6 /100	HALLWAY INSIDE CONTAINMENT	2011	10 : 25	15 : 12	6 6.2 6.1	287	1750.7	BDL	NA	0.002801427	YES
PC1241	7 /100	CELL III	2012	10 : 26	15 : 12	6 5.8 5.9	286	1687.4	BDL	NA	0.002906518	YES
PC1242	15 /100	OFFICE	93	10 : 30	15 : 46	5.8 5.8 5.8	316	1832.8	0.004147	0.002730	0.002675937	NO
PC1243	4 /100	SOUTH OF CONTAINMENT	1	10 : 31	15 : 47	6 6.2 6.1	316	1927.6	BDL	NA	0.002544334	YES
PC1244	5 /100	CLEAN ROOM	CR1	10 : 29	15 : 45	6.2 6.2 6.2	316	1959.2	BDL	NA	0.002503296	YES
PC1245	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR
				:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-2-90 C1240-C1247 ABATEMENT (CELLS 1 & 7)
 FLOOR TILE REMOVED IN CELL 7. MASTIC REMOVED IN CELL 1. WORKERS WORE
 FFDC RESPIRATORS, WASHABLE AB SUITS, GLOVES, AND RUBBER BOOTS.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:	MIDNITE (0 OR 1)	:	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:08-02-90	PER MM ²	:	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:08-02-90	TOTAL	:	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM	INI.	STOP	AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC1055	13 /100	GABOR SZEKELY	P4	10 : 34	12 :	2.2	2	2.1		86	180.6	0.035303	NA	0.027156470	NO
2 PC1056	1 /100	LARRY MATTOCKS	P3	10 : 34	12 : 15	2.2	2.2	2.2		101	222.2	BDL	NA	0.022072270	YES
3 PC1057	10 /100	BRIAN KISER	P1	13 :	14 : 30	2.2	2.2	2.2		90	198	BDL	NA	0.024769992	YES
4 PC1058	12 /100	MARTIN BROWN	P4	13 :	14 : 30	2.2	2.2	2.2		90	198	0.029723	NA	0.024769992	NO
5	/			:	:							ERR	ERR	ERR	ERR
6	/			:	:							ERR	ERR	ERR	ERR
7	/			:	:							ERR	ERR	ERR	ERR
8	/			:	:							ERR	ERR	ERR	ERR
9	/			:	:							ERR	ERR	ERR	ERR
10	/			:	:							ERR	ERR	ERR	ERR
11	/			:	:							ERR	ERR	ERR	ERR
12	/			:	:							ERR	ERR	ERR	ERR
13	/			:	:							ERR	ERR	ERR	ERR
14	/			:	:							ERR	ERR	ERR	ERR
15	/			:	:							ERR	ERR	ERR	ERR
16	/			:	:							ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KIETH L. STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:	MIDNITE (0 OR 1)	:	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:08-07-90	PER MM^2	:	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:08-07-90	TOTAL	:	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC1001	TD /TC	LEON OSBURN	P1	10 : 30	12 :	2 2 2	90	180	ERR	ERR	0.027246992	ERR
2 PC1002	TD /TC	BURL RAGLAND	P4	10 : 30	12 :	2 2 2	90	180	ERR	ERR	0.027246992	ERR
3 PC1003	12 /100	GABOR SZEKELY	P3	10 : 30	12 :	2 2 2	90	180	0.032696	NA	0.027246992	NO
4	/			:	:				ERR	ERR	ERR	ERR
5	/			:	:				ERR	ERR	ERR	ERR
6	/			:	:				ERR	ERR	ERR	ERR
7	/			:	:				ERR	ERR	ERR	ERR
8	/			:	:				ERR	ERR	ERR	ERR
9	/			:	:				ERR	ERR	ERR	ERR
10	/			:	:				ERR	ERR	ERR	ERR
11	/			:	:				ERR	ERR	ERR	ERR
12	/			:	:				ERR	ERR	ERR	ERR
13	/			:	:				ERR	ERR	ERR	ERR
14	/			:	:				ERR	ERR	ERR	ERR
15	/			:	:				ERR	ERR	ERR	ERR
16	/			:	:				ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KIETH L. STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:3202	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FT. SILL - CELL #3 - BUILDING 1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:1	MIDNITE (0 OR 1):	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:JULY 31, 1990	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:JULY 31, 1990	TOTAL:	: 0	FILTER PORE SIZE:	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE IN1. STOP	CLPH AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
3197	13 /100	HALLWAY INSIDE CONTAINMENT		17 : 59	20 : 42	6	5.5 5.7	163	937.25	0.006802	NA	0.005232817	NO
3198	4 /100	CELL 5		17 : 59	20 : 43	6	6 6	164	984	BDL	NA	0.004984205	YES
3199	3 /100	OFFICE		18 : 32	20 : 57	6.2	6.2 6.2	145	899	BDL	NA	0.005455460	YES
3200	0 /100	SOUTH OF CONTAINMENT		18 : 33	20 : 57	6	6.2 6.1	144	878.4	BDL	NA	0.0055834	YES
3201	10 /100	CLEAN ROOM		18 : 35	20 : 40	6.4	6.2 6.3	125	787.5	BDL	NA	0.006227883	YES
3202	1 /100	BLANK		:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR
	/			:	:	:	:	0	0	ERR	ERR	ERR	ERR

COMMENTS: ABATEMENT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* BELOW DETECTION LIMIT

TOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEER
CERTIFIED INDUSTRIAL HYGIENE SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
PROJECT: :FT. SILL - CELL #3 - BUILDING 1436
SAMPLED BY: :LEON OSBURN
DATE COLLECTED: :JULY 31, 1990
DATE ANALYZED: :JULY 31, 1990

BLANK I.D.: :****
FIBERS: :
OBSERVED- : 0
PER MM² : 0
TOTAL : 0

MICROSCOPE: :OLYMPUS
FIELD AREA (MM²) : 0.00785
MIDNITE (0 OR 1) : 1
FILTER AREA (MM²) : 385
FILTER PORE SIZE :0.8u
RESPIRATORY PROTECTION: :N/A
ASPD=AIR SUPPLIED PD :
DCHM=DUAL CART. HALF MASK :
FFDC=FULL FACE DUAL CART. :
PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L.
3203	7 /100	HALLWAY INSIDE CONTAINMENT	2011	20 : 42	4 : 40	5.5 5.5 5.5	478	2629	BDL	NA	0.001865522	YES
3204	2 /100	CELL 4	2012	20 : 13	4 : 41	6 5.8 5.9	508	2997.2	BDL	NA	0.001636346	YES
3205	0 /100	CELL 3 NORTHEAST	2019	20 : 54	4 : 15	5.5 5.6 5.5	441	2447.55	BDL	NA	0.002003823	YES
3206	1 /100	CELL 3 NORTH CENTRAL	2013	20 : 54	4 : 16	6 5.8 5.9	442	2607.8	BDL	NA	0.001880688	YES
3207	0 /100	CELL 3 NORTH WEST	2021	20 : 54	4 : 17	5.5 5.8 5.6	443	2502.95	BDL	NA	0.001959471	YES
3208	0 /100	CELL 3 SOUTH CENTER	2020	20 : 55	4 : 20	6 6 6	445	2670	BDL	NA	0.001836875	YES
3209	3 /100	OFFICE	1	20 : 57	4 : 21	6 5.8 5.9	444	2619.6	BDL	NA	0.001872216	YES
3210	1 /100	SOUTH OF CONTAINMENT	93	20 : 57	4 : 20	6.2 6 6.1	443	2702.3	BDL	NA	0.001814920	YES
3211	18 /100	CLEAN ROOM	CR1	20 : 40	4 : 30	6.5 6.4 6.4	470	3031.5	0.002912	0.002851	0.001617832	NO
3212	0 /100	BLANK					0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR
							0	1440	0	ERR	ERR	ERR

COMMENTS: CLEARANCE

* - BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FORT SILL--DEMONSTRATION
 SAMPLED BY: :LEON OSBURN/SEI
 DATE COLLECTED: :7-23-90
 DATE ANALYZED: :7-24-90

BLANK I.D.: :C619
 FIBERS: :
 OBSERVED- : 0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u
 RESPIRATORY PROTECTION: :NA
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPP=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
C607P	5 /100	AREA SOUTH OF CONTAINMENT	2020	16 : 0	19 : 14	6.8	8.4	7.6	194	1474.4	BDL	NA	0.003326409	YES
2 C608P	6 /100	OFFICE	2017	16 : 4	19 : 12	7.1	7.2	7.1	188	1344.2	BDL	NA	0.003648607	YES
3 C609P	84 /100	HALL	2012	16 : 17	19 : 17	6.7	9.4	8.0	180	1449	0.028431	0.010661	0.003384719	NO
4 C610P	41 /100	INSIDE C5	2011	16 : 18	19 : 18	7	8	7.5	180	1350	0.014895	0.005585	0.003632932	NO
5 C611P	90. /100	INSIDE C6 WEST	2013	16 : 25	19 : 17	6.8	9.2	8	172	1376	0.032256	0.011558	0.003564286	NO
6 C612P	51 /100	INSIDE C6 CENTER	2019	16 : 26	19 : 17	6.9	8.8	7.8	171	1342.35	0.018633	0.006638	0.003653636	NO
7 C613P	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: TEST AREA WAS WET WIPED AND MOPPED. WATER WAS REMOVED FROM FLOOR WITH WET VAC.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY, INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C619	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-24-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-24-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM	STOP MIN.	AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C614P	21 /100	AREA/SOUTH OF CONTAINMENT	93	10 : 18	16 : 10	6.2	6.8	6.5	352	2288	0.004501	0.003301	0.002143557	NO
2 C615P	11 /100	AREA/OFFICE	2017	10 : 27	16 : 13	6.8	0.6	3.7	346	1284.525	0.004199	NA	0.003818110	NO
3 C616P	VOID/	VOID SAMPLE * **		:	:			0	0	0	ERR	ERR	ERR	ERR
4 C617P	41 /100	INSIDE LABORATORY TRAILER	288	10 : 55	16 : 19	5.8	7.6	6.7	324	2170.8	0.009263	0.006252	0.002259286	NO
5 C618P	84 /100	INSIDE CELL VI CENTER	2019	11 : 0	16 : 24	6.8	6.4	6.6	324	2138.4	0.019265	0.013004	0.002293517	NO
6 C619P	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
7	/			:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: THIS IS ONLY BACKGROUND TESTING. THERE IS NOTHING GOING ON IN CELL VI AT THIS TIME.
 CELL I, II, III, V ARE BEING CLEANED.

* FILTER DAMAGED--CAUSE UNKNOWN **HEAVY RAIN SHOWER BETWEEN 14:45 AND 15:15
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C624P	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-24-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C620P	15 /100	EAST ROOM	ER1	17 : 40	19 : 14	6.8 8.4 7.6	94	714.4	0.010297	NA	0.006865143	NO
2 C621P	8 /100	SOUTH OF CELL VI	93	17 : 41	19 : 12	7.1 7.2 7.1	91	650.65	BDL	NA	0.007537783	YES
3 C622P	4 /100	OFFICE	2017	17 : 52	19 : 17	6.7 9.4 8.0	85	684.25	BDL	NA	0.007167641	YES
4 C623P	2 /100	OUTSIDE OF (NORTH) TRAILER	288	17 : 56	19 : 18	7 8 7.5	82	615	BDL	NA	0.007974729	YES
5 C624P	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
6	/			:	:	0	0	0	ERR	ERR	ERR	ERR
7	/			:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: SAMPLES TAKEN DURING AGGRESSIVE TESTING. NO PPE REQUIRED.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

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CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	: 0	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-26-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C625	7 /100	EAST ROOM	ER1	21 : 5	4 : 15	6.4 6.6 6.5	430	2795	BDL	NA	0.001754725	YES
2 C626	4 /100	SOUTH OF CELL VI	93	21 : 4	4 : 16	6 6.2 6.1	432	2635.2	BDL	NA	0.001861133	YES
3 C627	0 /100	OFFICE	2017	21 : 6	4 : 17	6.6 6.6 6.6	431	2844.6	BDL	NA	0.001724129	YES
4 C628	0 /100	BLANK		:	:		0	1440	ERR	ERR	ERR	ERR
5	/			:	:		0	1440	ERR	ERR	ERR	ERR
6	/			:	:		0	1440	ERR	ERR	ERR	ERR
7	/			:	:		0	1440	ERR	ERR	ERR	ERR
8	/			:	:		0	1440	ERR	ERR	ERR	ERR
9	/			:	:		0	1440	ERR	ERR	ERR	ERR
10	/			:	:		0	1440	ERR	ERR	ERR	ERR
11	/			:	:		0	1440	ERR	ERR	ERR	ERR
12	/			:	:		0	1440	ERR	ERR	ERR	ERR
13	/			:	:		0	1440	ERR	ERR	ERR	ERR
14	/			:	:		0	1440	ERR	ERR	ERR	ERR
15	/			:	:		0	1440	ERR	ERR	ERR	ERR
16	/			:	:		0	1440	ERR	ERR	ERR	ERR

COMMENTS: NO ACTIVITY DURING SAMPLE PERIOD

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

4127 S. HARVARD
TULSA, OKLAHOMA

AIHA QUALIFIED

CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES

AIRBORNE ASBESTOS SUMMARY/IND1

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C619	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C629	4 /100	EAST ROOM	ER1	4 : 15	9 : 30	6.4 6 6.2	315	1953	BDL	NA	0.002511243	YES
2 C630	0 /100	SOUTH OF CELL VI	93	4 : 16	9 : 22	6 6 6	306	1836	BDL	NA	0.002671273	YES
3 C631	2 /100	OFFICE	2017	4 : 17	8 : 42	6 5.8 5.9	265	1563.5	BDL	NA	0.003136845	YES
4 C632	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
5	/			:	:		0	0	ERR	ERR	ERR	ERR
6	/			:	:		0	0	ERR	ERR	ERR	ERR
7	/			:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: SAMPLING DURING PASSIVE TEST. NO PPE REQUIRED

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

Keith Stanley

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C642P	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:KEITH STANLEY/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C633P	4 /100	AREA EAST OF CONTAINMENT	ER1	9 : 32	16 : 11	6 5.8 5.9	399	2354.1	BDL	NA	0.002083368	YES
2 C634P	8 /100	AREA SOUTH OF CONTAINMENT	93	9 : 22	15 : 45	6 6 6	383	2298	BDL	NA	0.002134229	YES
3 C635P	VOID/100	OUTSIDE BUILDING ON PATIO (SOUTH)	3	9 : 28	16 : 16	6 6 6	408	2448	BDL	NA	0.002003455	YES
4 C636P	6 /100	OFFICE AREA	2017	9 : 19	16 : 16	5.7 5.8 5.7	417	2397.75	BDL	NA	0.002045442	YES
5 C637P	7 /100	OUTSIDE TRAILER (NORTH)	288	9 : 35	16 : 16	7 5.8 6.4	401	2566.4	BDL	NA	0.001911026	YES
6 C638P	14 /100	INSIDE TRAILER (NORTH)	T1	9 : 37	16 : 16	7.8 7.8 7.8	399	3112.2	0.002206	0.001833	0.001575881	NO
7 C639P	71 /100	CLEAN ROOM	CR1	9 : 42	17 : 17	7.8 5.8 6.8	455	3094	0.011254	0.010668	0.001585151	NO
8 C640P	11 /100	CELL V	2011	10 : 30	16 : 16	6 6.2 6.1	346	2110.6	0.002556	NA	0.002323727	NO
9 C641P	58 /100	HALLWAY OF CONTAINMENT (OUTSIDE CELL VI)	2012	10 : 30	16 : 16	6 7 6.5	346	2249	0.012648	0.009117	0.002180728	NO
10 C642P	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: THESE FILTERS WERE RUN WITH AN OPEN FACED.
 RAINED ON THE OUTSIDE PUMPS TODAY. (ON & OFF ALL DAY)

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY, INDIVIDUAL AIR MONITORING RESULTS

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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:656	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FT. SILL - AFTER ABATEMENT	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:0	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-25-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

	SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L	
1	643	12. /100	EAST OF CONTAINMENT - CELL 6	ER1	16 : 14	8 : 36	6 5.4 5.7		982	5597.4	0.001095	0.002240	0.000876203	NO	
2	644	14 /100	SOUTH OF CONTAINMENT - C6	93	16 : 4	8 : 34	6 6.2 6.1		990	6039	0.001136	0.002345	0.000812130	NO	
3	645	9 /100	OUTSIDE BLDG. ON PATIO (SOUTH)	3	16 : 9	8 : 45	6 4.8 5.4		996	5378.4	BDL	NA	0.000911880	YES	
4	646	10 /100	OFFICE AREA	2017	16 : 1	8 : 49	6 5.6 5.8		1008	5846.4	BDL	NA	0.000838885	YES	
5	647	17 /100	OUTSIDE TRAILER (NORTH)	288	16 : 56	8 : 54	5.8 6 5.9		958	5652.2	0.001475	0.002944	0.000867707	NO	
6	648	12. /100	INSIDE TRAILER (NORTH)	T1	16 : 51	8 : 55	7.8 7.2 7.5		964	7230	0.000847	0.001702	0.000678348	NO	
7	649	7 /100	CELL 6	NP	16 : 39	6 : 37	4.2 5.8 5		838	4190	BDL	NA	0.001170515	YES	
8	650	14. /100	HALLWAY BY CELL 6	2012	16 : 39	6 : 37	7 7.8 7.4		838	6201.2	0.001146	0.002002	0.000790888	NO	
9	651	9 /100	HALLWAY OF CONTAINMENT (OUTSIDE CELL 6)	NP	16 : 40	6 : 37	5 6 5.5		837	4603.5	BDL	NA	0.001065376	YES	
10	652	8 /100	CELL 6	NP	16 : 39	6 : 37	4.2 5 4.6		838	3854.8	BDL	NA	0.001272299	YES	
11	653	11 /100	CELL 6	NP	16 : 43	6 : 37	5 5.8 5.4		834	4503.6	0.001197	0.002081	0.001089008	NO	
12	654	7 /100	CELL 5	2011	16 : 45	6 : 37	6 6.4 6.2		832	5158.4	BDL	NA	0.000950771	YES	
13	6008	0 /100	BURL RAGLAND: 447-38-1989	P7	16 : 50	17 : 35	2 1.7 1.8		1485	2747.25	BDL	NA	0.001785224	YES	
14	655	11 /100	CLEAN ROOM	CR1	17 : 10	8 : 59	5.8 6.2 6		949	5694	0.000947	0.001873	0.000861338	NO	
15	656	0 /100	BLANK		:	:		0	1440	0	ERR	ERR	ERR	ERR	
16		/			:	:		0	1440	0	ERR	ERR	ERR	ERR	

COMMENTS: AFTER ABATEMENT IN CELL 6

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY / SEI

Keith L. Stanley

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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:N/A	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:N/A	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-25-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-27-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L.
6001	1.5 / 100	GABOR SZEKELY: 446-84-8119	P6	10 : 15	11 : 15	1.6 1.6	1.6	60	96	BDL	NA	0.051088110	YES
6002	3 / 100	LEON OSBURN: 442-50-8638	P7	10 : 20	13 : 6	1.6 1.6	1.6	166	265.6	BDL	NA	0.018465582	YES
6003	1 / 100	ALAN BUSCHE: 445-56-7173	P6	11 : 15	12 : 26	1.6 1.6	1.6	71	113.6	BDL	NA	0.043173051	YES
6004	1.5 / 100	BOB STOUT: 564-62-0686	11524	11 : 40	12 : 45	2 2	2	65	130	BDL	NA	0.037726604	YES
6005	1 / 100	BOB VANDEGRIFF	P6	12 : 51	13 : 51	1.6 1.8	1.7	60	102	BDL	NA	0.048082927	YES
6006	1 / 100	BURL RAGLAND	P7	13 : 18	14 : 12	1.9 1.8	1.8	54	99.9	BDL	NA	0.049093679	YES
6007	1 / 100	BRYAN KISER	11524	14 : 5	14 : 45	2 1.8	1.9	40	76	BDL	NA	0.06453235	YES
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR
							0	0	0	ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: ALISON MYERS

Alison Myers

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:	MIDNITE (0 OR 1)	:	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-30-90	PER MM^2	:	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-31-90	TOTAL	:	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC6046	2 /100	GABOR SZEKELY	P1	10 : 15	12 : 55	2.2 2.2 2.2	160	352	BDL	NA	0.013933121	YES
2 PC6047	4.5 /100	LEON OSBURN	P2	10 : 15	15 : 10	2.2 2.4 2.3	295	678.5	BDL	NA	0.007228384	YES
3 PC6048	/	VOID		:	:				ERR	ERR	ERR	ERR
4 PC6049	3 /100	BURL RAGLAND	P4	11 : 38	13 :	2.4 2.4 2.4	82	196.8	BDL	NA	0.024921029	YES
5 PC6050	/	VOID		:	:				ERR	ERR	ERR	ERR
6	/			:	:				ERR	ERR	ERR	ERR
7	/			:	:				ERR	ERR	ERR	ERR
8	/			:	:				ERR	ERR	ERR	ERR
9	/			:	:				ERR	ERR	ERR	ERR
10	/			:	:				ERR	ERR	ERR	ERR
11	/			:	:				ERR	ERR	ERR	ERR
12	/			:	:				ERR	ERR	ERR	ERR
13	/			:	:				ERR	ERR	ERR	ERR
14	/			:	:				ERR	ERR	ERR	ERR
15	/			:	:				ERR	ERR	ERR	ERR
16	/			:	:				ERR	ERR	ERR	ERR

COMMENTS: PC6050-VOID NO FILTER

off to pump at unk. time. Void sample.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1161	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-30-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM	INITIAL	STOP	AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1155	11 /100	HALLWAY INSIDE CONTAINMENT		12 : 16	16 : 20	6	5.9	5.9		244	1451.8	0.003716	NA	0.003378191	NO
2 C1156	4 /100	CELL 11		12 : 17	16 : 21	6	6	6		244	1464	BDL	NA	0.00335004	YES
3 C1157	21 /100	CLEAN ROOM	CR1	12 : 8	16 : 1	6.3	7.4	6.8		233	1596.05	0.006453	0.003132	0.003072872	NO
4 C1158	6 /100	OFFICE	1	12 : 4	15 : 55	6	6	6		231	1386	BDL	NA	0.003538570	YES
5 C1159	1.5 /100	AREA SOUTH OF CONTAINMENT	93	12 : 2	15 : 58	5.8	6	5.9		236	1392.4	BDL	NA	0.003522305	YES
6 C1160	3 /100	AREA EAST OF CONTAINMENT	ER1	12 : 6	15 : 59	5.8	6	5.9		233	1374.7	BDL	NA	0.003567657	YES
7 C1161	0 /100	BLANK		:	:			0		0	0	ERR	ERR	ERR	ERR
8	/			:	:			0		0	0	ERR	ERR	ERR	ERR
9	/			:	:			0		0	0	ERR	ERR	ERR	ERR
10	/			:	:			0		0	0	ERR	ERR	ERR	ERR
11	/			:	:			0		0	0	ERR	ERR	ERR	ERR
12	/			:	:			0		0	0	ERR	ERR	ERR	ERR
13	/			:	:			0		0	0	ERR	ERR	ERR	ERR
14	/			:	:			0		0	0	ERR	ERR	ERR	ERR
15	/			:	:			0		0	0	ERR	ERR	ERR	ERR
16	/			:	:			0		0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-30-90 C1155-C1161 ABATEMENT
 FLOOR TILE REMOVED WITH STRAIGHT HOE. ALL WORKERS WORE FFDC RESPIRATORS,
 WASHABLE AB SUITS, GLOVES, AND RUBBER BOOTS.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

* = BELOW DETECTION LIMIT

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/. DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1154	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-30-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1148	1 /100	HALLWAY BY CELL III	2012	6 : 33	12 : 16	6 6 6	343	2058	BDL	NA	0.002383118	YES
2 C1149	4 /100	CELL II	2011	6 : 34	12 : 17	6 6 6	343	2058	BDL	NA	0.002383118	YES
3 C1150	17 /100	CLEAN ROOM	CR1	7 : 26	12 : 8	7.2 6.7 6.9	282	1959.9	0.004254	NA	0.002502402	NO
4 C1151	7 /100	OFFICE	1	7 : 44	12 : 4	6 6 6	260	1560	BDL	NA	0.003143883	YES
5 C1152	5 /100	AREA SOUTH OF CONTAINMENT	93	7 : 36	12 : 5	5.8 5.8 5.8	269	1560.2	BDL	NA	0.003143480	YES
6 C1153	0 /100	AREA EAST OF CONTAINMENT	ER1	7 : 30	12 : 5	7.2 6.2 6.7	275	1842.5	BDL	NA	0.00266185	YES
7 C1154	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: C1148-C1154 7-30-90 PCM
 PASSIVE

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

STANLEY ENGINEERING, INC.
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 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1172	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 1	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-30-90	PER MM^2	:1.2	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	:490	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1162	6 /100	HALLWAY BY CELL I	2011	16 : 20	4 : 35	6 5.8 5.9	735	4336.5	BDL	NA	0.001130971	YES
2 C1163	4 /100	CELL 11	2012	16 : 20	4 : 35	5.9 6 5.9	735	4373.25	BDL	NA	0.001121467	YES
3 C1164	3 /100	AREA NORTHEAST OF CELL I	2019	16 : 28	4 : 37	6 5.6 5.8	729	4228.2	BDL	NA	0.001159940	YES
4 C1165	7 /100	AREA NORTH CENTER OF CELL I	2013	16 : 28	4 : 37	6 5.8 5.9	729	4301.1	BDL	NA	0.001140280	YES
5 C1166	15 /100	AREA NORTH WEST OF CELL I	2021	16 : 28	4 : 37	6 6 6	729	4374	0.001569	0.002384	0.001121275	NO
6 C1167	8 /100	AREA SOUTH WEST OF CELL I	2017	16 : 28	4 : 37	6 5.8 5.9	729	4301.1	BDL	NA	0.001140280	YES
7 C1168	3 /100	EAST ROOM	ER1	15 : 59	4 : 37	5.8 6 5.9	758	4472.2	BDL	NA	0.001096654	YES
8 C1169	4 /100	AREA SOUTH OF CONTAINMENT	93	15 : 58	6 : 15	6.2 6 6.1	857	5227.7	BDL	NA	0.000938167	YES
9 C1170	5 /100	OFFICE	1	15 : 55	6 : 12	6 6.6 6.3	857	5399.1	BDL	NA	0.000908384	YES
10 C1171	17 /100	CLEAN ROOM	CR1	16 : 2	:	5.9 :	478	1410.1	0.005564	0.005541	0.003478092	NO
11 C1172	1 /100	BLANK		:	:	0	1440	0	ERR	ERR	ERR	ERR
12	/			:	:	0	1440	0	ERR	ERR	ERR	ERR
13	/			:	:	0	1440	0	ERR	ERR	ERR	ERR
14	/			:	:	0	1440	0	ERR	ERR	ERR	ERR
15	/			:	:	0	1440	0	ERR	ERR	ERR	ERR
16	/			:	:	0	1440	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-30-90 C1162-C1172
 AFTER ABATEMENT
 NO ACTIVITY IN CELL DURING CLEARANCE TEST.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

Keith Stanley

AIRBORNE ASBESTOS SUMMARY/IND. CAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C3129	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-29-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C3123	11 /100	CELL IV	2011	8 : 16	12 : 10	6 5.9 5.9	234	1392.3	0.003874	NA	0.003522558	NO
2 C3124	6 /100	HALLWAY IN AREA	2012	8 : 16	12 : 10	6 6 6	234	1404	BDL	NA	0.003493204	YES
3 C3125	21 /100	CLEAN ROOM	CR1	9 : 16	12 : 46	8.4 7.8 8.1	210	1701	0.006054	NA	0.002883279	NO
4 C3126	9 /100	AREA SOUTH OF CONTAINMENT	93	8 : 48	12 : 30	6 6 6	222	1332	BDL	NA	0.003682026	YES
5 C3127	4 /100	EAST ROOM	ER1	9 : 13	12 : 33	6.2 6.1 6.1	200	1230	BDL	NA	0.003987364	YES
6 C3128	11 /100	OFFICE	1	8 : 47	12 : 35	6.6 7.1 6.8	228	1561.8	0.003454	NA	0.003140260	NO
7 C3129	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-29-90 C3123-C3129
 PASSIVE TEST DURING SAMPLE PERIOD.
 NO ACTIVITY AT THIS TIME.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
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P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C3136	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-29-90	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
C3130	0 /100	CELL II	2011	12 : 10	15 : 56	5.9 5.9 5.9	226	1333.4	BDL	NA	0.00367816	YES
C3131	9 /100	HALLWAY INSIDE CONTAINMENT	2012	12 : 10	15 : 55	6 6 6	225	1350	BDL	NA	0.003632932	YES
C3132	21 /100	CLEAN ROOM	CR1	12 : 45	16 : 37	7.4 6 6.7	232	1554.4	0.006625	0.003202	0.003155210	NO
C3133	2 /100	AREA EAST OF CONTAINMENT	ER1	12 : 34	16 : 34	6 6 6	240	1440	BDL	NA	0.003405874	YES
C3134	4 /100	AREA SOUTH OF CONTAINMENT	93	12 : 31	16 : 32	6 6 6	241	1446	BDL	NA	0.003391741	YES
C3135	7 /100	OFFICE	1	12 : 35	16 : 28	7.3 5.8 6.5	233	1526.15	BDL	NA	0.003213615	YES
C3136	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: C3130-C3136 7-29-90 ABATEMENT
FLOOR TILE WAS REMOVED WITH STRAIGHT HOES. ALL WORKERS WORE FFDC RESPIRATORS,
WASHABLE AB SUITS, GLOVES, AND BOOTS.
THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C3147	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-29-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C3137	4 /100	NORTH EAST CELL III	2019	16 : 2	6 : 30	6 6 6	868	5208	BDL	NA	0.000941716	YES
2 C3138	2 /100	NORTH CENTER CELL III	2013	16 : 2	6 : 30	6 6.4 6.2	868	5381.6	BDL	NA	0.000911338	YES
3 C3139	3 /100	NORTH WEST CELL III	2021	16 : 2	6 : 30	6 6 6	868	5208	BDL	NA	0.000941716	YES
4 C3140	7 /100	SOUTH CENTER CELL III	2020	16 : 2	6 : 30	6 6.4 6.2	868	5381.6	BDL	NA	0.000911338	YES
5 C3141	5 /100	HALLWAY BY CELL III	2012	15 : 55	6 : 32	6 6 6	877	5262	BDL	NA	0.000932052	YES
6 C3142	3 /100	CELL III	2011	15 : 56	6 : 33	6 6.5 6.2	877	5481.25	BDL	NA	0.000894770	YES
7 C3143	14 /100	CLEAN ROOM	CR1	16 : 38	7 : 25	6 7.2 6.6	887	5854.2	0.001172	0.002167	0.000837767	NO
8 C3144	12 /100	OFFICE	1	16 : 30	7 : 40	5.8 7.2 6.5	910	5915	0.000994	0.001886	0.000829156	NO
9 C3145	11. /100	SOUTH OF CONTAINMENT	93	16 : 33	7 : 33	6 5.8 5.9	900	5310	0.001062	0.001991	0.000923626	NO
10 C3146	6 /100	EAST OF CONTAINMENT	ER1	16 : 35	7 : 30	6 7.2 6.6	895	5907	BDL	NA	0.000830279	YES
11 C3147	0 /100	BLANK		:	:		1440	0	ERR	ERR	ERR	ERR
12	/			:	:		1440	0	ERR	ERR	ERR	ERR
13	/			:	:		1440	0	ERR	ERR	ERR	ERR
14	/			:	:		1440	0	ERR	ERR	ERR	ERR
15	/			:	:		1440	0	ERR	ERR	ERR	ERR
16	/			:	:		1440	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-29-90 C3137-C3147
 NO ACTIVITY; SAMPLE PERIOD FOR CLEARANCES.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

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CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	:	MIDNITE (0 OR 1)	:	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:07-29-90	PER MM^2	:	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:07-30-90	TOTAL	:	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC3032	11. /100	BURL RAGLAND	P1	12 :	13 : 30	2.2	2.2	2.2	90	198	0.028485	NA	0.024769992	NO
2 PC3033	13. /100	GABOR SZEKLEY	P3	12 :	13 : 30	2.2	2.2	2.2	90	198	0.033439	NA	0.024769992	NO
3 PC3034	14 /100	ALAN BUSCHE	P2	13 : 5	14 : 29	2.2	2.2	2.2	84	184.8	0.037154	NA	0.026539278	NO
4 PC3035	9 /100	BOB STOUT	P4	13 : 5	14 : 28	2.2	2.2	2.2	83	182.6	BDL	NA	0.026859028	YES
5 PC3036	10 /100	BOB VANDEGRIFF	P1	14 :	15 : 42	2.2	2	2.1	102	214.2	BDL	NA	0.022896632	YES
6 PC3037	24 /100	LEON OSBURN	P3	14 : 2	16 : 10	2.2	2.2	2.2	128	281.6	0.041799	NA	0.017416401	NO
7	/			:	:						ERR	ERR	ERR	ERR
8	/			:	:						ERR	ERR	ERR	ERR
9	/			:	:						ERR	ERR	ERR	ERR
10	/			:	:						ERR	ERR	ERR	ERR
11	/			:	:						ERR	ERR	ERR	ERR
12	/			:	:						ERR	ERR	ERR	ERR
13	/			:	:						ERR	ERR	ERR	ERR
14	/			:	:						ERR	ERR	ERR	ERR
15	/			:	:						ERR	ERR	ERR	ERR
16	/			:	:						ERR	ERR	ERR	ERR

COMMENTS:

followed by final clean. * Power
 off to pump at unk. time. Void sample.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY/SEI

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 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:PC5232	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1):	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-1-90	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL:	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPH) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC5219	2 /100	CELL II NORTH EAST	3	18 : 9	5 : 20	6 5.8 5.9	671	3958.9	BDL	NA	0.001238843	YES
2 PC5220	3 /100	CELL II NORTH CENTRAL	LM1	18 : 9	5 : 20	5.8 5.6 5.7	671	3824.7	BDL	NA	0.001282312	YES
3 PC5221	4 /100	CELL II NORTH WEST	2	18 : 9	5 : 20	5.8 5.6 5.7	671	3824.7	BDL	NA	0.001282312	YES
4 PC5222	3 /100	CELL II SOUTH WEST	288	18 : 9	5 : 20	5.6 6 5.8	671	3891.8	BDL	NA	0.001260203	YES
5 PC5223	6 /100	HALLWAY INSIDE CONTAINMENT	2011	18 : 15	5 : 21	6 6 6	666	3996	BDL	NA	0.001227342	YES
6 PC5224	3 /100	CELL III	2012	18 : 15	5 : 22	6 6 6	667	4002	BDL	NA	0.001225501	YES
7 PC5225	4 /100	CELL V	2019	18 : 19	5 : 24	6 5.8 5.9	665	3923.5	BDL	NA	0.001250021	YES
8 PC5226	5 /100	CELL V	2013	18 : 19	5 : 24	6 6 6	665	3990	BDL	NA	0.001229187	YES
9 PC5227	4 /100	CELL V	2021	18 : 19	5 : 24	6 5.8 5.9	665	3923.5	BDL	NA	0.001250021	YES
10 PC5228	5 /100	CELL V	2017	18 : 19	5 : 24	6 5.8 5.9	665	3923.5	BDL	NA	0.001250021	YES
11 PC5229	6 /100	OFFICE	1	18 : 21	6 : 40	6 6.2 6.1	739	4507.9	BDL	NA	0.001087969	YES
12 PC5230	3 /100	SOUTH OF CONTAINMENT	93	18 : 21	6 : 41	6.4 6.2 6.3	740	4662	BDL	NA	0.001052007	YES
13 PC5231	19 /100	CLEAN ROOM	CR1	18 : 22	6 : 42	6.2 6 6.1	740	4514	0.002064	0.003182	0.001086499	NO
14 PC5232	0 /100	BLANK		:	:	0	1440	0	ERR	ERR	ERR	ERR
15	/			:	:	0	1440	0	ERR	ERR	ERR	ERR
16	/			:	:	0	1440	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-1-90 C5227-C5240 AFTER ABATEMENT
 NO ACTIVITY INSIDE CELL DURING CLEARANCE TEST.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

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CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	: 0	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL DEMONSTRATION	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:08-01-90	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:08-02-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1	PC5051	1 / 100	GABOR SZEKELY	P1	11 : 40	13 : 55	2.2 2.2 2.2	135	297	BDL	NA	0.016513328	YES
2	PC5052	9.5 / 100	LARRY MATTOCKS	P2	11 : 40	15 : 35	2.2 2.1 2.1	235	505.25	BDL	NA	0.009706993	YES
3	PC5053	3 / 100	LEON OSBURN	P3	13 : 50	18 : 15	2.1 2.1 2.1	265	556.5	BDL	NA	0.008813043	YES
4	PC5054	2 / 100	MARY MOORE	P4	15 : 10	17 : 30	2.2 2.2 2.2	140	308	BDL	NA	0.015923566	YES
5		/			:	:	0	0	0	ERR	ERR	ERR	ERR
6		/			:	:	0	0	0	ERR	ERR	ERR	ERR
7		/			:	:	0	0	0	ERR	ERR	ERR	ERR
8		/			:	:	0	0	0	ERR	ERR	ERR	ERR
9		/			:	:	0	0	0	ERR	ERR	ERR	ERR
10		0 / 0		0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
11	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
12	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
13	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
14	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
15	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR
16	0	0 / 0	0	0	0 : 0	0 : 0	0 0 0	0	0	ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KIETH L. STANLEY/SEI

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 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C4266	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--1436	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 2	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:8-3-90	PER MM ²	:2.5	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-8-90	TOTAL	:980	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
PC4261	2 /100	HALLWAY NORTH	2011	6 : 20	10 : 14	6 5.8 5.9	234	1380.6	BDL	NA	0.003552411	YES
PC4262	12 /100	HALLWAY SOUTH	2012	6 : 20	10 : 15	6 5.8 5.9	235	1386.5	BDL	NA	0.003537294	YES
PC4263	18 /100	CLEAN ROOM	CR1	6 : 30	10 : 38	6.2 6.2 6.2	248	1537.6	0.005103	NA	0.003189684	NO
PC4264	1.5 /100	OUTSIDE NORTH	93	6 : 31	10 : 37	5.8 5.8 5.8	246	1426.8	BDL	NA	0.003437383	YES
PC4265	3 /100	OFFICE	1	6 : 32	10 : 35	6 6 6	243	1458	BDL	NA	0.003363826	YES
PC4266	2 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-3-90 C4261-C4266 PASSIVE (CELLS 4 & 7)
 NO ACTIVITY IN CELL DURING PASSIVE TEST.

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CLIENT: :CORP OF ENGINEERS
 PROJECT: :FORT SILL--1436
 SAMPLED BY: :LEON OSBURN/SEI
 DATE COLLECTED: :8-3-90
 DATE ANALYZED: :8-8-90

BLANK I.D.: :PC4272
 FIBERS: :
 OBSERVED- : 0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :NA
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
PC4267	4 /100	HALLWAY NORTH	2011	10 : 14	15 : 30	6	5.8	5.9	316	1864.4	BDL	NA	0.002630582	YES
2 PC4268	3 /100	HALLWAY SOUTH	2012	10 : 15	15 : 30	6	6	6	315	1890	BDL	NA	0.002594951	YES
3 PC4269	24 /100	CLEAN ROOM	CR1	10 : 38	15 : 45	6	6.2	6.1	307	1872.7	0.006285	0.004020	0.002618923	NO
4 PC4270	4 /100	OUTSIDE NORTH	93	10 : 37	15 : 46	6	5.8	5.9	309	1823.1	BDL	NA	0.002690175	YES
5 PC4271	4 /100	OFFICE	1	10 : 35	15 : 47	6	5.6	5.8	312	1809.6	BDL	NA	0.002710244	YES
6 PC4272	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
7	/			:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 8-3-90 C4267-C4272 ABATEMENT-MASTIC (CELLS 4 & 7)

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 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FT. SILL - CELL #6 - BUILDING 1436
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :JULY 31, 1990
 DATE ANALYZED: :AUGUST 1, 1990

BLANK I.D.: :****
 FIBERS: :
 OBSERVED- : 0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u
 RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
6173	3 /100	HALLWAY BY CELL 5	2011	4 : 35	10 : 25	6 6 6	350	2100	BDL	NA	0.002335456	YES
6174	2 /100	CELL 5	2012	4 : 36	10 : 25	6 5.6 5.8	349	2024.2	BDL	NA	0.002422912	YES
6175	0 /100	EAST ROOM	ER1	6 : 15	11 : 25	6 5.8 5.9	310	1829	BDL	NA	0.002681497	YES
6176	11 /100	SOUTH OF CONTAINMENT	93	6 : 12	10 : 25	6 5.6 5.8	253	1467.4	0.003676	NA	0.003342277	NO
6177	2 /100	OFFICE	1	6 : 10	10 : 55	6 6 6	285	1710	BDL	NA	0.002868104	YES
6178	25 /100	CLEAN ROOM	CR1	6 : 20	15 : 36	6 5.8 5.9	556	3280.4	0.003737	0.004329	0.001495079	NO
6179	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: NO ACTIVITY DURING PASSIVE TEST
 PASSIVE
 MASTIC

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FORT SILL - BLDG 1436 - CELL #6
 SAMPLED BY: :LEON OSBURN/SEI
 DATE COLLECTED: :JULY 31, 1990
 DATE ANALYZED: :AUGUST 1, 1990

BLANK I.D.: :6186
 FIBERS: :
 OBSERVED- :0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
6180	7 /100	HALLWAY BY CELL 6	2011	10 : 36	14 : 48	6 6 6	252	1512	BDL	NA	0.003243689	YES
6181	6 /100	CELL 5	2012	10 : 36	14 : 48	6 6.5 6.2	252	1575	BDL	NA	0.003113942	YES
6182	2 /100	OFFICE	1	10 : 55	15 : 27	6 6.2 6.1	272	1659.2	BDL	NA	0.002955917	YES
6183	2 /100	SOUTH OF CONTAINMENT	93	11 : 0	15 : 24	5.8 6 5.9	264	1557.6	BDL	NA	0.003148727	YES
6184	0 /100	EAST ROOM	ER1	11 : 2	13 : 44	5.8 6 5.9	162	955.8	BDL	NA	0.005131260	YES
6185	27 /100	CLEAN ROOM	CR1	10 : 46	15 : 20	6.2 6 6.1	274	1671.4	0.007922	0.004522	0.002934341	NO
6186	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: ABATEMENT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:****	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FORT SILL - BLDG 1436 - CELL #6	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 1	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:JULY 31, 1990	PER MM^2	:1.2	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:AUGUST 1, 1990	TOTAL	:490	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM) AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L	
6187	2 /100	NORTH EAST CELL 6		14 : 44	18 : 13	6	6	6	209	1254	BDL	NA	0.003911051	YES	
6188	2 /100	NORTH CENTER CELL 6		14 : 44	18 : 13	6	5.8	5.9	209	1233.1	BDL	NA	0.003977340	YES	
6189	0 /100	SOUTH EAST CELL 6		14 : 44	18 : 13	6	7	6.5	209	1358.5	BDL	NA	0.003610201	YES	
6190	1 /100	SOUTH CENTER CELL 6		14 : 44	18 : 13	6	6	6	209	1254	BDL	NA	0.003911051	YES	
6191	5 /100	HALLWAY BY CELL 6	2011	14 : 48	17 : 59	6	5.8	5.9	191	1126.9	BDL	NA	0.004352168	YES	
6192	3 /100	CELL 5	2012	14 : 48	17 : 59	6	6	6	191	1146	BDL	NA	0.004279632	YES	
6193	0 /100	OFFICE	1	15 : 27	18 : 32	6.2	6.4	6.3	185	1165.5	BDL	NA	0.004208029	YES	
6194	0 /100	SOUTH OF CONTAINMENT	93	15 : 24	18 : 32	6	6	6	188	1128	BDL	NA	0.004347924	YES	
6195	18 /100	CLEAN ROOM	CR1	15 : 21	18 : 35	6.2	5.8	6	194	1164	0.007162	NA	0.004213452	NO	
6196	1 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	
	/			:	:			0	0	0	ERR	ERR	ERR	ERR	

COMMENTS: AFTER ABATEMENT

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

AIRBORNE ASBESTOS SUMMARY/INL. DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
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 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C5108	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-28-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
C5102	11 /100	CELL IV	2011	8 : 50	13 : 12	6 5.8 5.9	262	1545.8	0.003490	NA	0.003172764	NO
C5103	6 /100	HALLWAY IN AREA	2012	8 : 48	13 : 13	6 5.8 5.9	265	1563.5	BDL	NA	0.003136845	YES
C5104	38 /100	CLEAN ROOM	CR1	9 : 24	15 : 17	8.2 8 8.1	353	2859.3	0.006518	0.004793	0.001715265	NO
C5105	3 /100	AREA SOUTH OF CONTAINMENT	93	9 : 9	15 : 14	6.4 6.2 6.3	365	2299.5	BDL	NA	0.002132837	YES
C5106	3 /100	EAST ROOM	ER1	9 : 13	15 : 15	6.4 6.5 6.4	362	2334.9	BDL	NA	0.002100500	YES
C5107	2 /100	OFFICE	1	9 : 15	15 : 30	6.2 3.5 4.8	375	1818.75	BDL	NA	0.002696609	YES
C5108	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-28-90 C5102-C5108
 NO ACTIVITY DURING SAMPLE PERIOD.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

AIRBORNE ASBESTOS SUMMARY/INL DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
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 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C5115	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-28-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L.
1 C5109	11 /100	CELL IV	2011	13 : 12	16 : 53	6 5.6 5.8	221	1281.8	0.004208	NA	0.003826227	NO
2 C5110	8 /100	HALLWAY IN AREA	2012	13 : 13	16 : 53	6 5.8 5.9	220	1298	BDL	NA	0.003778473	YES
3 C5111	31 /100	CLEAN ROOM	CR1	15 : 17	17 : 22	8.2 8.8 8.5	125	1062.5	0.014309	NA	0.004615961	NO
4 C5112	3 /100	AREA SOUTH OF CONTAINMENT	93	15 : 14	17 : 15	6.4 5.2 5.8	121	701.8	BDL	NA	0.006988399	YES
5 C5113	4 /100	AREA EAST OF CONTAINMENT	ER1	15 : 15	17 : 14	6.4 5.5 5.9	119	708.05	BDL	NA	0.006926712	YES
6 C5114	6 /100	OFFICE AREA	1	15 : 30	17 : 17	4.5 6.2 5.3	107	572.45	BDL	NA	0.008567488	YES
7 C5115	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-28-90 C5109-C5115 ABATEMENT
 FLOOR TILE WAS REMOVED WITH STRAIGHT HOES. ALL WORKERS WORE FFDC RESPIRATORS,
 WASHABLE AB SUITS, GLOVES, AND BOOTS.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C5122	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--B1436	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	: 0	MIDNITE (0 OR 1):	: 1	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-28 & 29-90	PER MM ² :	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:8-3-90	TOTAL:	: 0	FILTER PORE SIZE:	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C5116	3 /100	CELL IV	N/R	:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
2 C5117	1 /100	HALLWAY IN AREA	N/R	:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
3 C5118	32 /100	CLEAN ROOM	CR1	17 : 24	9 : 15	9.5	8	8.7	951	8321.25	0.001886	0.003736	0.000589389	NO
4 C5119	9 /100	AREA SOUTH OF CONTAINMENT	93	17 : 15	8 : 48	5.2	6.2	5.7	933	5318.1	BDL	NA	0.000922220	YES
5 C5120	11 /100	EAST ROOM	ER1	17 : 14	9 : 13	5.5	6.5	6	959	5754	0.000937	0.001873	0.000852356	NO
6 C5121	6 /100	OFFICE	1	17 : 18	8 : 47	6.8	3.5	5.1	929	4784.35	BDL	NA	0.001025104	YES
7 C5122	0 /100	BLANK		:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
8	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
9	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
10	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
11	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
12	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
13	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
14	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
15	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR
16	/			:	:	:	:	0	1440	0	ERR	ERR	ERR	ERR

COMMENTS: PCM 7-28 & 29-90 C5116-C5122
 CLEARANCES RAN FOR SAMPLE PERIOD. NO ACTIVITY IN CELL.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

Keith Stanley

**THE EVALUATION OF ASBESTOS FIBER RELEASE
FROM THE REMOVAL OF ASBESTOS CONTAINING FLOOR TILE
AND THE RESULTING EXPOSURE POTENTIAL UTILIZING
MULTIPLE
AGGRESSIVE TECHNIQUES OF REMOVAL**

CONTRACT NO. DACA56-88-D-0054 DELIVERY ORDER NO. "3"

**TESTING/SAMPLING PROTOCOL FOR THE REMOVAL OF NON-
FRIABLE
ASBESTOS (FLOOR TILE)**

MAY, 1990

DEVELOPED BY:

**STANLEY ENGINEERING INC.
2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLAHOMA 73112
(405) 948-6505**

INTRODUCTION

The following asbestos testing protocols are established for the purpose of determining the extent of asbestos fiber release while utilizing varying aggressive techniques to remove asbestos containing floor tile. Through this effort, it is the intent that the following test protocol will reflect an extent of sampling/testing sufficient to provide for an adequate defense of findings when presented to the scientific community, regulators, or others who would find value from the conclusions of testing. Only current state-of-the-art testing methodologies will be utilized as a basis from which conclusions of this study shall be drawn.

In order to assure that this project has as a basis a known and quantifiable base from which to begin, prior to the initiation the removal techniques, floor tile shall be tested in order to determine both the percent and type of asbestos within each visually distinguishable type of floor tile. Beyond this, the mastic shall also be tested and quantified with regard to percent and type of asbestos. These determinations shall be accomplished by utilizing Polarized Light/Dispersion Staining Microscopy with follow up analysis by Scanning Electron Microscopy (SEM) and/or Transmission Electron Microscopy (TEM) as may be necessary in order to achieve reliability in the quantification of asbestos. Beyond this, requirements of the Asbestos Hazard Emergency Response Act (AHERA) shall be implemented in sample collection within homogeneous areas and use constraints as well as sampling strategies and personnel qualifications. The precise methodologies utilized for preparation of samples will be detailed as apart of the final report, but shall be those methodologies considered to be current in the state-of-the-art.

Background air sampling shall be accomplished within each structure to include as a minimum, the area of the proposed floor tile removal, adjacent to the removal area and external to the removal area. In all instances where monitoring is accomplished, adequate volumes of air will be collected to assure that the minimum detection limit will be achieved.

It is not anticipated that this project will utilize a decontamination facility, negative air pressure, negative air pressure recording, room air changes, or complete preparation on walls and ceiling. It is anticipated that personnel protective equipment will be adequate as demonstrated by sampling results. Should results reflect the need to establish a decontamination facility, negative air pressure, etc., then this will be accomplished in order for the project to proceed.

ANALYTICAL METHODS

This testing program has been designed in order to assure that test results are complete, accurate and meaningful. This program of testing includes both Phase Contrast Microscopy (PCM), a total fiber counting technique, as well as Transmission Electron Microscopy (TEM), an asbestos fiber differentiating technique and may include, if necessary, Scanning Electron Microscopy (SEM) should a recognized need be established. The purpose of employing these techniques, is in order to assure that fibers counted as a result of asbestos containing floor tile ("tile") removal, are asbestos.

Bulk materials shall be analyzed by the utilization of Polarized Light/Dispersion Staining Microscopy as specified by EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples (latest revision).

Only recognized methodologies shall be utilized in the development of analytical results inclusive of NIOSH 7400, Revised 5-15-89, further analysts shall be participants in the Proficiency Analytical Testing (PAT) Program for the past six successive rounds. Additionally, laboratory shall be a participant in the National Institute of Science and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP). Analysts shall have attended McCrone Institute as a minimum.

Beyond this, all personnel involved in the collection of samples with specific regard to this project, shall have, as a minimum, attended a forty hour NIOSH 582 Course or its equivalency in "Sampling and Analysis for Asbestos Dust" Each individual shall further, have been involved, in a minimum of five asbestos abatement projects, with the responsibility for the collection and analysis of samples by the NIOSH 582 Procedure and Phase Contrast Microscopy. All work shall be accomplished at the specific direction of a Certified Industrial Hygienist, in the Comprehensive Practice of Industrial Hygiene.

Finally, a minimum of five percent of all air samples collected shall be analyzed by an equivalently qualified (NVLAP, PAT, etc.) outside laboratory. Duplicate sampling shall also constitute a portion of this project, with the intent and interest being reproducibility of samples collected.

ALTERNATIVE FLOOR TILE REMOVAL PROCEDURES

Seven alternative scenarios for removal of floor tile, have been identified to be included within the Scope of this project. Each alternative must have, as a basis, an adequate in-place floor tile, which will accommodate the required removal time to accomplish an adequate air sample duration. This is necessary in order to assure that a sufficient detection limit can be achieved while at the same time allowing for representative quantification of potential fiber releases due to the applied scenario.

This project will proceed by starting with the least aggressive removal technique and after a review of quantified air sample results, the project will then proceed to the next scenario, which will employ more aggressive removal techniques capable of demonstrating greater intensity of fiber release.

Facility selection considerations have included the following:

- * Building location
- * Availability
- * Building prior use
- * Facility age
- * Floor tile type
 - vinyl asbestos
 - asphaltic asbestos
- * Adhesive type
 - asbestos containing

- * non-asbestos containing
Building Friable Asbestos Content
background concentrations
physical presence (extent)
- * Square Footage of Floor Tile Present
asbestos content

To date, considerable effort has gone into locating building candidate for this project. At present the following building candidate have been identified.

- * Building No.: 4379, Ft. Sill, Oklahoma
Total Floors: 2; Gross Square Footage: 4,525
- * Building No.: 4380, Ft. Sill, Oklahoma
Total Floors: 2; Gross Square Footage: 4,525
- * Building No.: 4375, Ft. Sill, Oklahoma (being considered)
Total Floors: 1; Gross Square Footage: 1,311; this building has a layer of sheet flooring below the floor tile.
- * Building No: 4363, at present will be the only structure with a wood floor.

Alternatively, our most available source for candidates to be utilized within this project, appears to be houses with 9 x 9 floor tile.

Additional building candidate continue to be reviewed and it is anticipated that at the project start date, the additional necessary facilities to carry out the demonstration project, will have been identified.

REMOVAL SPECIFICATIONS

DEFINITION OF TERMS

Terms presented below may be applicable to the project as developed. A more indepth presentation of terms may be found in the Oklahoma State Department of Labor Rules and Regulations (current edition).

- A. Abatement: Procedures to control fiber release from asbestos-containing materials. Includes removal, encapsulation, enclosures, repair, demolition and renovation activities.
- B. Accredited or Accreditation: when referring to a person or a laboratory means that such a person or laboratory has met the training, experience, and/or quality control requirements to perform work in accordance with AHERA.
- C. AHERA: means the Asbestos Hazard Emergency Response Act of 1986 (PL99-519) and rules and regulations enacted by EPA for its implementation.
- D. AHERA Abatement Project Designer: means a person who develops plans and specifications for the abatement of asbestos. For the Purposes of these rules, Abatement Project Designers will be considered to be a category of contractors.
- E. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways separated by a distance of at least three feet (3') such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.
- F. Air Monitoring: The process of measuring the fiber content of a known volume of air collected during a specific period of time.
- G. Amended Water: Water to which a surfactant has been added.
- H. Asbestos: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthrophyllite, actinolite, and tremolite.
- I. Asbestos Containing Material (ACM): Material composed of asbestos of any type and in any amount, either alone or mixed with other fibrous or non-fibrous materials.
- J. Asbestos Containing Waste Material: Asbestos containing material or asbestos contaminated objects requiring disposal.
- K. Authorized Visitor: The Building Owner, inspecting architect, and any representative of a regulatory or other agency having jurisdiction over the project.
- L. Building Owner: The Owner or his authorized representative.

M. Clean Room: An uncontaminated area or room which is a part of the worker decontamination enclosure system with provisions for storage of worker's street clothes and clean protective equipment.

N. Commissioner: means the Oklahoma Commissioner of Labor.

O. Contractor: The individual and/or business with which the Building Owner contracts to perform the asbestos abatement.

P. Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing three overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of the first and third sheets along one vertical side of the doorway and securing the vertical edge of the second sheet along the opposite vertical side of the doorway.

Q. Decontamination Enclosure System: A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of workers and equipment.

R. DOL: Oklahoma State Department of Labor.

S. DOT: Oklahoma State Department of Transportation.

T. Encapsulant: A liquid material which can be applied to asbestos containing material, controlling the possible release of asbestos fibers from the material, either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

U. Encapsulation: The application of an encapsulant.

V. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos- containing material to control the release of asbestos fibers into the air.

W. EPA:

U.S. Environmental Protection Agency
401 M. Street S.W.
Washington, D.C. 20460

X. Equipment Decontamination Enclosure System: That portion of a decontamination enclosure system designed for controlled transfer of materials and equipment into or out of the work area, typically consisting of a washroom and holding area.

Y. Equipment Room: A contaminated area or room which is part of the worker decontamination enclosure system with provisions for storage of contaminated clothing and equipment.

Z. Friable Asbestos Material: means any material that contains asbestos of one percent (1%) or more that can be crumbled, pulverized or reduced to powder by hand pressure.

AA. Glovebag Technique: A method with limited applications for removing small amounts of friable asbestos-containing material from HVAC ducts, short piping runs, valves, joints, elbows, and other non-planar surfaces in a non-contained (plasticized) work area. The glovebag assembly is a manufactured or fabricated device consisting of a glovebag (typically constructed of 6 mil transparent polyethylene or polyvinylchloride plastic), two inward projecting longsleeves, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all the asbestos fibers released during the process. All workers who are permitted to use the glovebag technique must be highly trained, experienced and skilled in this method.

BB. HEPA Filter: HEPA means High Efficiency Particulate Absolute. A HEPA air filter is capable of removing particles >0.3 microns in diameter with 99.97 % efficiency.

CC. HEPA Vacuum: A vacuum system equipped with HEPA filtration.

DD. Holding Area: A chamber in the equipment decontamination enclosure located between the washroom and an uncontaminated area. The holding area comprises an airlock.

EE. Lockdown: Lockdown is the procedure of applying a protective coating or sealant to a surface from which asbestos-containing material has been removed. Its primary function is to control and minimize the amount of airborne asbestos fiber generation that might result from any residual asbestos-containing debris on the substrate. Though the substrate may appear to be clean, miniscule fibers may have become lodged in cracks or crevices that were inaccessible.

FF. Movable Object: A piece of equipment or furniture in the work area which can be removed from the work area.

GG. Negative Pressure Ventilation System: A portable system equipped with HEPA filtration and capable of maintaining a constant low velocity air flow into contaminated areas from adjacent uncontaminated areas.

HH. NIOSH:

The National Institute for Occupational Safety and Health
Building J N.E. - Room 3007
Atlanta, Georgia 30333

II. On-site Day: means any day in which work is being done on an asbestos abatement project that would require the services of a licensed asbestos worker, including but not limited to site preparation, establishment of decontamination facilities, removal and encapsulation, lock-down and removal of preparation.

JJ. OSHA:

The Occupational Safety and Health Administration
200 Constitution Avenue
Washington, D.C. 20210

KK. Plasticize: To cover floors and walls with plastic sheeting in an approved manner.

LL. Removal: The stripping of any asbestos-containing materials from surfaces or components of a facility.

MM. Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold or warm running water controllable at the tap and suitably arranged for complete showering during decontamination.

NN. Sprayback: Sprayback is the process of replacing the asbestos-containing material that was originally removed with an effective substitute. This material should have architectural properties and capabilities adequate to meet specifications and requirements originally set for the space (i.e., acoustical insulation, fireproofing). Caution should be used when choosing a sprayback material to ensure that other adverse problems will not result (i.e., potentially harmful vapors generated during application), and that the lockdown material is fully compatible with the sprayback material.

OO. Staging Area: Either the holding area or some area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

PP. Surfactant: A chemical wetting agent added to water to improve penetration.

QQ. Waste Transfer Airlock: A decontamination system utilized for transferring containerized waste from inside to outside the work area.

RR. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with water and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

SS. Worker: Any employee of a contractor physically engaged in the abatement of asbestos, or performing a task for the contractor in which direct contact with asbestos is likely.

TT. Work Area: Designated rooms, spaces, or areas of the project in which asbestos abatement actions are to be undertaken or which may become contaminated as a result of such abatement actions. A contained work area is a work area which has been sealed, plasticized, and equipped with a decontamination enclosure system. A non-contained work area is an isolated or controlled access work area which has not been plasticized nor equipped with a decontamination enclosure system.

UU. Worker Decontamination Enclosure: A decontamination system consisting of a clean room, a shower room, and an equipment room separated from each other and from the work area by airlocks and curtained doorways.

STANDARDS AND GUIDELINES

- A. All work shall be done in strict accordance with all applicable Federal, State and Local regulations, standards and codes governing asbestos abatement and any other trade work done in conjunction with the abatement.

- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements exists, the most stringent requirements apply.
- C. Copies of all standards, regulations, codes and other applicable documents, shall be available at the worksite.
- D. Specific requirements shall include:
 - 1. Occupational Safety and Health Administration (OSHA):
 - a) Title 29 Code of Federal Regulations Section 1910.1001 - General Industry Standard for Asbestos.
 - b) Title 29 Code of Federal Regulations Section 1910.134 - General Industry Standard for Respiratory Protection.
 - c) Title 29 Code of Federal Regulations Section 1926 Construction Industry.
 - d) Title 29 Code of Federal Regulations Section 1910.2 - Access to Employee Exposure and Medical Records.
 - e) Title 29 Code of Federal Regulations Section 1910.1200 - Hazard Communication.
 - 2. Environmental Protection Agency (EPA):
 - a) Title 40 Code of Federal Regulations part 61 Subparts A and M (Revised Subpart B) - National Emission Standard for Asbestos.
 - 3. Individuals will abide by all other applicable laws, rules and regulations, including but not limited to those relating to:
 - a) Worker's Compensation
 - b) Prevailing wage rates
 - c) Liability Insurance
 - d) EPA, OSHA, DOT, and DOL rules and regulations

SITE SECURITY

During the entirety of this project, i.e., during those times when elevated fiber concentrations are in evidence at each facility, site security shall be required. Security shall consist of a complete listing of all persons who enter and exit the controlled area. The time of entrance, the time of exit, as well as the nature of the business conducted, and with whom they are employed, address and phone number, shall also be recorded. At the present time it is not known who will provide site security, however, this will be in place for the duration of the project.

The controlled area will be established by the utilization of barrier tape and shall extent a minimum of twenty-five feet in all directions from the periphery of the immediate project.

The area shall be further defined by the posting of signs which carry the wording "CAUTION ASBESTOS HAZARDS - DO NOT ENTER".

BUILDING PREPARATIONS

Each facility from which floor tile is to be removed, shall be prepared in such a manner as to assure that workers, are not exposed to elevated levels of fiber concentrations which may adversely impact their health or life quality. Likewise, near and far, adjacent occupants, segments of the public, bystanders, and others shall be protected by interception of airborne fibers at the source and through the utilization of various control techniques. Beyond this, no individual who is involved within the project, shall at any time, leave the area of removal, without first having demonstrated that all traces of contamination have been removed from his person.

Prior to the start of the project, and as a first action, each building shall have the electricity disconnected in the area where the removal is to be accomplished. All power to the area shall be re-established through the utilization of ground fault circuit breakers.

Critical Barriers

Critical barriers shall be established at the boundary of each area of floor tile to be removed. These barriers shall consist of a minimum of one layer of six mil polyethylene sheeting which shall be held firmly in place by stapling and taping. Additional layers may be applied as necessary in order to assure the integrity of the critical barriers. Entrances to the area shall be addressed with a minimum of a double flap. During the course of removal activity, all entrances and exits from the area shall be securely closed. Beyond this, all air supply and return ducts shall be securely sealed in order to assure that contamination of the same does not occur.

Provided that windows and doors are complete, and as an alternative to polyethylene sheeting, spray "poly" or "vinyl" may be utilized in any facility scheduled for demolition.

Occupied vs Non-Occupied Facility

Measures of control shall not differ on the basis of whether a facility is occupied or not occupied. Control measures shall be complete and in effect throughout the entirety of the project and sampling results shall be utilized as the basis of reflecting the adequacy of the control strategy.

PROTECTIVE EQUIPMENT

Protective equipment shall be in evidence and properly worn at all times when individuals (workers, supervisory personnel, visitors, etc) are within the confines of the controlled area.

This action is required with regard to abatement worksites and in order to maintain compliance with the Occupational Safety and Health Act (OSHA) regulations (Title 29 Code of Federal Regulations Part 1910 Sec 1910.1001) Alternatively, individuals associated with the project, shall not be outside the controlled area while wearing protective equipment. Each worker will be supplied with the necessary disposable uniforms and respirator filter changes per each work day, for the complete duration of the project. Work clothes will consist of disposable fully body coveralls, disposable head cover, disposable gloves, disposable footwear, and eye protection. Hard hats and rubber boots (steel toed) shall also be worn by workers. Additional uniforms will be available for individuals performing inspection tasks at the work site.

Respirators

The respirator protection program, Attachment I, shall be in full force and effect with regard to the floor tile removal/demonstration project.

Decontamination Protocol

Decontamination involves the progressive removal of oneself from a contaminated area to a clean area without the transportation of the material of contamination from one area to the other. Basically, four steps are involved.

1. **Gross contamination removal.**
Prior to an individual leaving the area of floor tile removal, gross contamination should be removed from disposable clothing including head and foot covers. This is normally accomplished by one individual assisting another individual and utilizing a HEPA vacuum.
2. **Wash and remove footwear/respirator cartridges.**
Footwear shall be washed and removed immediately and at the exit of the floor tile removal area. The respirator shall then be washed, cleaned and disposable filters or cartridges then discarded as contaminated waste. Masks as a minimum should be wiped out with a cloth soaked in alcohol and disinfectant, and hung to dry. Finally, the mask shall be placed in a clean plastic bag for storage.
3. **Removal of contaminating clothing.**
All individuals involved within the project shall double suit. Following gross contamination removal, and immediately outside the entrance to the removal area, the exterior suit of clothing shall be removed and bagged.
4. **Leave controlled area.**
Each individual should then proceed to the clean area to remove the final disposable coverall and dress in street clothing.

Two important rules will be strictly enforced i.e., 1) *there shall be no eating, drinking or smoking within any contaminated area (controlled area)*; 2) *no individual shall remove their respirator for any reason while in an activated work area.*

An alternative to the double suiting procedure, shall be the utilization of a portable shower and clean room.

PRE-PROJECT BRIEFING

All asbestos removal projects have basic similarities, however, each will have differing problems requiring different solutions. Each individual having responsibility in this demonstration project, will receiving a briefing prior to each phase which will detail special considerations and/or conditions which may be encountered. These considerations will include:

1. Type of material to be removed, i.e., percent of asbestos, positive mastic, negative mastic, etc.
2. The control procedures to be employed, placement of critical barriers, doorways, loadouts, decontamination, etc.
3. Protective clothing to be worn, any hazards other than asbestos i.e., heat, cold, chemical, the need for hard hats, etc.
4. Specifics with regard to respiratory protection, needed/required.
5. Decontamination procedures, passage ways, emergency routes, and escape procedures.
6. Location of specific hazards, i.e., hot pipes, sharp edges, dangerous steps, etc.
7. Specific job assignments, prior job progress, future tasks, etc.
8. Awareness of unusual hazards i.e., limited vision, hearing and movement restrictions due to protective clothing, and respirators, uncertain footing, due to wet conditions on plastic and/or floor tile.

AIR MONITORING/TESTING

The primary purpose of testing and air monitoring, is the documentation of environmental contamination is not occurring as a result of floor tile removal (abatement) and to insure and document that the respiratory protection selected, is sufficient for the airborne concentrations present and finally to ensure that elevated levels of airborne asbestos fibers, which may have resulted from removal procedures, have been sufficiently reduced to a level equal to or less than that existing before project initiation.

Two different types of analysis may be performed in order to accomplish data reflective of airborne fiber concentrations, Phase Contrast Microscopy (NIOSH 7400) and the more sophisticated Transmission Electron Microscopy. Optical microscopy is limited in that it cannot discern the thinner kinds of asbestos fibers. This represents a significant deficiency since it is generally accepted that the largest number of fibers which constitutes typical airborne asbestos contamination in buildings, tends to be of the thinner variety.

Stanley Engineering will provide air monitoring and industrial hygiene oversight during the length of the project. All air monitoring will be conducted in compliance with sampling requirements made by the Oklahoma State Department of Labor at the time of "Prep Inspection", (if requested). Allowable minimum sampling rates will be determined at that point in time. Sampling will be as follows and may be changed, only at the specific direction of Dr. Keith L. Stanley, P.E., C.I.H.

Background Monitoring

1. Collect/analyze 3 samples within each area.
2. Collect/analyze 1 samples in each adjacent area (minimum of 3 samples)
3. Collect/analyze 3 ambient air sample

Samples collected in these areas are not expected to exceed 0.005 fibers per cc of air. All other samples are not expected to exceed 0.005 fibers per cc of air. Any result which exceeds the anticipated level will be explained or resampling will be required.

Monitoring During Preparation for the Removal of Floor Tile

1. Collect/analyze a minimum of 1 personnel air samples per individual worker per shift
2. Collect/analyze 3 area samples per shift.
3. Collect/analyze 3 air samples in adjacent areas per shift.

Any result greater than 0.01 fibers per cc, within the abatement area, will be considered excessive and will require the utilization of Personnel Protective Equipment. A minimum of dual cartridge half mask and tyvek will be necessary.

Any result greater than background (0.005 fibers per cc) in adjacent areas will be considered excessive and a complete wipe down of the area will be required.

Required Monitoring During Abatement Activity

1. Monitor 100% of all personnel on a daily (shift) basis.
2. Collect/analyze 3 area samples within the work area during each shift.
3. Collect/analyze 1 area samples in adjacent areas (outside each critical barrier) each shift (minimum of 3 samples).
4. Collect/analyze 1 area sample outside the loadout facility, per shift, while it is in use.
5. Collect/analyze 3 area sample per shift within the controlled area.
6. Collect/analyze 3 area samples per shift outside the controlled area. (one upwind and two downwind)
7. A minimum of 3 off shift area samples within each work area, shall be collected.
8. A minimum of 3 off shift area samples outside critical barriers shall be collected.

Results within the removal area will be consistent with the personal protection worn.

Any result outside the removal area shall not exceed 0.005 fibers per cc or background, whichever is greater. Results greater than 0.005 fibers per cc or background will require a complete wipe down of the area and retesting to demonstrate that control of the area has been re-established. All removal work will stop until such a time as control of the adjacent area has been established as demonstrated by air monitoring.

Following the conclusion of the removal project, clean air samples will be collected to demonstrate the return of the area to a level of fiber concentrations equal to or less than background concentrations or detection limits as established during the background monitoring of the facility. Samples shall be collected as follows:

1. A minimum of five samples shall be collected from within the removal area, of sufficient duration and volume to demonstrate a minimum detection. No less than six hours of collection per sample, will be required, and a minimum of 3000 liters of air.
2. Similarly and simultaneously, a minimum of five samples will be collected within the controlled area, external to critical barriers.
3. Similarly and simultaneously, as in one and two above, samples shall be collected for analysis by Transmission Electron Microscopy. Additionally, however, two field blanks and one laboratory blank shall also be analyzed.

The following specification will be utilized for clean air monitoring.

1. Sampling will not begin until all surfaces are dry and the area will be stirred with a fan or leaf blower.
2. A total of approximately 3,000 liters of air shall be collected at 7 LPM. Under no circumstances will less than six hours of sample duration be achieved.

REMOVAL SCENARIOS/TECHNIQUES

Each technique utilized to remove asbestos containing floor tile shall be documented in order to fully describe every detail utilized within that specific scenario of removal. As a minimum, each scenario shall be described as follows:

- * A statement of the room condition prior to the start of removal.
 - ** Square feet of floor tile
 - ** Floor tile types
 - ** Square footage of windows
 - ** Number of Doors
 - ** Prior use
- * Present a full description of the preparation accomplished with regard to the removal area.
 - ** Initial cleaning
 - ** Window coverings
 - ** Door seals
 - ** Pressures
- * Tools of removal
 - ** Shovels
 - ** Hoes
 - ** Water
 - ** Air cleaning devises
 - ** Others
- * Time required for removal
- * Manpower utilized during removal
- * Work rate
 - ** Maximum
 - ** Breaks
 - ** Other

- * Identification of removal stages
 - ** Wetting
 - ** Removal
 - ** Pick up and Bag
 - ** Wipedown and Loadout

- * Disposal
 - ** Method
 - ** Location
 - ** Control measures in route
 - ** Offloading

PROPOSED SCENARIOS OF REMOVAL

The following brief description is provided which describes the proposed removal method.

1. Wet Removal of Floor Tile by Hand Exercising Ordinary Care
 - 1a Remove Mastic Utilizing Current State-of-the-Art Techniques, differentiated by floor substrate (wood, concrete)
2. Dry Removal of Floor Tile by Hand Exercising Ordinary Care
3. Strip with Power Stripped utilizing commercial strip liquid and recommended stripper pad.
 - 3.a Aggressive dry removal from wood floor, by hand utilizing maximum workers to accomplish removal task in minimal time.
4. Aggressive dry removal from concrete floor, by hand, utilizing maximum workers to accomplish removal task in minimal time.
 - 4.a Grind to remove mastic (wet sand and power grinder)
5. Wet vacuum to clean the floor prior to wetting floor with amended water, cover with visqueen, on concrete, allow to stand (time treatment) removal by hand.
6. Water soak with amended water, cut through wood floor, and completely remove in, tact, four by eight sheet of wood flooring bearing tile. Alternative sizes may be appropriate.
7. Aggressive dry removal from concrete floor, by hand, utilizing maximum workers to accomplish removal task in minimal time. To be accomplished without the utilization of critical barriers. Wind speeds not to exceed 15 mph, measurements of airborne fiber concentrations shall be intensified.
8. Power removal floor tile by commercial removal methods utilizing prototype machine of Cooper and Associates.

Each scenario will be concluded with a final cleanup of the area, which will, as a minimum, include HEPA vacuuming of each floor from which the tile has been removed, as well as wet mopping and wet wiping. It is anticipated that samples will be collected to reflect the content of dust remaining on the floor, prior to the utilization of the HEPA vacuum, and following the wet wiping.

A typical building floor tile demonstration project as anticipated at this time, will be accomplished on wooden structures with either wood or concrete floors. It is not anticipated that the structures will be occupied at the time of floor tile removal, however, the intensity of air monitoring will be of an extent to evaluate adjacent areas with regard to airborne fiber concentrations. A typical building floor plan, Attachment II, reflects both floors within a single structure and will present some variations to the monitoring schedule and removal scheme in order to assure proper documentation of all efforts and activities.

Attachment I

RESPIRATOR PROGRAM AND POLICY

GENERAL

Stanley Engineering is committed to employee safety. Our employees are the most important aspect of asbestos abatement and their protection from harm is a first priority. This "Respirator Program and Policy" will be fully utilized by all employees and management personnel.

Federal and State laws required that respirators be worn if asbestos concentrations exceed .1 fibers/cc (those fibers that are 5 micrometers and larger). The present day method of measuring fiber concentrations requires air monitoring followed by laboratory analysis that involves a 12 to 24 hour time lag. We therefore require that respirator be worn during all removal and cleanup operations, and during encapsulation to be certain of protection.

Applicable rules to this policy are as follows:

EPA	40 CFR 763.120 & 121	Regulations Governing Asbestos Abatement Projects
OSHA	29 CFR 1910.134	Respiratory Protection
	29 CFR 1926.58	Asbestos Rules for the Construction Industry
ANSI	Z88.2	Practices for Respiratory Protection
STATE	Title 40, Sections 451 through 457 of Oklahoma Statutes	Rules for Abatement of Friable Asbestos Materials

ADMINISTRATION

This policy shall be administered by a designated person that will be identified as the Program Coordinator.

EQUIPMENT

All respirators furnished for the employee will have an approved MSHA and NIOSH rating. Type "C" supplied-air respirators shall be used during the beginning shift of an abatement job when a containment is used. Personnel air sample results will be used to determine what level of protection will be necessary for the shifts that follow.

Upgrading or downgrading in respiratory equipment will be based on maintaining a level of 0.01 fibers/cc inside the mask. The following table will decide what will be required.

<u>AIRBORNE CONCENTRATION OF ASBESTOS</u>	<u>REQUIRED RESPIRATOR</u>
NOT IN EXCESS OF 0.1 F/CC	HALF-FACE AIR-PURIFYING RESPIRATORS EQUIPPED WITH HEPA FILTERS
NOT IN EXCESS OF 0.5 F/CC	FULL-FACE AIR PURIFYING RESPIRATOR EQUIPPED WITH HEPA FILTERS
NOT IN EXCESS OF 1.0 F/CC	ANY POWERED AIR PURIFYING RESPIRATORY EQUIPPED WITH HEPA FILTER(S)
NOT IN EXCESS OF 10 F/CC	FULL-FACE SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE
NOT IN EXCESS OF 10 F/CC	FULL FACE SUPPLIED AIR RESPIRATOR OPERATED IN A PRESSURE DEMAND MODE

Special situations may arise where the necessary or preferred equipment is a self contained breathing apparatus. When this is the case, it will be the Program Coordinator's responsibility to advise the regulating agency (i.e., ODOL, Corps of Engineers, etc.) of the intent and the justification.

The Contractor will provide respirators. If the employee finds the unit he is furnished with to be uncomfortable, he will be offered other types until he is satisfied with the fit. The employee may request a power air purifying respirator (PAPR). Provided that a fit cannot be achieved, the employee will not be allowed within abatement areas.

STANDARD OPERATING PROCEDURES

- A. Each employee will be issued a respirator, properly selected and fit tested.
- B. Each employee will label his or her respirator with name and issue date, and will be held responsible for it.
- C. No employee will borrow or share another employee's respirator, unless they receive a supervisor's approval and the unit has been thoroughly checked and disinfected.
- D. After each day's use, or more often if necessary, the employee must clean, inspect, and store his/her respirator in a convenient and sanitary location, preferably a sealed plastic bag in the clean change room.
- E. Employees will be fit tested (qualitative) at least every six months.

Employees will read the literature furnished with the respirator before attempting to wear the unit.

Replacement filters and parts will be stored at a central location designated by job conditions. All employees must know this location. Only filters and replacement parts specified by the respirator manufacturer for job hazard conditions (asbestos) may be used. If in doubt, contract the Program Coordinator. Do not guess; it could be harmful to your health. Health effects from breathing hazardous substances often take many years to result in disease.

Respirators will be donned in the clean room/area and doffed in the shower after thorough wetting of filters. Filters shall be changed after each shower. Filters must be changed when breathing becomes difficult or any changes in the filter function are noted. Examine your filters when you clean and inspect your respirator each day. Replace them if necessary, especially if breathing becomes difficult. Replaced filters must be discarded in plastic bags and disposed of properly. Filters must be replaced outside the work area in clean air.

MEDICAL

All employees must be physically fit to work while wearing a respirator. Air purifying respirators with cartridges make breathing more difficult because the filters can reduce the flow of air. If you have heart or lung problems, wearing a respirator could present an unacceptable risk.

All employees are required to take a company-furnished medical examination within 30 days of starting employment. This examination includes chest x-rays and lung capacity tests as well as a general medical history, examination of the respirator system and audiometric examination.

Accurate medical records of all employees will be kept by the Contractor and will be provided upon request to all employees.

Additional medical requirements for employees engaged in asbestos removal work include:

1. Employees should not smoke. Studies have indicated that smoking increases the risk of contracting lung cancer by 92 times.
2. Employees must be clean shaven with short sideburns and hair if they wear disposable or cartridge type respirators. Beards and sideburns interfere with the respirator face seal so the air, instead of going through the filter, actually goes around the respirator. Long hair provides a place for all asbestos fall-out to collect, even though protected by clothing and head covers.
3. Employees must not chew gum or tobacco if they wear disposable or cartridge type respirators because it causes excess facial movement which can break the face seal.
4. Employees who wear prescription glasses must wear a respirator that accommodates glasses without interfering with the protection to the wearer.

FITTING

A respirator should fit snugly and comfortable. It should not leave red marks, deep indentations on face, or make it difficult to turn your head.

The Program Coordinator will demonstrate two types of fitting tests as described below.

POSITIVE PRESSURE TEST

Close the exhalation valve by placing the palm of your hand over the opening. The exhalation valve cover will have to be removed for this test. Exhale gently into the facepiece. This test is satisfactory if a slight positive pressure can be built up inside the facepiece without feeling leakage of air at the face seal. Replace the valve cover and proceed to work.

NEGATIVE PRESSURE TEST

Close off the inlet openings of the cartridges using the fit check filter cover, if available, with the palm of your hands or with plastic. Inhale gently so that the facepiece collapses slightly, and hold your breath for ten seconds. If the facepiece remains collapsed and no inward leakage of air is detected around the face seal, the respirator fits satisfactorily.

Positive and negative fit testing shall be conducted by the wearer each time the respirator is put on or re-positioned.

IRRITANT FUME TEST

You may be asked, by your supervisor, to be fit tested under simulated work conditions, using irritant fume. This test on your respirator will be performed by a Certified Industrial Hygienist or his technician who will challenge the seal to a series of head and face movements and breathing both normal and then deep.

CLEANING

Respirator will be washed and cleaned in a designated area and either taken home by employee or stored in a clean location on job site.

Cleaning will be accomplished utilizing the following method.

- a. Wash with a detergent and disinfectant (Hypochlorite solution) in warm water and with a brush.
- b. Rinse in clean water or rinse over with a disinfectant and once with warm water. Rinsing with water is required to remove traces of detergent and disinfectant left on the mask which can cause dermatitis (skin rash).

DRYING

Respirators can be dried on a rack or clothes line so that the facepiece rubber will not "set" crooked as it dries. Also, care should be taken not to damage the respirator unit.

STORAGE

The units will be stored in plastic bags so they are protected from dust, sunlight, heat, extreme cold, excessive moisture and damaging or contaminating chemicals.

INSPECTION

All respirator protective equipment must be inspected:

Before and after each use, and;

During cleaning

Air purifying respirators (Quarter-Mask, Half-Mask, Full Facepiece)

A facepiece-excessive dirt (clean all dirt from facepiece)

Facepiece cracks, tears or holes (obtain a new respirator from your supervisor).

Facepiece distortion (allow facepiece to "sit" free from any constraints and see if distortion disappears: if not, obtain a new respirator).

POWERED AIR-PURIFYING RESPIRATORS (PAPR)

- A. Face-seal - clean daily and check for wear - replace as needed.
- B. Face-shield - clean daily or more often as necessary.

- C. Head-piece - clean daily or more often as necessary.
- D. Battery - charge after each day's use and replace when needed.
- E. Filters - inspect pre-filter and replace if dirty. Check with supervisor for replacement of HEPA filter.

HEADSTRAPS - CHECK FOR:

- A. Breaks or tears - replace.
- B. Loss of elasticity - replace.
- C. Broken or malfunctioning buckles or attachments - replace.
- D. Excessively worn serrations on the head harness which might allow the facepiece to slip - replace.

INHALATION VALVE, EXHALATION VALVE - CHECK FOR:

- A. Detergent residue, dust particles, dirt on valve or valve seat.
- B. Cracks, tears or distortion in the valve material or valve seat.
- C. Missing or defective valve cover.

FILTER ELEMENTS - CHECK FOR:

- A. Proper filter for the hazard.
- B. Approval designation.
- C. Missing or worn gaskets.
- D. Worn threads - both filter and facepiece threads.
- E. Cracks or dents in filter housing.

CORRUGATED BREATHING TUBE (POWERED AIR) CHECK FOR:

- A. Cracks or holes.
- B. Missing or loose hose clamps.
- C. Broken or missing end connectors.

REPAIRS

Only manufacturer's approved parts shall be used to repair respirators. Although some parts may look the same, the manufacturer will only guarantee their respirators if their parts are used. If in doubt, ask your supervisor.

All repairs must be performed at approved locations that are clean and sanitary inside work area.

SURVEILLANCE OF WORK AREA AND RESPIRATOR PROGRAM

The Contractor's representative will review the work practices and respirator maintenance procedures by the employees to insure the above practices are followed. This will be performed to insure that workers understand the importance and intent of the respirator program.

Air monitoring will be conducted for all asbestos abatement projects.

STANDARD SAFETY PRACTICES

The following are basic safety practices this company recommends. Please provide any added practices you feel we should incorporate in this standard.

GENERAL

1. All persons shall follow safe work practices.
2. All unsafe conditions or practices shall be reported to the proper authority.
3. Safety meetings will be held whenever improper work habits are noted.
4. Anyone known to be under the influence of drugs or intoxicating liquor shall not be allowed on the job.
5. Horseplay and scuffling are prohibited.
6. All work shall be well planned to prevent accidents.
7. All injuries or accidents shall be reported promptly to job supervisor.
8. When lifting heavy objects, use legs, not back muscles.
9. Shoes shall have proper soles and shall not be badly worn out.
10. No material or tools shall be dropped from structures or scaffolding without taking proper precautions.

11. Notify supervisor of any equipment or tools required for proper performance of work.

INJURIES AND FIRST AID

1. There will be one person qualified in first aid on the job at all times.
2. All employees must be informed as to the nearest source of first aid. If unsure employee must ask this location.
3. A properly equipped industrial first aid kit must be available and on the job at all times. Employees should know its location and, if not, ask supervisor.
4. Report all accidents or injuries as soon as they occur.
5. When working in an asbestos contaminated atmosphere, do not waste time in decontamination procedure to remove injured worker.

HOUSEKEEPING

1. Keep all traffic aisles clean and clear of obstructions.
2. All supplies and tools are to be kept in proper place.
3. All electric cords, air and water hoses shall be kept coiled when not in use.

WORK PRACTICE

It is important to minimize the risk of exposure to asbestos. This means following the above procedures and instructions, but...more importantly, to keep air concentrations of asbestos as low as reasonably possible. This means following good work practices that include:

1. Keeping wet, all asbestos that is being removed or has been removed.
2. Disturb the asbestos as little as possible through removal and clean-up techniques.
3. Clean-up removed asbestos promptly and keep it wet.
4. Removing contaminated clothing, leaving the work site.

SPECIAL OPERATING CONDITIONS

EMPLOYEE'S RESPONSIBILITIES

The employee has the following responsibilities as part of this program.

- A. Use respirators as instructed.
- B. Guard against damaging the respirator.
- C. Go immediately to an area of "clean" air if your respirator malfunctions.
- D. Reports any malfunctions of respirators to your supervisor. These include:
 - Discomfort
 - Resistance to breathing
 - Fatigue due to respirator usage
 - Interface with vision or communication
 - Restriction to movement

Use of respirators in cold temperature causes fogging of facepiece and freezing of the exhalation valve to seal, due to moisture in the exhaled air.

Use of respirator in hot environment can put additional stress on the user. Employees should be aware of heat stress and reduce respirator work time.

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:2087	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FT. SILL - CELL #2 - PASSIVE	FIBERS:	:	FIELD AREA (MM ²)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:JULY 27, 1990	PER MM ²	: 0	FILTER AREA (MM ²)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:JULY 28, 1990	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
2081	19 /100	CLEAN ROOM	CR1	7 : 56	12 : 40	6.2 5.8 6	284	1704	0.005468	0.003235	0.002878203	NO
2082	11 /100	HALLWAY IN CONTAINMENT	2012	8 : 30	13 : 18	6 6 6	288	1728	0.003122	NA	0.002838228	NO
2083	7 /100	OFFICE AREA	2017	8 : 3	12 : 17	5.6 5.6 5.6	254	1422.4	BDL	NA	0.003448016	YES
2084	4 /100	SOUTH OF CONTAINMENT	93	8 : 8	12 : 13	5.8 5 5.4	245	1323	BDL	NA	0.003707073	YES
2085	5 /100	EAST OF CONTAINMENT	ER1	8 : 16	13 : 20	6 5.6 5.8	304	1763.2	BDL	NA	0.002781566	YES
2086	5 /100	CELL 3	2011	8 : 30	12 : 11	6 5.8 5.9	221	1303.9	BDL	NA	0.003761376	YES
2087	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: LOG # 912093 - PASSIVE SAMPLES TOOK PLACE AT THIS TIME. NO PPE REQUIRED AT THIS TIME. PHASE CONTRAST MICROSCOPY.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: ALISON MYERS / SEI

Alison Myers

()

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

RESPIRATORY PROTECTION:	:N/A
ASPD=AIR SUPPLIED PD	:
DCHM=DUAL CART. HALF MASK	:
FFDC=FULL FACE DUAL CART.	:
PAPR=POWERED AIR PURIFYING	:

1
2
3
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16

* = BELOW DETECTION LIMIT

Alison Myers

AIRBORNE ASBESTOS SUMMARY/INTEGRAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
PROJECT: :FT. SILL - CELL #2 - ABATEMENT
SAMPLED BY: :LEON OSBURN
DATE COLLECTED: :JULY 27, 1990
DATE ANALYZED: :JULY 28, 1990

BLANK I.D.:	:2094
FIBERS:	:
OBSERVED-	:1
PER MM ²	: 0
TOTAL	: 0

MICROSCOPE:	: OLYMPUS
FIELD AREA (MM ²)	: 0.00785
MIDNITE (0 OR 1)	: 0
FILTER AREA (MM ²)	: 385
FILTER PORE SIZE	: 0.8u

RESPIRATORY PROTECTION:	:FFDC
ASPD=AIR SUPPLIED PD	:
DCHM=DUAL CART. HALF MASK	:
FFDC=FULL FACE DUAL CART.	:
PAPR=POWERED AIR PURIFYING	:

[illegible]

COMMENTS: LOG #912095 - BUILDING 1436 - PHASE CONTRAST MICROSCOPY - LARGE FAN RAN IN OFFICE AREA DURING SAMPLE PERIOD. SAMPLE #2089 WAS A BUSTED FILTER. HAD TO DISCONNECT FILTER IN OFFICE TO REPLACE IN CELL THAT WOULDN'T WORK.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

* = BELOW DETECTION LIMIT

ANALYST: ALISON MYERS / SEI

Alison Myers

STANLEY ENGINEERING, INC.
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 ASBESTOS AIR SAMPLE RESULTS
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P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:NA	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:NA
PROJECT:	:FORT SILL--DEMONSTRATION	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:SEI	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:7-27-90	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:7-30-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 PC2015	3 /100	LEON OSBURN 442-50-8638	P6	12 : 48	14 : 3	1.8 1.8 1.8	75	135	BDL	NA	0.036329323	YES
2 PC2016	4 /100	BURL RAGLAND	P7	13 : 30	15 : 20	1.6 1.6 1.6	110	176	BDL	NA	0.027866242	YES
3 PC2017	3 /100	BOB VANDERGRIF	P6	14 : 32	16 : 45	1.8 1.8 1.8	133	239.4	BDL	NA	0.020486460	YES
4 PC2018	2 /100	BOB STOUT	P7	15 : 30	16 : 35	1.6 1.6 0.8	65	52	BDL	NA	0.094316511	YES
5 PC2019	0 /100	BURL RAGLAND	P7	16 : 40	17 : 20	1.6 1.6 1.6	40	64	BDL	NA	0.076632165	YES
6	/			:	:	0	0	0	ERR	ERR	ERR	ERR
7	/			:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	0	0	0	ERR	ERR	ERR	ERR
14	/			:	:	0	0	0	ERR	ERR	ERR	ERR
15	/			:	:	0	0	0	ERR	ERR	ERR	ERR
16	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PUMPS WORN DURING ABATEMENT. A SPRAY MIST WAS USED DURING SAMPLE PERIOD.
 FULL FACE DUAL CART., RESPIRATOR, RUBBER BOOTS AND WASHABLE AB SUITS
 WORN BY ALL WORKERS.
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/1. DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FORT SILL DEMONSTRATION - BLDG 4387
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :
 DATE ANALYZED: :10-01-90

BLANK I.D.: :N/A
 FIBERS: :
 OBSERVED- :N/A
 PER MM² :
 TOTAL :

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) :
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :FFDC
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPH) AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1007	4 /100	TRACY COOPER: 460-12-7575	P1	10 : 00	11 : 05	2.2	2.2	2.2	65	143	BDL	NA	0.034296913	YES
1008	2.5 /100	MERT BUCHANAN: 444-62-1096	P2	10 : 00	11 : 05	2.2	2.2	2.2	65	143	BDL	NA	0.034296913	YES
1009	3 /100	EDDIE HUFF: 443-54-1401	P4	10 : 00	11 : 05	2.2	2.2	2.2	65	143	BDL	NA	0.034296913	YES
1010	3.5 /100	EDDIE HUFF	P1	13 : 30	15 : 05	2.2	2	2.1	95	199.5	BDL	NA	0.024583752	YES
1011	2 /100	TRACY COOPER	P2	13 : 30	15 : 05	2.2	2.1	2.1	95	204.25	BDL	NA	0.024012037	YES
1012	TD /TC	MERT BUCHANAN	P4	13 : 30	15 : 05	2.2	2	2.1	95	199.5	ERR	ERR	0.024583752	ERR
1013	2 /100	TRACY COOPER	P2	15 : 50	16 : 55	2	2	2	65	130	BDL	NA	0.037726604	YES
1014	6 /100	MERT BUCHANAN	P1	15 : 50	16 : 55	2.2	2	2.1	65	136.5	BDL	NA	0.035930099	YES
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR
	/			:	:						ERR	ERR	ERR	ERR

COMMENTS:

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORPS OF ENGINEERS	BLANK I.D.:	:C1020N	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:FFDC
PROJECT:	:FORT SILL - BUILDING 4387 - MASTIC	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN	OBSERVED-	: 0	MIDNITE (0 OR 1):	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:08-07-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:08-08-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR.	DETECTION LIMIT F/CC	B.D.L
1 C1017N	5 /100	EAST	2020	16 : 35	21 : 0	6	5.7	5.8	265	1550.25	BDL	NA	0.003163656	YES
2 C1018N	3.5 /100	CENTER	2021	16 : 35	21 : 0	6	5.9	5.9	265	1576.75	BDL	NA	0.003110485	YES
3 C1019N	7 /100	WEST	3	16 : 35	21 : 0	6	6	6	265	1590	BDL	NA	0.003084565	YES
4 C1020N	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
5	/			:	:			0	0	0	ERR	ERR	ERR	ERR
6	/			:	:			0	0	0	ERR	ERR	ERR	ERR
7	/			:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PARTICLE BOARD WITH MASTIC ON IT WAS REMOVED WITH PRY BARS. WORKERS WORE
 WASHABLE AB SUITS, GLOVES & RUBBER BOOTS.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORPS OF ENGINEERS
 PROJECT: :FORT SILL - BUILDING 4387 - FLOOR TILE
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :08-07-90
 DATE ANALYZED: :08-08-90

BLANK I.D.: :C1016N
 FIBERS: :
 OBSERVED- : 0
 PER MM^2 : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM^2) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM^2) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1013N	2.5 /100	EAST	2020	15 : 0	18 : 30	6 5.8 5.9	210	1239	BDL	NA	0.003958400	YES
2 C1014N	1 /100	CENTER	2021	15 : 0	18 : 30	6 6 6	210	1260	BDL	NA	0.003892427	YES
3 C1015N	3 /100	WEST	3	15 : 0	18 : 30	6 5.8 5.9	210	1239	BDL	NA	0.003958400	YES
4 C1016N	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
5	/			:	:		0	0	ERR	ERR	ERR	ERR
6	/			:	:		0	0	ERR	ERR	ERR	ERR
7	/			:	:		0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: NO ACTIVITY INSIDE CELL DURING PASSIVE TEST.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:C1004N	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FORT SILL - BUILDING 4387	FIBERS:	:	FIELD AREA (MM ²):	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN / S.E.I.	OBSERVED-	: 0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:08-06-90	PER MM ²	: 0	FILTER AREA (MM ²):	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:08-07-90	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW INI.	RATE STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1001N	7 /100	NORTHEAST INSIDE CELL 4	2020	16 : 48	20 : 30	6	6.4	6.2	222	1376.4	BDL	NA	0.003563250	YES
2 C1002N	3 /100	NORHT CENTER INSIDE CELL 4	2021	16 : 48	20 : 30	6	5.9	5.9	222	1320.9	BDL	NA	0.003712967	YES
3 C1003N	4 /100	NORTHWEST INSIDE CELL4	3	16 : 48	20 : 30	6	6	6	222	1332	BDL	NA	0.003682026	YES
4 C1004N	0 /100	BLANK		:	:			0	0	0	ERR	ERR	ERR	ERR
5	/			:	:			0	0	0	ERR	ERR	ERR	ERR
6	/			:	:			0	0	0	ERR	ERR	ERR	ERR
7	/			:	:			0	0	0	ERR	ERR	ERR	ERR
8	/			:	:			0	0	0	ERR	ERR	ERR	ERR
9	/			:	:			0	0	0	ERR	ERR	ERR	ERR
10	/			:	:			0	0	0	ERR	ERR	ERR	ERR
11	/			:	:			0	0	0	ERR	ERR	ERR	ERR
12	/			:	:			0	0	0	ERR	ERR	ERR	ERR
13	/			:	:			0	0	0	ERR	ERR	ERR	ERR
14	/			:	:			0	0	0	ERR	ERR	ERR	ERR
15	/			:	:			0	0	0	ERR	ERR	ERR	ERR
16	/			:	:			0	0	0	ERR	ERR	ERR	ERR

COMMENTS: CELL 1 WAS HEPA VACED BEFORE PASSIVE TEST BEGAN. NO OTHER ACTIVITY TOOK PLACE DURING TEST.

* = BELOW DETECTION LIMIT

PASSIVE-METHOD 7402

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORPS OF ENGINEERS
 PROJECT: :FORT SILL - BUILDING 4387 - FLOOR TILE
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :08-07-90
 DATE ANALYZED: :08-08-90

BLANK I.D.: :C1008N
 FIBERS: :
 OBSERVED- : 0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :FFDC
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE INI. STOP	(LPM AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 C1005N	4 /100	EAST	2020	6 : 33	9 : 35	6 5.8	5.9	182	1073.8	BDL	NA	0.004567385	YES
2 C1006N	6.5 /100	CENTER	2021	6 : 33	9 : 35	6 6	6	182	1092	BDL	NA	0.004491262	YES
3 C1007N	13 /100	WEST	3	6 : 33	9 : 35	6 5.6	5.8	182	1055.6	0.006039	NA	0.004646133	NO
4 C1008N	0 /100	BLANK		:	:		0	0	0	ERR	ERR	ERR	ERR
5	/			:	:		0	0	0	ERR	ERR	ERR	ERR
6	/			:	:		0	0	0	ERR	ERR	ERR	ERR
7	/			:	:		0	0	0	ERR	ERR	ERR	ERR
8	/			:	:		0	0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	0	ERR	ERR	ERR	ERR

COMMENTS: FLOOR TILE REMOVAL WITH STRAIGHT HOE. WORKERS WORE WASHABLE AB SUITS, GLOVES,
 AND RUBBER BOOTS.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY

AIRBORNE ASBESTOS SUMMARY/INDIVIDUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
PROJECT: :FT. SILL - CELL 5 - CLEAN UP 4385
SAMPLED BY: :LEON OSBURN / SEI
DATE COLLECTED: :AUGUST 23, 1990
DATE ANALYZED: :OCTOBER 1, 1990

BLANK I.D.: :N/A
FIBERS: :
OBSERVED- :N/A
PER MM² : 0
TOTAL : 0

MICROSCOPE: :OLYMPUS
FIELD AREA (MM²) : 0.00785
MIDNITE (0 OR 1) : 0
FILTER AREA (MM²) : 385
FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :DCHM
ASPD=AIR SUPPLIED PD :
DCHM=DUAL CART. HALF MASK :
FFDC=FULL FACE DUAL CART. :
PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
5008	1 /100	NORTH OF BUILDING	2019	9 : 5	12 : 55	6 5.8 5.9	230	1357	BDL	NA	0.003614192	YES
5009	8 /100	SOUTHWEST ROOM	2017	9 : 55	12 : 50	6 5.9 5.9	175	1041.25	BDL	NA	0.004710164	YES
5010	5 /100	SOUTHWEST OF BUILDING	2021	9 : 50	12 : 56	6 6 6	186	1116	BDL	NA	0.004394676	YES
5011	7.5 /100	EAST ROOM	3	9 : 55	12 : 50	6 5.7 5.8	175	1023.75	BDL	NA	0.004790679	YES
5012P	4 /100	GABOR SZEKELY	P1	10 : 0	12 : 50	2 2 2	170	340	BDL	NA	0.014424878	YES
5013P	3 /100	BURL RAGLAND	P2	10 : 0	12 : 50	2 2 2	170	340	BDL	NA	0.014424878	YES
5014P	10 /100	LEON OSBURN	P3	10 : 0	12 : 50	2 2 2	170	340	BDL	NA	0.014424878	YES
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: LOG #912001 - PHASE CONTRAST MICROSCOPY - BUILDING 4375: FLOOR TILE WAS PLACED IN BOX THEN WRAPPED IN 6 MIL POLY. BOX WAS THEN * = BELOW DETECTION LIMIT
DOUBLE WRAPPED WITH SECOND SHEET OF 6 MIL POLY. WORKERS WORE DCHM RESP., DISPOSABLE AB SUITS,
GLOVES AND RUBBER BOOTS.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: ALISON MYERS / SEI

Alison Myers

AIRBORNE ASBESTOS SUMMARY/IN LOCAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
PROJECT: :FT. SILL - GEL - CLEAN UP 4367
SAMPLED BY: :LEON OSBURN / SEI
DATE COLLECTED: :AUGUST 23, 1990
DATE ANALYZED: :AUGUST 24, 1990

BLANK I.D.: :N/A
FIBERS: :
OBSERVED- :N/A
PER MM² : 0
TOTAL : 0

MICROSCOPE: :OLYMPUS
FIELD AREA (MM²) : 0.00785
MIDNITE (0 OR 1) : 0
FILTER AREA (MM²) : 385
FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :DCHM
ASPD=AIR SUPPLIED PD :
DCHM=DUAL CART. HALF MASK :
FFDC=FULL FACE DUAL CART. :
PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
7001	TD /TC	WEST	2017	5 : 0	9 : 20	6 5.9 5.9	260	1547	ERR	ERR	0.003170302	ERR
7002	TD /TC	EAST	3	5 : 0	9 : 20	6 6 6	260	1560	ERR	ERR	0.003143883	ERR
7003	2 /100	NORTH (OUTSIDE)	2021	4 : 45	9 : 30	6 5.7 5.8	285	1667.25	BDL	NA	0.002941645	YES
7004	2.5 /100	SOUTH (OUTSIDE)	2019	4 : 45	9 : 30	6 5.7 5.8	285	1667.25	BDL	NA	0.002941645	YES
7005P	6 /100	GABOR SZEKELY: 446-84-8118	P-1	5 : 0	9 : 20	2 2 2	260	520	BDL	NA	0.009431651	YES
7006P	8 /100	BURL RAGLAND: 447-38-1989	P-2	5 : 0	9 : 20	2 2 2	260	520	BDL	NA	0.009431651	YES
7007P	9 /100	LEON OSBURN: 442-50-8638	P-3	5 : 0	9 : 20	2 2 2	260	520	BDL	NA	0.009431651	YES
8	/			:	:		0	0	ERR	ERR	ERR	ERR
9	/			:	:		0	0	ERR	ERR	ERR	ERR
10	/			:	:		0	0	ERR	ERR	ERR	ERR
11	/			:	:		0	0	ERR	ERR	ERR	ERR
12	/			:	:		0	0	ERR	ERR	ERR	ERR
13	/			:	:		0	0	ERR	ERR	ERR	ERR
14	/			:	:		0	0	ERR	ERR	ERR	ERR
15	/			:	:		0	0	ERR	ERR	ERR	ERR
16	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: LOG #912000 - PHASE CONTRAST MICROSCOPY - BUILDING 4387: FLOOR TILE WAS PLACED IN BOX WRAPPED IN 6 MIL

* = BELOW DETECTION LIMIT

POLY THEN DOUBLE WRAPPED WITH SECOND SHEET OF 6 MIL POLY. DOUBLE WRAPPED BOXES

WERE THEN PLACED INSIDE AB TRAILER. WORKERS WORE DCHM RESP., DISPOSABLE AB SUITS, GLOVES AND RUBBER BOOTS.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: ALISON MYERS / SEI

Alison Myers

AIRBORNE ASBESTOS SUMMARY/INL .DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORPS OF ENGINEERS
 PROJECT: :FORT SILL DEMONSTRATION *Bldg 4387*
 SAMPLED BY: :LEON OSBURN
 DATE COLLECTED: :08-07-90
 DATE ANALYZED: :08-08-90

BLANK I.D.: :
 FIBERS: :
 OBSERVED- :
 PER MM² :
 TOTAL :

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) :
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :FFDC
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM	INITIAL	STOP	AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1	PC1004	9 /100	LEON OSBURN	P1	18 : 30	20 : 15	2.2	2	2.1	105	220.5	BDL	NA	0.022242442	YES
2	PC1005	4 /100	GABOR SZEKELY	P2	18 : 30	20 : 15	2.2	2.2	2.2	105	231	BDL	NA	0.021231422	YES
3	PC1006	8 /100	BURL RAGLAND	P4	18 : 30	20 : 15	2.2	2	2.1	105	220.5	BDL	NA	0.022242442	YES
4												ERR	ERR	ERR	ERR
5												ERR	ERR	ERR	ERR
6												ERR	ERR	ERR	ERR
7												ERR	ERR	ERR	ERR
8												ERR	ERR	ERR	ERR
9												ERR	ERR	ERR	ERR
10												ERR	ERR	ERR	ERR
11												ERR	ERR	ERR	ERR
12												ERR	ERR	ERR	ERR
13												ERR	ERR	ERR	ERR
14												ERR	ERR	ERR	ERR
15												ERR	ERR	ERR	ERR
16												ERR	ERR	ERR	ERR

COMMENTS: WASHABLE AB SUITS,GLOVES & RUBBER BOOTS

off to pump at unk. time. Void sample.

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: KEITH L. STANLEY/SEI

* = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/IND. LOCAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:1020	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FORT SILL - BLDG 4387 - CELL #1	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	:0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:AUGUST 7, 1990	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:AUGUST 7, 1990	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1017	15 /100	CLEAN ROOM	7	17 : 55	19 : 40	6 6.2 6.1	105	640.5	0.011485	NA	0.007657234	NO
1018	5 /100	NORTH EAST	2017	17 : 56	19 : 41	6 5.9 5.9	105	624.75	BDL	NA	0.007850273	YES
1019	12 /100	SOUTH WEST	2013	17 : 57	19 : 42	6 6 6	105	630	0.009341	NA	0.007784854	NO
1020	0 /100	BLANK		:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR
	/			:	:		0	0	ERR	ERR	ERR	ERR

COMMENTS: ABATEMENT
 MASTIC
 MASTIC REMOVAL INSIDE CELL 1
 THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/IND. DUAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
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 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :Corps of Engineers
 PROJECT: :Ft. Sill - Cell #5-Abatement **4375**
 SAMPLED BY: :Leon Osborn
 DATE COLLECTED: : 8/8/90
 DATE ANALYZED: : 9/27/90

BLANK I.D.: : 1
 FIBERS: :
 OBSERVED- : 1
 PER MM² : 1.2
 TOTAL : 490

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE : 0.8u

RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME HR	ON MIN.	TIME HR	OFF MIN.	FLOW RATE (LPM) INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
1 B021	2 / 100	West Room	2013	15	30	22	15	6 5.9 5.9	405	2409.75	BDL	NA	0.002035256	YES
2 B022	4 / 100	South East Room	7	15	30	22	15	6 5.8 5.9	405	2389.5	BDL	NA	0.002052504	YES
3 B023	7 / 100	North East Room	2017	15	30	22	15	6 5.9 5.9	405	2409.75	BDL	NA	0.002035256	YES
4 B024	1 / 100	Blank		:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
5	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
6	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
7	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
8	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
9	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
10	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
11	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
12	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
13	/			:	:	:	:	0	0	0	ERR	ERR	ERR	ERR
14	0 / 0	0	0	0	0	0	0	0 0 0	0	0	ERR	ERR	ERR	ERR
15	0 / 0	0	0	0	0	0	0	0 0 0	0	0	ERR	ERR	ERR	ERR
16	0 / 0	0	0	0	0	0	0	0 0 0	0	0	ERR	ERR	ERR	ERR

COMMENTS: No activity inside building while samples were taken. Map on back of location of pumps.

* = BELOW DETECTION LIMIT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: Alison Myers/SEI

Alison Myers

AIRBORNE ASBESTOS SUMMARY/INDIV. AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS
PROJECT:	:FT. SILL - CELL #1 - BUILDING 4387
SAMPLED BY:	:LEON OSBURN
DATE COLLECTED:	:AUGUST 7, 1990
DATE ANALYZED:	:AUGUST 8, 1990

BLANK I.D.:	:1012
FIBERS:	:
OBSERVED-	:0
PER MM ²	: 0
TOTAL	: 0

MICROSCOPE:	: OLYMPUS
FIELD AREA (MM^2)	: 0.00785
MIDNITE (0 OR 1)	: 0
FILTER AREA (MM^2)	: 385
FILTER PORE SIZE	: 0.8u

RESPIRATORY PROTECTION:	:FFDC
ASPD=AIR SUPPLIED PD	:
DCHM=DUAL CART. HALF MASK	:
FFDC=FULL FACE DUAL CART.	:
PAPR=POWERED AIR PURIFYING	:

[illegible]

COMMENTS: FLOOR TILE REMOVED WITH STRAIGHT HOE. WORKERS WORE FFDC RESPIRATORS, WASHABLE ASBESTOS SUITS, GLOVES & RUBBER BOOTS.
ABATEMENT

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

/ = BELOW DETECTION LIMIT

AIRBORNE ASBESTOS SUMMARY/INDUSTRIAL AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
 CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
 ASBESTOS AIR SAMPLE RESULTS
 SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
 OKLAHOMA CITY, OKLA. 73112
 4137 S. HARVARD
 TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
 E.P.A. QUALITY ASSURANCE
 NVLAP PARTICIPANT
 AIHA QUALIFIED

CLIENT: :CORP OF ENGINEERS
 PROJECT: :FORT SILL - BLDG 4387 - CELL #2
 SAMPLED BY: :LEON OSBURN/SEI
 DATE COLLECTED: :AUGUST 7, 1990
 DATE ANALYZED: :AUGUST 7, 1990

BLANK I.D.: :2016
 FIBERS: :
 OBSERVED- :0
 PER MM² : 0
 TOTAL : 0

MICROSCOPE: :OLYMPUS
 FIELD AREA (MM²) : 0.00785
 MIDNITE (0 OR 1) : 0
 FILTER AREA (MM²) : 385
 FILTER PORE SIZE :0.8u

RESPIRATORY PROTECTION: :N/A
 ASPD=AIR SUPPLIED PD :
 DCHM=DUAL CART. HALF MASK :
 FFDC=FULL FACE DUAL CART. :
 PAPR=POWERED AIR PURIFYING :

SAMPLE NUMBER	FIBER S/ FIELD S	EMPLOYEE NAME SAMPLE LOCATION	PUMP NUMBER	TIME ON HR MIN.	TIME OFF HR MIN.	FLOW RATE LPM INI. STOP AVG.	TOTAL RUN MINUTES	TOTAL VOL LITERS	FIBERS/ C.C.	T.W.A. 8 HR	DETECTION LIMIT F/CC	B.D.L
2013	9 /100	CLEAN ROOM	7	9 : 30	17 : 55	6 5.9 5.9	505	3004.75	BDL	NA	0.001632235	YES
2014	7 /100	NORTH EAST	2017	9 : 30	17 : 56	6 5.7 5.8	506	2960.1	BDL	NA	0.001656855	YES
2015	5 /100	SOUTH WEST	2013	9 : 31	17 : 57	6 5.8 5.9	506	2985.4	BDL	NA	0.001642814	YES
2016	0 /100	BLANK		:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR
	/			:	:	0	0	0	ERR	ERR	ERR	ERR

COMMENTS: PASSIVE
 PASSIVE TEST RAN WITH NO ACTIVITY DURING TEST

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

James R. Gaylor = BELOW DETECTION LIMIT

AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS	BLANK I.D.:	:1008	MICROSCOPE:	:OLYMPUS	RESPIRATORY PROTECTION:	:N/A
PROJECT:	:FORT SILL - BLDG 4387 - CELL #1	FIBERS:	:	FIELD AREA (MM^2)	: 0.00785	ASPD=AIR SUPPLIED PD	:
SAMPLED BY:	:LEON OSBURN/SEI	OBSERVED-	:0	MIDNITE (0 OR 1)	: 0	DCHM=DUAL CART. HALF MASK	:
DATE COLLECTED:	:AUGUST 7, 1990	PER MM^2	: 0	FILTER AREA (MM^2)	: 385	FFDC=FULL FACE DUAL CART.	:
DATE ANALYZED:	:AUGUST 7, 1990	TOTAL	: 0	FILTER PORE SIZE	:0.8u	PAPR=POWERED AIR PURIFYING	:

[illegible]

COMMENTS: CELL 1 WAS HEPA VACED BEFORE PASSIVE TEST BEGAN. NO OTHER ACTIVITY TOOK PLACE DURING TEST.
PASSIVE

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* = BELOW DETECTION LIMIT

AIR MONITORING RESULTS

STANLEY ENGINEERING, INC.
CERTIFIED INDUSTRIAL HYGIENE AND ANALYTICAL LABORATORY SERVICES
ASBESTOS AIR SAMPLE RESULTS
SUMMARY DOCUMENT - CONSULT INDIVIDUAL AIR SAMPLE SHEETS FOR DETAILS

2700 N.W. 39TH STREET
OKLAHOMA CITY, OKLA. 73112
4137 S. HARVARD
TULSA, OKLA. 74135

P.A.T. QUALITY ASSURANCE
E.P.A. QUALITY ASSURANCE
NVLAP PARTICIPANT
AIHA QUALIFIED

CLIENT:	:CORP OF ENGINEERS
PROJECT:	:FORT SILL - BLDG 4387 - BACKGROUNDS
SAMPLED BY:	:LEON OSBURN/SEI
DATE COLLECTED:	:AUGUST 5, 1990
DATE ANALYZED:	:AUGUST 6, 1990

BLANK I.D.:	:N/A
FIBERS:	:
OBSERVED-	:N/A
PER MM ²	: 0
TOTAL	: 0

MICROSCOPE:	:OLYMPUS
FIELD AREA (MM^2)	: 0.00785
MIDNITE (0 OR 1)	: 0
FILTER AREA (MM^2)	: 385
FILTER PORE SIZE	:0.8u

RESPIRATORY PROTECTION:	:N/A
ASPD=AIR SUPPLIED PD	:
DCHM=DUAL CART. HALF MASK	:
FFDC=FULL FACE DUAL CART.	:
PAPR=POWERED AIR PURIFYING	:

[illegible]

COMMENTS: NO ACTIVITY DURING BACKGROUD TEST

THANK YOU FOR THE OPPORTUNITY TO PROVIDE ENVIRONMENTAL MEASUREMENTS

ANALYST: JAMES R. GAYLOR

* = BELOW DETECTION LIMIT

S T R E E T

BUILDING 1436 FINAL CLEAN UP OF MACHINE REMOVED FLOOR TILE

LAB
TRAILER

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

BLDG.
1434

BLDG.
1436

BLDG.
1435

Neg. Air
unit. Located
but not used.

R
E
S
T
R
O
O
M

R
E
S
T
R
O
O
M

OFFICE
AREA

1 2 3 4 5 6
A N

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER

A

HEPA VACUUM

B

HEPA FILTER

C

Abatement Order: 22 - 08/25/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
B L D G 1 4 3 6 F C 2	BACKGROUND	1	<0.005	<0.005	<0.005	
	PERSONNELS	2				
	INSIDE AREA	3				
	OUTSIDE AREA	4				
	OUTSIDE BLDG.	6				
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER TEM (AIHRA)	A/N				

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: Both f tile and mastic removed by machine

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date: BLDG. 1436

By:
KLS

S T R E E T

First final Build. 1436
CELL ☐ Phase Contrast Sample
Results ☐ Floor Tile ☐ Mastic

LAB
TRAILER

E. R. SHOWER RR
CLEAN ROOM MOVEMENT
AIR

AIR CONDITIONERS

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

waste loadout
holding area

1 2 3 4 5 6
A N

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER A

HEPA VACUUM B

HEPA FILTER C

BLDG.
1434

BLDG.
1436
CELL 7

BLDG.
1435

Neg. Air
unit. Located
but not used.

RESTROOM

RESTROOM

OFFICE
AREA

Large fan

Tables

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: TEM Clearance was accomplished using AHERA Protocol
PC then TEM

Abatement Order: 15 - 08/03/90

Unit	Sample		Results			
	Type	Loc.	Max.	Min.	Avg.	TWA 8
BLDG 1436 F	BACKGROUND	1	See Cell 8 Floor Tile Removal			
	PERSONNELS	2	NA	NA	NA	NA
	INSIDE AREA	3	See Clearance Below			
	OUTSIDE AREA	4	<0.005	<0.005	<0.005	
	OUTSIDE BLDG.	5	<0.005	<0.005	<0.005	
	CLEARANCE	6	<0.005	<0.005	<0.005	
	OTHER TEM (AHERA)	A/N	<0.005	<0.005	<0.005	

Stanley Engineering, Inc. - OKC/Tulsa

Location:
FT. SILL

Scale: NONE

Date:

BLDG. 1436

By:
KLS

MACHINE REMOVAL OF FLOOR TILE AND MASTIC

AIR CONDITIONERS

LAB TRAILER

BLDG. 1434

BLDG. 1436

BLDG. 1435

Neg. Air unit. Located but not used.

Critical Barriers established

RESTROOM

RESTROOM

MOP RAGS, WATER
PAPER TOWELS,
ECT

STRAIGHT HOE

DEHUMIDIFIER

HEPA VACUUM

HEPA FILTER

PARKING LOT

DECONTAMINATION
ENTRANCE

SUPPLIES

SUPPLIES

Abatement Order: 19 -- 08/09/90

Unit	Sample		Results		
	Type	Loc.	Max.	Min.	Avg. TWA 8
B L D G	BACKGROUND	1	<0.005 FROM TEN	<0.005 (AIHRA FINALS OF 08/03/90)	<0.005
	PERSONNELS	2	<0.005	<0.005	<0.005
1 4 3 6	INSIDE AREA	3			
	OUTSIDE AREA	4			
	OUTSIDE BLDG.	5			
M R	CLEARANCE	6	<0.005	<0.005	<0.005
	OTHER TEN (AIHRA)	A/N			

Cell construction was of 2"x 4" wood covered with two layers of polyethylene sheeting.

Note: Both f tile and mastic removed by machine

Stanley Engineering, Inc. - OKC/Tulsa

Location: FT. SILL Scale: NONE

Date: BLDG. 1436 By: KLS

REFERENCE

2

AUG 22 1991

EVALUATION OF TILE AND MASTIC REMOVAL AT FORT SILL

Draft Report

Prepared by:

DAVID C. COX & ASSOCIATES
1620 22nd Street, N.W.
Washington, D.C. 20008

Under subcontract to:

PEI ASSOCIATES, INC.
11499 Chester Road
Cincinnati, OH 45246

EPA Contract No. 68-CO-0016
PEI Subcontract No. 1045-91
Work Assignment No. 0-10

For the:

Risk Reduction Engineering Laboratory
Office of Research and Development
U.S. Environmental Protection Agency
26 West Martin Luther King Drive
Cincinnati, OH 45268

EVALUATION OF TILE AND MASTIC REMOVAL AT FORT SILL

1. Study Objectives

Vinyl asbestos floor tile and the underlying mastic adhesive were removed by a variety of methods in 7 distinct areas ("cells") in a single building at the Fort Sill U.S. Army base in Oklahoma. Tile was removed by either a dry method or a wet method (there were two different wet methods, one involving soaking the tile prior to removal, and the other involving misting of the cell during removal, but both are considered "wet" removal for the purposes of this analysis). Mastic was removed either using citric acid and towels, or using a sand machine (two varieties of sand were used, but we will not distinguish between them here).

Airborne asbestos levels were monitored before and during the removals using transmission electron microscopy (TEM), with a direct preparation technique. Samples included in this evaluation were collected under passive conditions, i.e., without disturbance of the air beyond that caused by the activity being monitored.

Numerous comparisons are of interest in this analysis. First, we want to compare airborne asbestos levels during removal by each of the 4 methods to those measured before removal. Second, we want to develop confidence intervals for the average airborne asbestos levels during removal by each of the 4 methods. Third, we want to compare levels during removal by each of the 4 methods. Finally, it is of interest to determine whether airborne asbestos levels during mastic removal, irrespective of method, are different from those during tile removal, irrespective of method.

2. Study Data

The assignment of removal methods to cells in the study is shown in

Table I.

TABLE I
ASSIGNMENT OF REMOVAL METHODS TO CELLS

CELL NUMBER	TILE REMOVAL	MASTIC REMOVAL
1	Dry	Citric Acid/Towels
2	Wet (Mist)	Sand (blasting)
3	Dry	Citric Acid/Towels
4	Dry	Sand (blasting)
5	Dry	Sand (blasting)
6	Dry	Sand (masonry)
7	Wet	Citric Acid/Towels

Three airborne asbestos samples were taken in each cell before and after both tile and mastic removal (the cells were thoroughly cleaned after tile removal), for a total of 84. The 3 filters from Cell 5 during tile removal were too heavily loaded to be analyzed, so that a total of 81 TEM measurements are actually available. A listing of the study database is given in the appendix.

3. Descriptive Statistics

Figures 1, 2, and 3 give a graphical portrayal of the data. Figure 1 shows airborne asbestos levels by cell before and during tile removal; Figure 2 is the corresponding graph for mastic removal. On both figures, a "1" denotes a measurement before removal, while

a "2" denotes a measurement during removal. Some of the "1's" represent multiple measurements close together. Figure 3 shows asbestos levels during removal for both tile and mastic removals. The measurements are coded numerically by removal method: 1 = dry tile removal; 2 = wet tile removal; 4 = sand machine mastic removal; 5 = citric acid/towels mastic removal.

Table II is a companion to Figures 1 and 2 combined. It shows arithmetic average airborne asbestos levels by cell before and during both tile and mastic removal.

TABLE II

ARITHMETIC AVERAGE AIRBORNE ASBESTOS LEVELS (S/CC), BY CELL, BEFORE AND DURING TILE AND MASTIC REMOVAL

CELL	TILE			MASTIC		
	METHOD	BEFORE	DURING	BEFORE	DURING	METHOD
1	Dry	0	0.130	0.008	0.290	Citric
2	Wet	0.001	0.067	0.022	0.103	Sand
3	Dry	0	0.169	0.001	0.261	Citric
4	Dry	0	0.125	0.003	0.925	Sand
5	Dry	0.005	N/A	0.003	0.223	Sand
6	Dry	0	0.116	0.001	0.056	Sand
7	Wet	0	0.066	0	0.190	Citric
ALL		0.001	0.112	0.005	0.292	

Several observations can be made based on Figures 1 - 3 and Table II:

- * asbestos levels before removal are very low, especially those before tile removal (19 of 21 measurements before tile removal were 0).
- * levels during removal (of tile or mastic) are typically 2 orders of magnitude higher than those before removal, with the exception of mastic removal in Cell 2, where the difference is a factor of 5.
- * with the exception of sand removal of mastic, asbestos levels in different cells with the same removal method are quite consistent. The sand mastic removal levels are very variable from cell to cell.
- * Dry tile removal appears to result in higher asbestos levels than wet tile removal.
- * Mastic removal appears to generally result in higher levels than tile removal, irrespective of removal methods.

4. Statistical Tests

4.1 Statistical Significance of Elevation of Levels During Removal

Table II suggests that airborne asbestos levels during both tile and mastic removal are elevated compared to levels before removal, and that there is a large relative difference between the "during" and "before" levels. In testing the statistical significance of these elevated levels, it is therefore natural to focus on the ratio of levels during removal to levels before removal. An

immediate difficulty arises in that many of the "before" levels are zero (19 of 21 for tile removal; 10 of 21 for mastic removal). We therefore replaced zero levels by one-half the corresponding analytical sensitivity. The analytical sensitivity is the airborne asbestos concentration corresponding to a single asbestos structure found on 10 grid openings.

This procedure is conservative in the sense that plausible arguments exist for replacing the zeros with a lower value. For example, since 19 "before" levels for tile removal are zero, it might be reasonable to replace these zeros by one-half of one-nineteenth of the average analytical sensitivity. The replacement procedure adopted in this analysis is therefore, by comparison with other plausible replacement procedures, less likely to lead to a conclusion that levels during removal are statistically significantly elevated compared to levels before removal.

Having replaced zeros with one-half the analytical sensitivity, the data was transformed by a natural logarithm. Average values were then calculated for the logarithms in each cell before and during tile and mastic removal. Paired t-tests were then applied to the "before" and "after" cell means for each removal method. This procedure is equivalent to applying an analysis of variance (ANOVA) model, separately for each removal method, with TIME (before and after) as a fixed effect, and CELL as a random effect. Thus, we are testing the difference between before and after removal levels assuming that the cells actually tested represent a random sample from the universe of cells to which the method could be applied.

Table III shows the t-statistic, the number of degrees of freedom (one less than the number of cells available for the comparison), and the one-sided p-value for testing the hypothesis that the geometric mean level during removal exceeds the geometric mean level before removal.

TABLE III

**PAIRED T-TESTS FOR: GEOMETRIC MEAN AIRBORNE ASBESTOS LEVEL DURING
REMOVAL GREATER THAN GEOMETRIC MEAN LEVEL BEFORE REMOVAL**

REMOVAL METHOD	T-STATISTIC	DEGREES OF FREEDOM	P-VALUE
Dry Tile	30.02	3	<0.0001
Wet Tile	33.83	1	0.0094
Citric Mastic	17.63	2	0.0016
Sand Mastic	4.82	3	0.0085

When 4 simultaneous comparisons are made, an overall significance level of 0.05 is achieved when significance for individual comparisons is recognized for p-values less than $0.05/4 = 0.0125$. By this criterion, all comparisons in the table are significant. We conclude that airborne asbestos levels during removal of tile or mastic are elevated as compared to levels before removal irrespective of removal method.

4.2 Confidence Intervals for Average Levels During Removal

These confidence intervals can be calculated for both the arithmetic and the geometric mean levels during removal. The calculation for geometric means is formally the same as the calculation for arithmetic means, except that it is carried out on the log scale and the results exponentiated back to the measurement scale. The confidence intervals in both cases are based on the t-statistic with the appropriate number of degrees of freedom, which is one less than the number of cells in which the method was applied. Thus, the confidence interval calculation accounts for

the variability between cells, and assumes that the cells are a random sample of all cells to which the methods could be applied. Table IV shows the point estimates (arithmetic or geometric means) and associated 95% confidence intervals.

TABLE IV

ESTIMATED ARITHMETIC AND GEOMETRIC MEAN AIRBORNE ASBESTOS LEVELS (S/CC) DURING TILE AND MASTIC REMOVAL, BY REMOVAL METHOD, WITH ASSOCIATED 95% CONFIDENCE INTERVALS

REMOVAL METHOD	ARITHMETIC MEAN	95% CONFIDENCE INTERVAL	GEOMETRIC MEAN	95% CONFIDENCE INTERVAL
Dry Tile	0.135	0.098 - 0.173	0.132	0.101 - 0.173
Wet Tile	0.066	0.058 - 0.075	0.061	0.048 - 0.076
Citric Acid	0.247	0.119 - 0.374	0.241	0.141 - 0.410
Sand Machine	0.326	-0.317 - 0.970	0.183	0.027 - 1.248

The arithmetic and geometric means, and associated confidence intervals, are in close agreement for dry and wet tile removal, and for mastic removal by citric acid/towels. For sand machine removal of mastic, however, the situation is different. The arithmetic mean is almost twice the geometric mean, indicating a positively

skewed distribution. The confidence interval for the arithmetic mean includes the value 0, again indicating a skewed distribution with high variability. The confidence interval for the geometric mean covers the range of confidence intervals for the other three methods combined. The major contributor to this variability in levels during sand machine removal can be found in Cell 4, where the levels are far higher than in other cells.

4.3 Comparison of Levels During Removal by Different Methods

With 4 removal methods, there are 6 pairwise comparisons of airborne asbestos levels during removal. As the study design turned out, only 2 of the 6 comparisons can be based on more than a single matched cell: Cells 1 and 3 for the Dry Tile - Citric Mastic comparison; Cells 4 and 6 for the Dry Tile - Sand Mastic comparison. Clearly, it is better to compare Dry Tile in 4 cells to Citric Mastic in 3 cells, without pairing the methods by cell, than to restrict the comparison to the 2 paired cells. The same is true for Dry Tile - Sand Mastic (4 cells each for the unpaired comparison versus 2 for the paired comparison). Accordingly, two-sample t-tests were carried out on the log-transformed data. For each comparison, an F-test of equality of variance between the two groups was first performed. If the F statistic was significant at the 5% level, the unequal variance version of the two-sample t-test was used. Otherwise, the equal variance version was used.

Table V shows the results of the two-sample t-tests. In assessing the significance of these results, the appropriate p-value for an overall significance level of 0.05 is, by the Bonferroni method, $0.05/6 = 0.008$, since 6 simultaneous comparisons are being made. By this criterion, the Dry Tile/Citric Mastic comparison is barely non-significant. Since the Bonferroni method is conservative, and an argument can be made for basing these comparisons on a one-sided rather than a two-sided test (which would cut the p-values in half), we will count this comparison as significant. Hence, we

conclude that airborne asbestos levels during Citric Acid/Towels removal of mastic are statistically significantly higher than those during tile removal by either a dry or a wet method. Also, Dry Tile removal results in significantly higher levels than Wet Tile removal. There are no statistically significant differences between Sand Removal of mastic and Dry or Wet tile removal, or Citric Acid removal of mastic.

TABLE V

TWO-SAMPLE T-TESTS FOR EQUALITY OF GEOMETRIC MEAN AIRBORNE ASBESTOS LEVELS DURING REMOVAL OF TILE OR MASTIC BY VARIOUS METHODS

COMPARISON	P-VALUE (2-SIDED)	T-TEST VERSION
Dry Tile/Wet Tile	0.004	Equal Variance
Dry Tile/Citric Mastic	0.009	Equal Variance
Dry Tile/Sand Mastic	0.63	Unequal Variance
Wet Tile/Citric Mastic	0.003	Equal Variance
Wet Tile/Sand Mastic	0.17	Unequal Variance
Citric Mastic/Sand Mastic	0.69	Unequal Variance

4.4 Overall Comparison of Tile and Mastic Removal

An ANOVA model with REMOVAL TYPE (tile or mastic) as a fixed effect and CELL (1,2,3,4,6,7) as a random effect was fit to the "during" data on both the measurement and the log scale. In neither case was REMOVAL TYPE a statistically significant effect. Thus, the apparent elevation of airborne asbestos levels during mastic removal as compared to tile removal, evident in Figure 3, is not

statistically significant. This negative conclusion is due to the variability in asbestos levels between cells during sand machine removal of mastic.

5. Conclusions

The principal conclusions of this analysis are as follows:

- (i) Airborne asbestos levels during removal of tile or mastic were statistically significantly elevated compared to levels before removal, irrespective of removal method.
- (ii) Airborne asbestos levels before removal were very low, averaging 0.001 s/cc before tile removal, and 0.005 s/cc before mastic removal.
- (iii) Airborne asbestos levels averaged 0.135 s/cc during dry tile removal, 0.066 s/cc during wet tile removal, 0.247 s/cc during removal of mastic using citric acid and towels, and 0.326 s/cc during sand machine mastic removal.
- (iv) Airborne asbestos levels during removal of mastic by sand machine were much more variable than levels during removal of tile or mastic by the other methods.
- (v) Airborne asbestos levels were statistically significantly higher during citric acid removal of mastic as compared to tile removal by either method. Levels during dry tile removal were significantly higher than during wet tile removal. However, the differences between sand machine removal of mastic and all other removal methods were not significant, because of the much larger variability of the sand machine data.

ASBESTOS LEVELS FOR TILE REMOVAL (1 = BEFORE; 2 = DURING)

A
I
R
B
O
R
N
E

A
S
B
E
S
T
O
S

C
O
N
C

E
N
T
R
A
T
I
O
N
S

I
N

S
/
C
C

Figure 1

A
I
R
B
O
R
N
E

A
S
B
E
S
T
O
S

C
O
N
C
E
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T
R
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N

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C
C

ASBESTOS LEVELS FOR MASTIC REMOVAL (1 = BEFORE; 2 = DURING)

Figure 2

LEVELS DURING REMOVAL (1=DRY; 2=WET; 4=SAND; 5=CITRIC)

A
I
R
B
O
R
N
E

A
S
B
E
S
T
O
S

C
O
N
C
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S
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C
C

Figure 3

APPENDIX

FORT SILL ANALYSIS DATASET

SAMPLEID	LOCATION	TIME	AIRCONC (S/CC)	CELL	REMTYPE	REM METH
1057	EAST	PRE	0	1	Tile	Dry
1058	CENTER	PRE	0	1	Tile	Dry
1059	WEST	PRE	0	1	Tile	Dry
1061	EAST	DUR	0.143	1	Tile	Dry
1062	CENTER	DUR	0.138	1	Tile	Dry
1063	WEST	DUR	0.11	1	Tile	Dry
1105	EAST	PRE	0.014	1	Mastic	Citric Acid
1106	CENTER	PRE	0	1	Mastic	Citric Acid
1107	WEST	PRE	0.009	1	Mastic	Citric Acid
1113	EAST	DUR	0.345	1	Mastic	Citric Acid
1114	CENTER	DUR	0.267	1	Mastic	Citric Acid
1115	WEST	DUR	0.257	1	Mastic	Citric Acid
2025	EAST	PRE	0	2	Tile	Mist
2026	CENTER	PRE	0.004	2	Tile	Mist
2027	WEST	PRE	0	2	Tile	Mist
2029	EAST	DUR	0.082	2	Tile	Mist
2030	CENTER	DUR	0.034	2	Tile	Mist
2031	WEST	DUR	0.085	2	Tile	Mist
2093	EAST	PRE	0.009	2	Mastic	Sand - blasting
2094	CENTER	PRE	0.049	2	Mastic	Sand - blasting
2095	WEST	PRE	0.009	2	Mastic	Sand - blasting
2097	EAST	DUR	0.085	2	Mastic	Sand - blasting
2098	CENTER	DUR	0.111	2	Mastic	Sand - blasting
2099	WEST	DUR	0.114	2	Mastic	Sand - blasting
3041	EAST	PRE	0	3	Tile	Dry
3042	CENTER	PRE	0	3	Tile	Dry
3043	WEST	PRE	0	3	Tile	Dry
3053	EAST	DUR	0.191	3	Tile	Dry
3054	CENTER	DUR	0.176	3	Tile	Dry
3055	WEST	DUR	0.141	3	Tile	Dry
3073	EAST	PRE	0	3	Mastic	Citric Acid
3074	CENTER	PRE	0.004	3	Mastic	Citric Acid
3075	WEST	PRE	0	3	Mastic	Citric Acid
3077	EAST	DUR	0.2225	3	Mastic	Citric Acid
3078	CENTER	DUR	0.331	3	Mastic	Citric Acid
3079	WEST	DUR	0.228	3	Mastic	Citric Acid
4017	EAST	PRE	0	4	Tile	Dry
4018	CENTER	PRE	0	4	Tile	Dry
4019	WEST	PRE	0	4	Tile	Dry
4021	EAST	DUR	0.093	4	Tile	Dry
4022	CENTER	DUR	0.145	4	Tile	Dry
4023	WEST	DUR	0.138	4	Tile	Dry
4125	EAST	PRE	0.005	4	Mastic	Sand - blasting
4126	CENTER	PRE	0	4	Mastic	Sand - blasting

4127	WEST	PRE	0.004	4	Mastic	Sand - blasting
4133	EAST	DUR	1.152	4	Mastic	Sand - blasting
4134	CENTER	DUR	0.693	4	Mastic	Sand - blasting
4135	WEST	DUR	0.929	4	Mastic	Sand - blasting
5033	EAST	PRE	0	5	Tile	Dry
5034	CENTER	PRE	0	5	Tile	Dry
5035	WEST	PRE	0.016	5	Tile	Dry
5089	EAST	PRE	0.004	5	Mastic	Sand - blasting
5090	CENTER	PRE	0.005	5	Mastic	Sand - blasting
5091	WEST	PRE	0	5	Mastic	Sand - blasting
5101	EAST	DUR	0.184	5	Mastic	Sand - blasting
5102	CENTER	DUR	0.221	5	Mastic	Sand - blasting
5103	WEST	DUR	0.2625	5	Mastic	Sand - blasting
6009	EAST	PRE	0	6	Tile	Dry
6010	CENTER	PRE	0	6	Tile	Dry
6011	WEST	PRE	0	6	Tile	Dry
6013	EAST	DUR	0.083	6	Tile	Dry
6014	CENTER	DUR	0.127	6	Tile	Dry
6015	WEST	DUR	0.138	6	Tile	Dry
6065	EAST	PRE	0	6	Mastic	Sand - masonry
6066	CENTER	PRE	0	6	Mastic	Sand - masonry
6067	WEST	PRE	0.003	6	Mastic	Sand - masonry
6069	EAST	DUR	0.055	6	Mastic	Sand - masonry
6070	CENTER	DUR	0.044	6	Mastic	Sand - masonry
6071	WEST	DUR	0.068	6	Mastic	Sand - masonry
7109	SOUTH	PRE	0	7	Tile	Wet
7110	CENTER	PRE	0	7	Tile	Wet
7111	NORTH	PRE	0	7	Tile	Wet
7117	SOUTH	DUR	0.103	7	Tile	Wet
7118	CENTER	DUR	0.059	7	Tile	Wet
7119	NORTH	DUR	0.035	7	Tile	Wet
7121	SOUTH	PRE	0	7	Mastic	Citric Acid
7122	CENTER	PRE	0	7	Mastic	Citric Acid
7123	NORTH	PRE	0	7	Mastic	Citric Acid
7129	SOUTH	DUR	0.175	7	Mastic	Citric Acid
7130	CENTER	DUR	0.194	7	Mastic	Citric Acid
7131	NORTH	DUR	0.201	7	Mastic	Citric Acid