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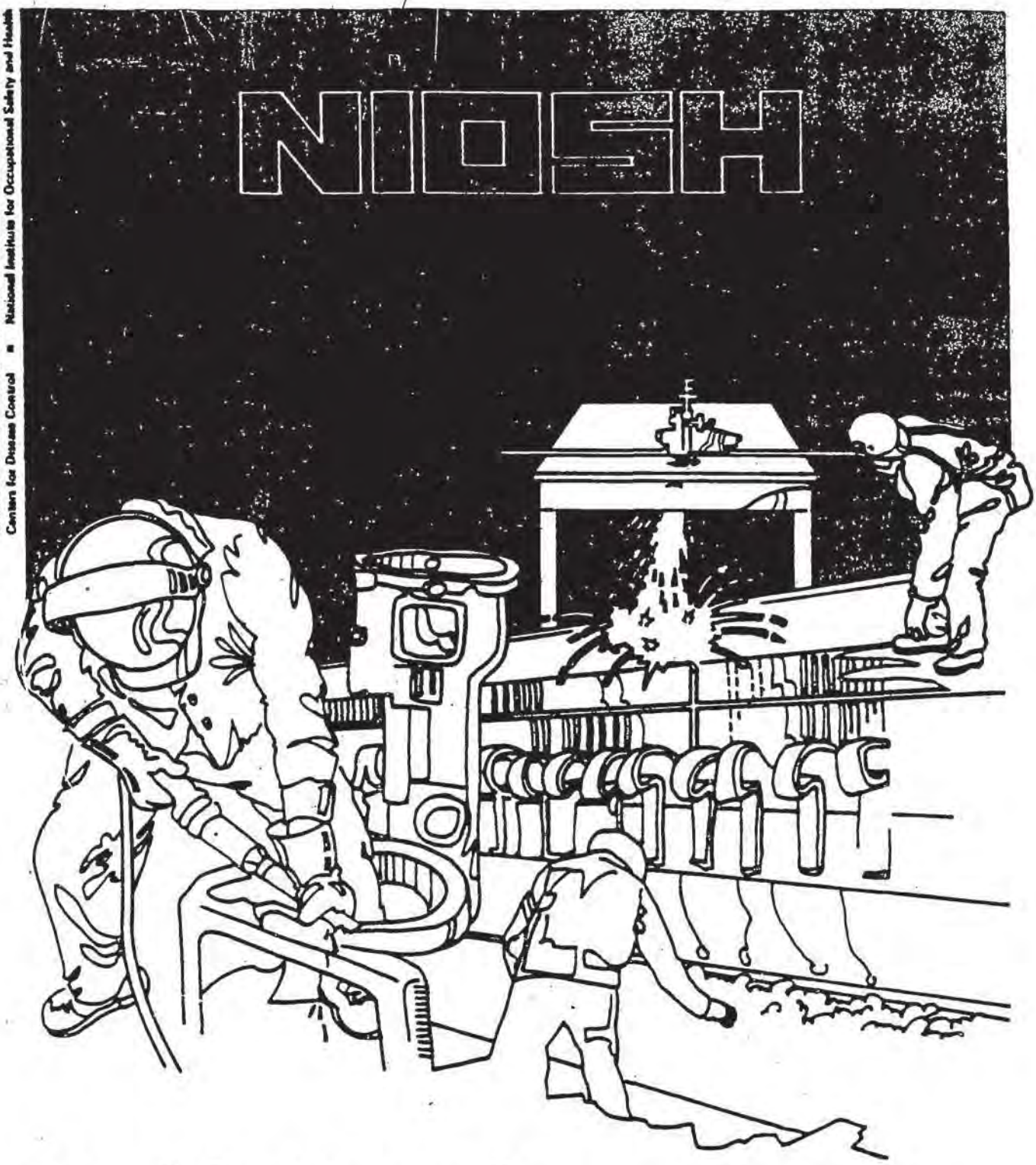

Health Hazard Evaluation Report

HETA 85-414-1805
NEW MEXICO STATE
HIGHWAY DEPARTMENT
GENERAL OFFICE BUILDING
SANTA FE, NEW MEXICO

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 85-414-1805
JUNE 1987
NEW MEXICO STATE HIGHWAY DEPARTMENT
GENERAL OFFICE BUILDING
SANTA FÉ, NEW MEXICO

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1.0 EXECUTIVE SUMMARY

On the morning of June 17, 1985, an electrical malfunction occurred in the 500 KVA power transformer located in the basement transformer vault of the New Mexico State Highway Department General Office Building in Santa Fe, New Mexico. The transformer contained 245 gallons of askarel coolant liquid consisting of approximately 87% polychlorinated biphenyls (PCB) and 13% chlorinated benzenes. The electrical malfunction caused the askarel to boil and vaporized PCB, polychlorinated dibenzofurans (PCDF) and polychlorinated dibenzo-p-dioxins (PCDD) vented from the pressure relief device on the top of the transformer. The PCDF and PCDD were believed to be formed by the pyrolysis of the PCB and chlorinated benzenes. The State Highway Department Building was immediately closed; emergency gross cleaning was completed; and samples were taken to determine the extent of the contamination.

The contamination was distributed throughout the General Office Building by convective air currents and mechanical transfer through the heating, ventilation, and air-conditioning (HVAC) system. PCB surface concentrations ranged from 28,000,000 ug/m^2 for grossly contaminated surfaces to 9 ug/m^2 for surfaces with no visible contamination; PCB air concentrations ranged from 0.14 to 42 ug/m^3. The Annex, a separate building connected at the southern end of the General Office Building, showed significantly lower levels of contamination. PCB concentrations ranged from 17 to 46 ug/m^2 on surfaces and 0.17 to 0.35 ug/m^3 in air.

Governor Anaya appointed an Expert Advisory Panel to develop guidelines for the permanent re-occupancy of these Buildings. The Panel consisted of representatives of the National Institute for Occupational Safety and Health (NIOSH), Environmental Protection Agency (EPA), Workers Institute for Safety and Health (WISH) and four members of New Mexico's scientific community. The Panel developed re-occupancy guidelines for both PCB and 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalents (TCDD-equivalents). TCDD-equivalents are defined as the concentration of

2,3,7,8-tetrachlorodibenzo-p-dioxin which by itself is believed to exhibit the same biological potency as a mixture of PCDF and PCDD actually present in an air or surface sample. These guidelines are:

	Surface	Air
PCDF/PCDD (TCDD-Equivalents)	1 ng/m^2	2 pg/m^3
PCB	50 ug/m^2	0.50 ug/m^3

In addition to developing these guidelines, the Panel requested that a study be conducted to determine how these levels compared to the normal levels of background contamination that exist in other similar buildings in Santa Fe.

NIOSH conducted a background study in three commercial office buildings in Santa Fe in November 1985. The concentrations of PCBs on high skin contact surfaces (desks and tables) ranged from non-detected (1.0 ug/m^2) to 5.9 ug/m^2 (arithmetic mean = 1.3 ug/m^2, n=2) and on surfaces in the fresh air intake plenums ranged from non-detected (1.0 ug/m^2) to 34 ug/m^2 (arithmetic mean = 9.9 ug/m^2, n=6). The building air concentrations of PCBs ranged from non-detected (0.03 ug/m^3) to 0.18 ug/m^3 (arithmetic mean = 0.04 ug/m^3, n =21); three ambient air samples were non-detected (0.03 ug/m^3). The concentrations of PCDF/PCDD (converted to TCDD-equivalents) on high skin contact surfaces ranged from 0.04 to 0.42 ug/m^2 (arithmetic mean = 0.15 ng/m^2, n = 12). The building air concentrations of TCDD-equivalents ranged from 0.15 to 1.5 pg/m^3 (arithmetic mean = 0.50 pg/m^3, n = 9); four ambient air samples ranged from 0.01 to 0.21 pg/m^3 (arithmetic mean = 0.14 pg/m^3). The air and surface concentrations of these contaminants present as normal background contamination in office buildings in Santa Fe were below the cleanup guidelines for the Highway Department Building.

The Annex and General Office Buildings were decontaminated between August 1985 and July 1986. NIOSH was requested by the Advisory Panel to design and implement a test plan to determine that the Annex and General Office Buildings are acceptable for re-occupancy.

The Annex Building Final Certification Test Plan was implemented by the representatives from NIOSH and the New Mexico Environmental Improvement Division (EID) on September 16, 1985. The test results, summarized below, showed that the air and surface concentrations of PCB and PCDF/PCDD were all below the specified re-occupancy guidelines. The Annex Building was determined to be acceptable for occupancy and re-occupied by the State Highway Department on November 11, 1985.

SUMMARY OF CERTIFICATION TEST RESULTS - ANNEX BUILDING

Description		n/N*	Range**	Mean	Std Dev
TCDD-Equivalents					
Air	(pg/m^3)	4/4	0.26-0.70	0.48	0.19
Surface	(ng/m^2)	9/9	0.03-0.32	0.20	0.12
HVAC	(ng/m^2)	3/3	0.09-0.28	0.16	0.10
PCB					
Air	(ug/m^3)	3/7	(0.02)-0.05	0.02	0.02
Surface	(ug/m^2)	14/39	(0.56)-5.6	1.5	1.3
HVAC	(ug/m^2)	11/13	(1.9)- 26	7.0	7.1
Paper	(ug/m^2)	1/9	(0.56)-2.1	0.5	0.6

* n/N is the number of samples above the detection limit/total number of samples collected.
** The limit of detection is in parentheses.

The General Office Building Final Certification Test Plan was implemented by NIOSH and EID investigators. The testing included measurements for both air and surface concentrations of PCBs, PCDFs and PCDDs throughout the Building. The surfaces tested included desks, tables, doors, walls, floors, ceilings, paper materials, electronic equipment (typewriters and computer terminals as well as fixed place equipment) and the interior of the HVAC system.

The results of this sampling are summarized below:

SUMMARY OF CERTIFICATION TEST RESULTS - GENERAL OFFICE BUILDING

Description		Date	n/N*	Range**	Mean	Std.Dev.
TCDD-Equivalents						
Air	(pg/m^3)	01-15-86	12/12	0.05-1.21	0.38	0.30
Surface	(ng/m^2)	01-15-86	27/27	0.01-0.17	0.06	0.04
HVAC	(ng/m^2)	10-04-85	8/8	0.03-1.62	0.46	0.55
HVAC	(ng/m^2)	05-28-86	2/2	0.05-0.15	0.10	-
PCB						
Air	(ug/m^3)	01-15-86	25/25	0.10- 0.95	0.40	0.25
Air	(ug/m^3)	05-28-86	14/17	(0.02)-0.28	0.11	0.09
Air	(ug/m^3)	07-11-86	16/16	0.04- 0.26	0.15	0.07

Surface (ug/m^2)

Perim Strata	01-15-86	219/228	(0.20)- 256	7.0	19
Vault Strata	01-15-86	161/161	0.6 -2760	40	219
Vault Strata	05-28-86	109/111	(0.7) - 76	14	18
Vault Strata	07-11-86	91/93	(0.6) - 32	5.0	5.9
HVAC System	10-04-85	38/39	(0.6) - 640	50	110
HVAC System	01-15-86	12/12	17 - 204	73	50
HVAC System	05-28-86	28/29	0.7 - 176	24	34
HVAC System	07-11-86	5/5	8.9 - 104	35	39
Paper	01-28-86	60/246	(0.07)- 300	19	48
Paper	03-11-86	3/6	(0.4) - 11	2.5	4.0
Field Books	04-10-86	4/5	(0.4) -7.8	2.3	3.1
Equipment	12-16-85	40/40	0.54 -8.0	3.0	3.6
Equipment	03-11-86	7/9	(0.4) - 22	3.7	7.0
Equipment	06-13-86	5/5	3.8 - 10	6.8	2.9
Furniture	12-16-85	36/36	0.57 - 58	4.8	12
Furniture	01-29-86	24/30	(0.3) - 16	2.4	4.0

* n/N is the number of samples above the detection limit/total number of samples collected.
** The limit of detection is in parentheses.

The surface and air concentrations of PCDF/PCDDs (converted to TCDD-equivalents for all samples were below the guidelines established by the Expert Advisory Panel. The relationship between PCBs and TCDD-equivalents on surfaces was evaluated. A PCB concentration of 50 ug/m^2 (cleanup guideline) would correspond to 0.3 ng/m^2 TCDD-equivalents (95% upper confidence limit). Thus, meeting the PCB criteria should also ensure meeting the TCDD-equivalents criteria (1 ng/m^2). The Building was divided into two strata regarding PCB surface contamination. The vault strata consisting of the areas believed to be most heavily contaminated originally by the incident; and the perimeter strata consisting of the balance of the Building. The results of the PCB surface wipe samples collected in January 1986 showed that the vault strata had a 95%-95% tolerance limit of 60 ug/m^2, while the perimeter strata had a 95%-95% tolerance limit of 18 ug/m^2. This tolerance limit is a value for which there is 95% confidence that at least 95% of the population falls below that limit. This means that with 95% confidence, one can state that the probability of a point (surface) contacted having contamination levels greater than 60 ug/m^2 in vault strata and 18 ug/m^2 in the perimeter strata is less than 5%. Therefore according to the cleanup criterion (50 ug/m^2) recommended by the Expert Panel, the January 1986 data indicate that perimeter strata passed certification, and the vault strata failed certification requiring further cleanup. Eight of the 25 PCB air samples exceeded the 0.50 ug/m^3 guideline. These eight samples (range 0.53 to 0.95 ug/m^3) were all collected in the vault strata.

A subsequent investigation on March 18, 1986, identified low level sources of PCB in the concrete between the first floor and basement, and in the East wall around the vault. In addition, a concrete pit outside the vault contained high levels of PCB (57,000 ug/m^2). A work plan was developed to physically remove the concrete ceiling above the vault, the adjoining rooms next to the vault and the East structural wall around the vault. The concrete pit outside the vault was decontaminated and the entire vault strata was re-cleaned along with the entire HVAC system. These decontamination efforts were completed on May 24, 1986. Certification re-sampling was conducted by NIOSH on May 28-30, 1986. Certification re-sampling consisted of collecting 17 PCB air samples throughout the entire building; 111 PCB surface samples in the vault strata; and 29 PCB and 2 PCDF/PCDD wipe samples in the HVAC system throughout the entire building. Results of these samples showed that the PCB air concentrations ranged from none detected (0.02 ug/m^3) to 0.28 ug/m^3, which did not exceed the 0.50 ug/m^3 guideline value. The PCB surface concentrations ranged from none detected to (0.7 ug/m^2) to 76 ug/m^2. The calculated 95%-95% tolerance limit was 65 ug/m^2, which exceeded the 50 ug/m^2 guideline requiring another re-cleaning of the vault strata. The PCB concentrations in the HVAC system ranged from none detected (0.7 ug/m^2) to 176 ug/m^2. Three of the samples showed concentrations (52.0 - 176 ug/m^2) that exceeded the 50 ug/m^2 guideline, requiring further re-cleaning of the HVAC system. The two PCDF/PCDD samples showed concentrations of 0.15 ng/m^2 and 0.045 ng/m^2.

Certification re-sampling of the vault strata and HVAC system was conducted by NIOSH on July 11-13, 1986. The testing included collecting 16 PCB air samples throughout the entire building; 93 PCB surface wipe samples in the vault strata; and 5 PCB surface samples in the HVAC system. The results of these samples showed that the PCB air concentrations now ranged from none detected (0.02 ug/m^3) to 0.26 ug/m^3. The PCB surface concentrations ranged from none detected (0.6 ug/m^2) to 32 ug/m^2. The calculated 95% - 95% tolerance limit was 20 ug/m^2, which is below the 50 ug/m^2 Advisory Panel surface PCB guideline. The PCB concentrations in the HVAC system ranged from 8.8 - 104 ug/m^2. One of the 5 samples showed a concentration (104 ug/m^2) exceeding the 50 ug/m^2 guideline requiring subsequent replacement of that ductwork.

The Final (January 1986) Test Plan for the General Office Building had required sampling of the decontaminated paper materials and documents, electronic equipment and furniture frames. The furniture and all of the equipment that was not disposed of had results below the 50 ug/m^2 guideline. The equipment that failed the certification sampling was discarded. All of the paper materials and documents were cleaned to a level of less than 50 ug/m^2, except the vinyl and leather covers of the field books. The covers were replaced.

The final results of the certification testing conducted by the NIOSH investigator demonstrate the residual concentrations of PCB and PCDF/PCDD in air and on surfaces are below the guidelines recommended by the Governor's Expert Advisory Panel. Based on these results, the NIOSH investigators concluded that the Annex and General Office Buildings are considered acceptable for occupancy and the contents contained therein are also safe and acceptable for use.

It recommended that both the Annex and General Office Buildings be retested to verify that the conditions with regard to the contamination have not changed significantly since the Environmental Improvement Division judged these Buildings to be acceptable for re-occupancy. The testing should be conducted approximately 12-months following reoccupancy of the General Office Building.

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2.0 INTRODUCTION

This document has been prepared by investigators from the National Institute for Occupational Safety and Health (NIOSH) with assistance from the State of New Mexico's Highway Department and Strategic Organizational Systems (SOS) Environmental Engineering. The objective of this Final Certification document is to provide comprehensive documentation for all of the work associated with the decontamination, certification and re-occupancy of the Annex Building and the General Office Building. The study conducted to determine the background concentrations of PCBs, PCDFs and PCDDs in commercial office buildings in Santa Fe also is summarized in this document (see Section 5.0).

2.1 Background

On the morning of June 17, 1985 at approximately 0400 hours, an electrical malfunction occurred in the 500 KVA transformer located in the basement transformer vault in the General Office Building of the New Mexico State Highway Department in Santa Fe, New Mexico.

The transformer contained 245 gallons of askarel cooling fluid consisting of 87% PCB-1260 (PCB-1260 refers to a commercial mixture of polychlorinated biphenyls having a chlorine content of 60% by weight) and 13% chlorinated benzenes. The electrical malfunction caused the askarel fluid to boil and vaporized polychlorinated biphenyls (PCB), polychlorinated dibenzo-furans (PCDF) and polychlorinated dibenzo-p-dioxins (PCDD) vented from the pressure relief device on the transformer. The PCDF/PCDD were believed to be formed by the pyrolysis of the PCB and chlorinated benzenes. The volume of askarel released is estimated at approximately 100 gallons. A similar incident in Minnesota resulted in the release of approximately 50 of the 290 gallons of PCB askarel contained in the transformer [1].

At the recommendation of New Mexico Environmental Improvement Division, the State Highway Department Building was closed on June 17, 1985, and tested for PCB contamination. Based on these preliminary tests, NIOSH was requested to provide expert assistance in interpretation of these data. A contractor was immediately contracted to seal the building, provide necessary emergency gross cleaning, and conduct a contamination assessment to determine the concentrations of PCBs and PCDF/PCDDs in air and on surfaces throughout the Building [2].

According to the data collected between June 18 - 24, 1985 [2], the contamination was distributed throughout the General Office Building by convective air currents and mechanical transfer through the heating, ventilation, and air-conditioning (HVAC) system. The General Office Building showed the highest air and surface concentration levels of PCB and PCDF/PCDD. The Annex Building, at

the southern end of the main building and connected at the basement level and by a first-floor breezeway, showed significantly lower levels of these contaminants [2].

2.2 Project History

In July 1985, the Governor of the State of New Mexico appointed an Expert Advisory Panel to develop cleanup guidelines and approve a final test plan for the re-occupancy certification of the General Office and Annex Buildings. The Panel consisted of representatives of the National Institute for Occupational Safety and Health (NIOSH), U.S. Environmental Protection Agency (EPA), Workers Institute for Safety and Health (WISH), and four members of the New Mexico scientific community (Appendix IXX).

The Advisory Panel's first convened meeting was July 16, 1985. During this meeting, the data from the contamination assessment was reviewed; surface and air cleanup guidelines for PCDF/PCDDs were developed; and NIOSH was selected to certify the buildings for re-occupancy upon completion of the decontamination efforts.

Subsequent to this meeting, an RFP (Request for Proposals) was developed and distributed to qualified contractors for their development of a Work Plan to decontaminate the General Office Building and Annex. In late August 1985, SOS Environmental Engineering was selected as the decontamination contractor and work on the project commenced.

Decontamination of the Annex was completed on September 13, 1985. The Annex was tested by NIOSH the week of September 16; recommended as acceptable for re-occupancy on November 5, 1985; and reoccupied by the State Highway Department on November 11, 1985. The certification test plan was based on a Best Engineering Judgment (BEJ) strategy. A BEJ strategy considers physical and chemical characteristics of the contaminant; mode of transport, dispersion path and deposition of the contaminants, and weights site selection for surface samples towards the highest potential contamination surface.

The second meeting of the Advisory Panel was on September 27, 1985. Update reports were given by New Mexico State Highway Department the project manager and SOS Environmental Engineering; surface and air cleanup guidelines for PCBs were established; and the U.S. EPA presented the concept of Random Statistical Sampling concerning surface testing for PCBs and PCDF/PCDDs. The Advisory Panel requested that the BEJ and random sampling concepts be combined together as a single certification test plan. The random sampling component would allow for a statistical statement to be made as to the confidence in the decontamination of untested surfaces.

Due to the ubiquity of PCBs, PCDFs and PCDDs in the environment, a study was conducted to determine how the cleanup guidelines compared to normal levels of background contamination that exist in commercial building in Santa Fe, New Mexico. Three office buildings were tested for air and surface concentrations of these contaminants. The study was conducted by NIOSH with assistance from the New Mexico Environmental Improvement Division and SOS Environmental Engineering in November 1985.

In January 1986, NIOSH, with input from the New Mexico State Highway Department Advisory Committee (Appendix XX) developed a Final Test Plan for the certification of the cleaning of the General Office Building. The Test Plan consisted of two subsets of samples: One to test at locations suggested by BEJ; the other, the weighted random sample (WRS). The BEJ samples were aimed at determining the residual contamination in air and on surfaces, while the WRS was limited to contamination on surfaces. The WRS sampling approach is the random sampling of locations, weighted by frequency of contact. Both the BEJ and WRS approaches divided the General Office Building into two strata based on the known contamination assessment (Figures 12, 13, and 14). The vault strata included the areas around the vault on all three floors where the original contamination levels were the highest; this represented approximately 25% of the building. The perimeter strata included all other areas in the building; this was approximately 75% of the building.

The third meeting of the Advisory Panel was held on January 15, 1986. At this meeting the Final Test Plan was presented and accepted by the Advisory Panel. Implementation of the Test Plan by NIOSH commenced in January 16, 1986. Also, samples were collected separately for paper, electronic equipment and furniture frames.

Analysis of the January certification sample results was completed by early March. These results indicated that the perimeter strata was within the established guidelines for PCBs and PCDF/PCDDs on surfaces; however, the vault strata still showed levels for both PCB air and surfaces that were above the recommended guidelines. On March 13, 1986, an investigation identified PCB in the concrete between the basement and first floor, and in the east wall of the vault. This structural concrete was removed beginning April 16, 1986.

By June 13, 1986, all furniture frames, electronic equipment and paper was certified. Also by this date, the demolition of the structural concrete in the vault was completed. Mechanical barriers, and a carbon adsorption negative air system were used to prevent re-contamination of the perimeter strata during the demolition work. Air and surface montoring of the perimeter strata was conducted to demonstrate the effectiveness of the contaminant containment systems.

Certification re-sampling of the vault strata was conducted by NIOSH on May 28-30, 1986. This testing showed that the vault strata and those three sections of the HVAC system still had low level residual PCB surface levels in excess of the guideline. The vault strata and HVAC system were re-cleaned during June 1986.

Certification re-sampling of the vault strata and HVAC system was conducted by NIOSH on July 11-13, 1986. These samples indicated that the vault strata was within the guidelines established by the Expert Advisory Panel, thus, the General Office Building was certified as acceptable for re-occupancy on August 5, 1986. An Interim Certification Letter is prepared by NIOSH contained in Appendix XIV.

Reconstruction of the General Office Building commenced on August 30, 1986. The Building was re-occupied on December 15, 1986.

3.0 CERTIFICATION GUIDELINES

In July 1985, the Governor of the State of New Mexico appointed an Expert Advisory Panel to develop air and surface cleanup guidelines for the New Mexico State Highway Department General Office Building.

The guidelines developed by the Advisory Panel were based on the potential risk of cancer resulting from exposure to polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-p-dioxins (PCDDs). The guidelines for PCDFs and PCDDs (Appendix XVII) were intented to maintain the risk of developing cancer below one in one million for a person spending the rest of his/her working lifetime (30 years) in the building. Animal studies on the carcinogenicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) were used to estimate the potential cancer risks. It was necessary to make certain judgements and assumptions regarding the toxicity of the related compounds and the potential for exposure to occupants of the building. The guidelines for PCBs (Appendix XVIII) took into account the usual presence of detectable background levels of PCBs in air [10] and on surfaces, [11], and were intented to guide the cleanup within a safe margin of this background level.

The surface and air guidelines recommended by the Panel are shown below:

	Air	Surface
PCBs	0.5 ug/m^3	50 ug/m^2
2,3,7,8-TCDD Equivalents*	2 pg/m^3	1 ng/m^2

Units: ug/m^3 = micrograms of PCB per cubic meter of air.
pg/m^3 = picograms of TCDD Equivalents per cubic meter of air.
ug/m^2 = micrograms of PCB per square meter of surface.
ng/m^2 = nanograms of TCDD Equivalents per square meter of surface.

* The observed surface and airborne concentrations of PCDF/PCDD (including penta through hepta chloro isomer groups and 2,3,7,8-tetra isomers) were converted to 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalents (TCDD Equivalents). TCDD Equivalents are defined as the concentration of 2,3,7,8,-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) which by itself would be believed to exhibit the same biological potency as a mixture of structurally-related compounds (PCDF/PCDD) actually present in a sample.

In 1982, the New York State Department of Health [7] developed the concept of TCDD-equivalents for estimating the total toxicity of a mixture of PCDFs and PCDDs as part of the development of re-occupancy criteria for the Binghamton State Office Building [8]; the building had experienced a PCB transformer fire in 1981 [9]. This procedure calculates the amount of 2,3,7,8-TCDD that would have to be present to exhibit the same toxicity as the measured quantities of each of the various other PCDFs and PCDDs that are present, and adds these calculated amounts of 2,3,7,8-TCDD to obtain an estimate of the TCDD-equivalent toxicity of the mixture. The procedure assumes certain ratios of toxicities (termed weighting factors) between 2,3,7,8-TCDD and the other PCDFs and PCDDs [7]. The same weighting factors, with the exception of those for the hexa- and heptachlorodibenzofuran isomer groups, were used by the New Mexico Advisory Panel.

The PCDFs and PCDDs present in air and surface samples are converted to 2,3,7,8-TCDD equivalents using the following weighting factors:

PCDFs	Factor	PCDDs	Factor
TCDF	0.33	TCDD	1.0
Other tetra-CDFs	0.0	Other tetra-CDDs	0.0
Penta-CDFs	0.17	Penta-CDDs	0.5
Hexa-CDFs	0.005	Hexa-CDDs	0.02
Hepta-CDFs	0.0005	Hepta-CDDs	0.0
Octa-CDFs	0.0	Octa-CDDs	0.0

In calculating the equivalents, the raw data concentrations reported as none detected were treated using the L/2 approximation method [3,4]. This approach assumes that all none detected (ND) values are equal to one-half of the detection limit, (L), i.e., ND = L/2.

The observed PCDF/PCDD concentrations were converted to TCDD Equivalents according to the following equation:

TCDD Equivalents =

[2,3,7,8-TCDD] + 0.5 [Penta-CDD] + 0.02 [Hexa-CDF]
+ 0.33 [2,3,7,8-TCDF] + 0.17 [Penta-CDF] + 0.005 [Hexa-CDF] + 0.0005 [Hepta-CDF].

4.0 CERTIFICATION SAMPLING AND RESULTS

The certification testing was conducted according to the sampling and analytical methodology described in the January 1986 Final Test Plan (Appendix I).

4.1 General Office Building Air Samples - PCB and PCDF/PCDD

4.1.1 Sampling Philosophy and Sample Locations

Air sampling was conducted with the heating, ventilation, and air conditioning (HVAC) system adjusted to normal occupancy psychrometric conditions. The HVAC system was maintained at these conditions for a minimum of 72-hours prior to sampling. The HVAC system was operated in a 80% recirculation mode with 20% fresh air make-up.

A total of 25 PCB and 12 PCDF/PCDD air samples were collected during the initial certification sampling on January 15-19, 1986. The sampling locations for the PCB and PCDF/PCDD air samples are shown in Figure 3, 4, and 5. A larger number of PCB air samples were collected to determine the degree of homogeneity of the air throughout the building.

A total of 17 PCB air samples were collected throughout the building during the certification re-sampling of the building on May 27-29, 1986. These sample locations are shown in Figures 6, 7, and 8.

A total of 21 PCB air samples were collected throughout the building during the certification re-sampling on July 11-13, 1986. Five of the 21 samples were duplicates. These sample locations are shown in Figures 9, 10, and 11.

4.1.2 PCB and PCDF/PCDD Air Sampling Results

The airborne concentrations of PCB measured during both the January 1986 certification sampling, and the May and July 1986 certification re-sampling are summarized in Table 1. (The individual air sample results are contained in Appendix III.) The airborne concentrations of PCB measured during the January certification sampling ranged from none detected (0.04 ug/m^3) to 0.95 ug/m^3 (n = 25, mean = 0.40, std. dev. = 0.25). Eight of the 25 air samples showed PCB concentrations (range = 0.53 to 0.95 ug/m^3, mean = 0.71, std. dev. = 0.15) above the 0.50 ug/m^3 guideline value.

The PCB air concentrations measured during the May certification re-sampling ranged from none detected (0.02) to 0.28 ug/m^3 (n = 17, mean = 0.11, std. dev. = 0.09). None of the 17 test results exceeded the 0.5 ug/m^3 guideline value. The maximum sample concentration (0.28 ug/m^3) was approximately 56% of the guideline.

The PCB air concentrations measured during the July certification re-sampling ranged from 0.04 to 0.26 ug/m^3 (n=16, mean = 0.15, std. dev. = 0.07). None of the 21 test results exceeded the 0.5 ug/m^3 guideline value. The maximum sample concentration (0.26 ug/m^3) was approximately 52% of the guideline.

The airborne concentrations of PCDF/PCDD (converted to 2,3,7,8-TCDD equivalents) measured during January 1986 certification test are summarized in Table 1. (The individual test results are contained in Appendix IV.) The airborne concentrations of the PCDF/PCDD ranged from 0.03 to 1.21 pg/m^3 (n = 12, mean = 0.38, std. dev. = 0.30). By comparison, the background concentrations of airborne PCDF/PCDD measured by NIOSH researchers in office buildings in Santa Fe ranged from 0.15 to 1.5 pg/m^3 (n = 9, mean = 0.50, std. dev. 0.37). (The results of the Santa Fe background study are presented in Section 4.9 of this report.)

4.2 General Office Building - Surface Samples

4.2.1 Introduction

The certification test plan consisted of two subsets of surface wipe samples: One, to sample at locations selected by Weighted Random Sampling (WRS); the other, to sample at locations selected by Best Engineering Judgment (BEJ). The complete set of samples was intended to yield a comprehensive sampling plan that verifies that long-term health exposure to workers in the building are within the guidelines of the Risk Assessment accepted by the Expert Advisory Panel [12]. Furthermore, this integration provided a set of test results that allowed a determination of the building cleanliness on both a statistical and engineering basis.

4.2.2 Weighted Random Sampling - PCB Surface

4.2.2.1 Sampling Philosophy and Sample Locations

The General Office Building was divided into two strata: the "vault" strata consisting of the area thought to be most heavily contaminated by the incident; and the "perimeter" strata consisting of the balance of the building. Figures 12, 13, and 14 show the boundary between the perimeter strata and the vault strata for the basement, first and second floors. A total of 93 PCB random surface samples were selected for each strata each time it was tested.

Figures 15, 16, and 17 show the locations of the surface samples collected during the initial January certification testing. The May certification re-sampling locations are shown in Figures 18, 19, and 20. The July certification re-sampling locations are shown in Figures 21, 22, and 23.

The Weighted Random Sampling of surfaces for PCB analysis incorporates a scheme for random sampling of locations, weighted by likely frequency of human skin contact. The different work spaces were first divided into three broad categories by occupancy or frequency of use:

Office Space
Hallways and Reception Areas
Storage Areas

The work surfaces were then divided into seven categories by likelihood of skin contact: floors; ceilings; high contact work surfaces such as desks and telephones; low contact work surfaces such as book shelves and file cabinets; high use wall areas such as doors knobs and light switches, as well as, the areas around them; high contact wall areas (between 3' and 6' from the floor) including room dividers; and low contact wall areas (below 3' and above 6' from the floor). A system of weighting factors was developed to characterize the contact an occupant might have with each surface. The probability of selection for any given surface for

the random sampling was weighted by a factor according to the frequency of contact with the surface by the worker. The weighting factors ranging from 0.05 to 1.0 are shown below:

	WRS Weighting Factors		
Surface	Office	Hallway	Storage
Floors	.15	.05	.10
Ceilings	.05	.05	.05
HC Work	1.00	N/A	N/A
LC Work	.50	.10	.50
H Use Wall	.50	.30	.50
HC Wall	.40	.20	.30
LC Wall	.15	.10	.15

To accomplish the weighted random sampling of surfaces, an inventory of the existing surfaces and structural configuration in the building was completed. The rooms were re-numbered with the basement rooms beginning with "z", the first floor rooms beginning with "y", and the top floor rooms beginning with "x". The "NMSHD STATISTICAL DATA INPUT FORM" was developed to list all surfaces in each room. Figure 1 is the form completed for room Z-15. The information from the NMSHD STATISTICAL DATA INPUT FORM was entered into a computer data base. The computer reduced data for room Z-15 is shown in Figure 2.

The information from the NMSHD STATISTICAL DATA INPUT FORM was converted to weighted surfaces. A computer program was developed to read the data base and produce a new data base of surfaces, including their areas, and then the areas were weighted according to the weighting factors. This new data base of weighted areas was then randomly sampled by a computer program using a uniform random number generator. The output of this random sampling program, using the weighted areas as input, generated the sampling locations for the Weighted Random Sampling portion of the Certification Sampling Plan.

4.2.2.2 Statistical Calculations

For each strata, the first step was to determine the appropriate distribution to use in estimating an upper tolerance limit. To test distributions, a modified version of the Shapiro and Wilks W-test was used [5] which tests for a Gaussian distribution.

The test was first applied directly to the PCB data, for each strata, and the assumption of a Gaussian distribution was accepted or rejected. If the Gaussian distribution was rejected, then the logarithm of the data was used with the W-test to test for a log-normal distribution. If the log-normal distribution was rejected, then a non-parametric technique was used.

If the outcome of the W-test is to accept the Gaussian distribution, then the 95%-95% upper Gaussian tolerance limit would be computed. This tolerance limit is a value for which there is 95% confidence that at least 95% of the population falls below that limit. The tolerance limit is given by

$$T_1 = \bar{X} + K_{t1} \quad S$$

where $\bar{X}$ is the sample mean, K_{t1} is the Gaussian tolerance factor [6] and S is the sample standard deviation. For 95% confidence and 95% reliability with a sample size of 93, $K_{t1} = 1.938$ [6].

If the tolerance limit is below the guideline established by the Panel, then the stratum is accepted as clean.

If the Gaussian distribution is rejected, but the log-normal is not, then a 95%-95% tolerance limit for the log-normal distribution is computed. The tolerance limit is identical to the one in the previous paragraph, except the natural logarithm of

the data is used to compute $\bar{X}$ and S, and the exponential of the above tolerance interval is used:

$$T_1 = \exp (\bar{X} + K_{t1} \quad S)$$

As before, if the tolerance limit is below the guideline established by the Panel, the stratum is accepted as clean.

In the case that both the Gaussian and log-normal distributions are rejected, a non-parametric 95%-95% tolerance limit is used. For a sample of size 93, this non-parametric 95%-95% tolerance limit is the second largest observed value. In this case, if no more than one observed value exceeds the panel criterion, the stratum is accepted as clean.

4.2.2.3 PCB Surface Sampling Results

The analysis from the January 1986 certification sampling of the PCB surface wipe samples found that the perimeter stratum had a 95%-95% tolerance limit of 18 ug/m^2, while the vault stratum had a 95%-95% tolerance limit of 60 ug/m^2. This means that with 95% confidence, one can state the probability of a point contacted having contamination levels greater than 18 ug/m^2 in the perimeter stratum, and 60 ug/m^2in the vault stratum, is less than 5%. According to the guideline recommended by the PCB Expert Advisory Panel, the perimeter stratum passed and the vault stratum required further clean-up.

The three possible tolerance intervals for the two strata are given in the table below. A modification of the W-test for large sample sizes was used to test for Gaussian and log-normal distributions [5]. The W-test applied directly to the data rejects the Gaussian hypothesis if $z < -2.6$ or $z > 1.3$ ($p = .05$). For the perimeter stratum, $z = -44.1$, and for the vault stratum, $z = -20.7$. Consequently, the Gaussian hypothesis is rejected for both strata. Next, the W-test was applied to the logarithm of the data to test for the hypothesis that the distribution is log-normal, with the same limits for rejection as stated above. For the perimeter stratum, $z = -0.4$, and for the vault stratum, $z = -2.9$, so the test failed to reject the log-normal hypothesis for the perimeter stratum, but did reject it for the vault stratum.

Summary of Tolerance Intervals

PCB Surface Wipe Samples

(ug/m^2)

95%-95% Tolerance Intervals

Strata	Mean	Std. Dev.	Gaussian	Log-normal	Non-parametric
Perimeter	4.1	8.7	21.2	18.3	26.4
Vault	12.7	13.5	38.8	49.8	60.0

There appears to be an effect that when the stratum is homogeneous (does not contain outliers), it will follow a log-normal distribution. The presence of "outliers" in the data set, however, seems to destroy any distributional assumption, and make non-parametric methods necessary.

As first evidence, the perimeter stratum appears to follow a log-normal distribution very closely as the z value from the W-test was well within the boundaries of the "fail to reject" region. This is in spite of the fact that the largest value observed in the stratum (80.0 ug/m^2), was obviously an outlier, and came from a room that has subsequently been moved to the vault stratum and included in the vault stratum re-clean.

The vault stratum further demonstrates the point. The hypothesis of a log-normal distribution was rejected for this stratum. The most intense exposure was in the vault room itself, and the mail room across the hall. Removing these rooms from the stratum changes the z to -2.4, which fails to reject the log-normal distribution.

After the January test, several significant actions were taken in the vault strata to assure that any possible sources of PCB contamination were removed. The most significant effort involved removal of the vault room.

As a precaution to see that no cross-contamination occurred in the perimeter strata while this removal took place, the contractor monitored air and surface PCB concentrations before, during and after the removal process. Carbon filtered negative air exhaust was established in the removal work zone and the zone was isolated with fixed place, air tight barriers. Air was monitored by sampling just outside the barriers and also sampling in each of the other three building sections, on each of the three floors. Surfaces were monitored by strategically placing glass plates throughout the perimeter strata in 19 locations. When the removal was complete, samples were collected from these plates.

An individual listing of these sample results can be found in the SOS Environmental Engineering Quality Control Appendix IX.

The summary results of the perimeter strata monitoring are presented below:

SUMMARY OF BARRIER QUALITY CONTROL

PCB AIR SAMPLES

DESCRIPTION	n/N*	Range**	Mean	Std. Dev.
AIR (ug/m^3)	14/14	(0.03)-0.12	.05	.08
GLASS PLATES (ug/m^2)	5/19	(1.0)-12.0	3.1	2.6

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

The vault strata was then re-sampled May 28-30, 1986. The test consisted of both WRS and BEJ samples. As it appears, the data does follow a log-normal distribution. The W-test of the Gaussian hypothesis resulted in $z = -19.2$, while the log-normal hypothesis resulted in $z = -0.3$. Hence, the log-normal distribution will be assumed in making statements about the population of PCB concentrations in the building.

The summary statistics for the May re-sampling are presented below:

SUMMARY STATISTICS

N	92
Mean	13.2 ug/m^2
Std. Dev.	17.5 ug/m^2

Over all, there is an apparent shift towards lower concentration levels in the May vault sample; however, there are considerably more values in excess of the recommended guideline of 50 ug/m^2 in this sample. Accordingly, the 95%-95% tolerance limit rose to 63.9 ug/m^2.

To test the overall shift in the data, a Mann-Whitney U test was used. This test was used because the January vault data rejected the log-normal distribution. The concept of the Mann-Whitney U test is if a value is collected at random from the January vault stratum, and another from the May vault stratum, what is the probability of the May sampling being smaller than the January sampling. If this probability were greater than an even chance, i.e., 50%, than it would be shown that there was an overall shift downward on the May sampling even though there were more values over 50 ug/m^2. This was shown using the Mann-Whitney U Statistic with significance less than 5%, ($z = 2.01$, one tailed). This conclusion is referred to by saying the January vault concentrations are significantly larger than the May vault concentrations, supporting the hypothesis that a positive effort towards cleaning the building was made even though there were several values above 50 ug/m^2. Given the May sample results, and considering the guideline of 50 ug/m^2, it was decided to re-clean the vault strata again in preparation for a further WRS sampling in July.

After the re-cleaning, the Weighted Random Sampling of PCB surface contamination collected July 11, 1986, consisted of 93 locations throughout the vault strata. The summary statistics for the data are presented below:

SUMMARY STATISTICS

N	93
Mean	5.0 ug/m^2
Std. Dev.	5.9 ug/m^2

The data clearly rejected the Gaussian distribution ($z = -19.96$), but failed to reject the log-normal distribution ($z = -1.12$). Consequently, a log normal distribution is assumed in the analysis. The statistic of greatest interest is the 95%-95% tolerance limit which, based on the log-normal distribution, is 20.4 ug/m^2. It can be stated with 95% confidence that the risk of a point being contacted having contamination in excess of 20.4 ug/m^2 is less than 5%.

4.2.3 Best Engineering Judgement Sampling

4.2.3.1 Sampling Philosophy and Sample Locations

Sample site selection for certification testing using Best Engineering Judgment (BEJ) considers several objectives. The first is to follow the original mode of contaminant migration; that is, to identify and sample locations that would be suspected of high areas of original known contamination. Second, one should select specific surfaces which may preferentially absorb or adsorb PCB. Third, one should select a percentage of test surfaces based on the contractors suspected lack of ability to effectively decontaminate such surfaces (for example, selection of impervious glass versus porous concrete).

Meeting these objectives involves evaluating the history of the transformer incident. This includes identifying the physical state (solid particulate, vapor or liquid aerosol) of the substances emitted by the transformer and knowing the mode of transport (mechanical and natural ventilation) through the building. The overall approach is, therefore, based on an engineering assessment of the transformer failure assumptions regarding the effectiveness of the decontamination effort, combined with knowledge of the architectural layout of the building and the HVAC system.

A total of 207 PCB and 27 PCDF/PCDD surface wipe samples were collected from the internal building surfaces during the initial certification testing in January 1986. The sampling locations for both the PCB and PCDF/PCDD samples are shown in Figures 15, 16 and 17. As with the PCB air samples (Section 4.1), a larger number of PCB surface samples were collected to demonstrate the range of cleanliness of surfaces throughout the building in order to support the use of a smaller number of PCDF/PCDD samples as being representative. However, a sufficient number of PCDF/PCDD samples were collected to independently assess the levels of these contaminants on the various surfaces in the event that a statistical correlation between PCB and PCDF/PCDD could not be established.

A total of 19 PCB surface wipe samples were collected from internal building surfaces during the certification re-sampling of the vault strata on May 28-30, 1986. The sampling locations are shown in Figures 18, 19, and 20.

The July certification re-sampling did not include collection of any Best Engineering Judgment samples on interior building surfaces.

4.2.3.2 PCB and PCDF/PCDD Surface Sampling Results

The surface concentrations of PCB measured during the January certification sampling and the May and July certification re-sampling are summarized in Table 4. (The individual sample results are contained in Appendix II.) The PCB surface wipe samples were divided into the vault and perimeter

strata. The vault strata consisted of all of the rooms on all three floors from the central lobby to the North end of the building. The perimeter strata was the remainder of the building (refer to Figures 12, 13, and 14).

The PCB surface concentrations measured during the January certification sampling in the vault strata ranged from 0.9 to 2760 ug/m^2 (n = 79, mean = 67, std. dev. 310). Of the 79 samples, 18 samples showed concentrations (range 52.0 to 2760.0 ug/m^2, mean = 255, std. dev. 610) above the guideline value of 50 ug/m^2. The distribution of these 16 samples by location and concentration follows: 13 were in the basement near the transformer vault (range = 52 to 2760 ug/m^2, mean = 322, std. dev. = 735); two on the first floor (76 and 76 ug/m^2); and one on the second floor (104 ug/m^2). Of these 16 samples, six were from walls; two were from floors; one from a door; two from electronic data processing equipment; one from a mobile file assembly; two from the inside of dumbwaiters; one from the electrical junction box in the transformer vault; and one from the surface of the elevator motor drive in the mechanical room.

Based on these results, the vault strata failed the January 11, 1986 certification test for PCB. The entire vault strata had to be re-cleaned.

The surface concentrations measured during the January certification sampling in the perimeter strata ranged from none detected (0.3 ug/m^2) to 256 ug/m^2 (n = 228 samples). Four samples showed concentrations (range 60 to 256 ug/m^2) above the guideline value of 50 ug/m^2. Three of the four samples were in the basement from a door (80 ug/m^2), a storage shelf (64 ug/m^2) and the North wall in the duplicating room (60 ug/m^2); and the third sample was on the first floor on a bathroom floor (256 ug/m^2).

Based on these results, the door and the storage shelf were physically removed and discarded. The North wall in the duplicating room and the bathroom floor were re-cleaned.

The surface concentrations of PCDF/PCDD (converted to 2,3,7,8-TCDD equivalents) measured during the January 1986 certification sampling are summarized in Table 5. (The individual test results are contained in Appendix IV.) The surface concentrations of PCDF/PCDD ranged from 0.01 to 0.17 ng/m^2 (n = 27, mean = 0.06 ng/m^2, std. dev. = 0.04). The maximum PCDF/PCDD concentration (0.17 ng/m^2) is approximately 17% of the guideline (1.0 ng/m^2). By comparison, the background surface concentration of PCDF/PCDD measured by NIOSH researchers in office buildings in Santa Fe ranged from 0.02 to 0.38 ng/m^2 (n = 12, mean = 0.13, std. dev. = 0.10). (The results of the Santa Fe background study are presented in Section 4.9 of this report.)

Subsequent to removal of the ceiling and East wall in the vault area and recleaning of the entire vault strata, a May 1986 certification re-sampling was conducted in the vault strata.

The results of the PCB surface May certification re-sampling are summarized in Table 4. The PCB surface concentrations ranged from (0.7) to 56 ug/m^2 (n = 19, mean = 17, std. dev. = 14). Only one of the samples showed a concentration (56 ug/m^2) in excess of the 50 ug/m^2 guideline.

The results of the PCB surface July certification re-sampling are summarized in Table 4. The PCB surface concentrations ranged from none detected, (0.6) to 32.0 ug/m^2 (n= 93, mean = 5.0, std. dev. = 5.9). None of the 93 sample results exceeded the the 50 ug/m^2 guideline, where the maximum sample concentration (32.0 ug/m^2) was approximately 64% of the guideline.

4.2.4 Evaluation of Correlation of PCB to PCDF/PCDD

4.2.4.1 Philosophy of Correlation

The existence of a statistical relationship between PCB and PCDF/PCDD would permit the use of a PCB concentration to predict the corresponding PCDF/PCDD concentration. To determine the existence of this relationship, side-by-side PCB

and PCDF/PCDD samples were collected at 27 different locations throughout the building. The test results for these 27 samples are presented in Table 6.

4.2.4.2 Results of Correlation

To study the relationship between PCB and PCDF/PCDD concentrations, the natural logarithms of both data sets were used in a linear regression. The regression model was a straight line fit of the log of the PCDF/PCDD concentration as a function of the log of the PCB concentration. The results of the linear fit are presented below:

Analysis of Variance

Source	df	Sum of Squares	Mean Square	F
Regression	1	1.58	1.58	4.87
Error	25	8.11	.32	
Total	26	9.69		

1.5% significance for $F > 4.24$

And

Estimates of Parameters

Parameter	Estimate	Variance	t
Intercept	-3.196	.04005	-15.9
Slope	.200	.0079	2.2

A W-test was used for the residuals, with z = -1.68, and a rejection region of the absolute value of d exceeding 1.96, so the residuals may be taken to follow a Gaussian distribution.

Comparing the PCB to PCDF/PCDD concentrations, for a PCB concentration of 50 ug/m^2, the corresponding estimates of PCDF/PCDD concentration would be exp (-3.19 + 0.20 log 50) = 0.09 ng/m^2.

The upper 95% confidence interval for the predicted value (0.09 ng/m^2) is 0.30 ng/m^2. Since the 95% confidence interval (0.30 ng/m^2) is below the guideline (1 ng/m^2), it is concluded that there is reasonable confidence that a surface concentration 50 ug/m^2 PCB would have a corresponding PCDF/PCDD concentration below the guideline.

4.3 Certification of the Building HVAC System

4.3.1 Sampling Philosophy and Sample Locations

The General Office Building's heating, ventilating, and air conditioning (HVAC) system was sampled and certified according to the PCB guideline of 50 ug/m^2 for surface levels. It was felt that since the HVAC system was one of the primary means of contaminant transport, an independent certification sampling was necessary. All samples were collected on a Best Engineering Judgment (BEJ) basis.

The initial 1985 October certification sampling consisted of collecting 39 PCB and 8 PCDF/PCDD surface wipe samples distributed throughout the HVAC System. The January, May and July 1986 certification re-sampling consisted of collecting 12, 29 and 5 PCB surface samples, respectively. The May sampling also included collection of two PCDF/PCDD samples. The locations for both the PCB and PCDF/PCDD surface wipe samples are shown in Figures 24, 25, 26 and 27. Both types of samples were collected because of the significance of the HVAC system as a means of original contaminant transport and as a potential future source for transmitting contamination.

The samples were collected using the wet wipe protocol described in the final test plan shown in Appendix I for both PCB and PCDF/PCDD. The major distributional ducts were large enough to accommodate a 0.25 m^2 template for determining the sampling area. Smaller ducts required the 0.25 m^2 sampling area to be measured and outlined with masking tape.

The PCDF/PCDD samples were collected from a 1.0 m^2 sampling area and were only collected from the larger distributional ducts where such an area could be obtained.

4.3.2 PCB and PCDF/PCDD Results

The HVAC system was sampled on four separate occasions corresponding to an initial sampling in October 1985 and the January, May and July 1986 building structural certification

sampling events. The surface concentrations of PCB for the four sampling events are summarized in Table 7. (The PCB and the PCDF/PCDD individual sampling results are shown in Appendix IV.) The initial sampling showed residual concentrations ranging from none detected (0.6 ug/m^2) to 640 ug/m^2 (n = 39, mean = 50, std. dev. = 110). The January certification sampling showed lower residual concentrations ranging from 16.8 ug/m^2 to 204 ug/m^2 (n = 12, mean = 73.4 std. dev. 49.7). The May certification re-sampling results ranged from none detected (0.7) to 176 ug/m^2 (n = 29, mean = 23.6, std. dev. 33.6). Three of the samples showed concentrations (52.0 - 176.0 ug/m^2) that exceeded the 50 ug/m^2 guideline. The July certification re-sampling results ranged from 0.3 to 32.0 (n = 95, mean = 5.0 std. dev. 5.9). One sample result was 104 ug/m^2 from a duct section which has subsequently been replaced.

The surface concentrations of PCDF/PCDD (converted to 2,3,7,8-TCDD-equivalents) for the October certification sampling and May certification re-sampling are summarized in Table 7. (The individual test results are shown in Appendix IV.) The initial October sampling showed residual concentrations ranging from 0.03 to 1.62 ng/m^2 (n = 8, mean = 0.46, std. dev. = 0.55). One of the eight samples exceeded the guideline value of 1 ng/m^2.

No PCDF/PCDD surface samples were collected during the January certification. Two samples were collected during the May certification re-sampling. The two final certification samples showed concentrations of 0.5 and 0.15 ng/m^2. Both results are significantly below the guideline value.

4.4 Certification of Paper

4.4.1 Introduction

There were approximately 6.5 million books, papers, binders, specifications, blueprints, drawings, field logs, and other paper products inside the building at the time of the transformer incident. A work plan was developed to decontaminate the paper products using a Freon 113 flushing and re-capture system. Quality control samples were collected by SOS Environmental Engineering on a daily basis from all of the shipped batches of paper that were processed. Over 336 quality control samples were collected and from these samples it was determined that all binders and vinyl coated products should be discarded due to the specific PCB affinity for that type of surface in relation to one's ability to clean that type of surface.

Following Freon-cleaning, when State Highway Department personnel could handle the paper materials in minimum protective clothing, the paper products were separated with all documents, books and drawings being saved and all other non-essential papers such as catalogues, magazines, calendars, and notes being discarded. In addition, all vinyl and ring binders were removed from the inside papers that were saved. The exception to this was the field survey notebooks which had a leather and vinyl permanent cover.

The documents that were saved were repackaged into approximately 11,000 boxes. These boxes were stored on racks in an off-site warehouse to facilitate access and retrieval. SOS Environmental Engineering, in conjunction with Highway Department personnel, was able to evaluate each box removing immediately critical papers for reproduction, discarding non-essential and duplicate papers and consolidating important documents.

Following this paper reduction effort, the total number of boxes was reduced to 4108. The approximately 6892 boxes of culled documents were shipped to Idaho for disposal in a controlled hazardous waste landfill. A complete inventory was conducted and all of the boxes were labeled using an alpha-numeric sequence with the alpha character corresponding to the section where the box's contents came from. This inventory was used for the certification sample selection of the documents that remained.

4.4.2 Sampling Philosophy

The certification sampling philosophy for paper was based on random statistical selection of the samples for a sample population of 60 samples corresponding to a 95%-95% tolerance interval. The 4108 boxes were grouped according to the four zones (A, B, C, and D) established for the building. Each box was assigned a number which resulted in a numbering series for each zone. The series of numbers for each zone was used to generate a random sampling selection of 60 boxes for each zone. A computerized random number generator was used to select the boxes that were sampled.

The New Mexico State Environmental Improvement Division implemented this sampling plan. The 60 boxes from each zone were located and removed from their storage locations, opened, and a piece of paper was randomly selected from each box and surface sampled.

The wipe sampling procedure consisted of using a 12" x 13" glass plate cleaned with pesticide grade n-hexane. The randomly selected piece of paper was placed on the clean glass plate. The top surface of the paper was wiped with a 3" x 3" gauze pad wetted with 8 ml of pesticide grade n-hexane. The paper was turned over and wiped again using the same gauze pad. The paper was removed from the plate and the surface of the plate was wiped with the gauze pad. The gauze pad was then placed in a numbered glass sample bottle with a teflon-lined lid and submitted for analysis.

One field blank was collected for every 10 paper wipe samples that were collected. The field blanks were submitted to the laboratory for analysis with the paper samples.

Each piece of paper that was sampled was measured to determine the sample area so sample results could be normalized to comparable units of ug/m^2. The calculation that was used for the normalization process was affected by the thickness and porosity of the paper that was sampled. If the piece sampled was thick such as a piece of cardboard or a non absorbent plasticized surface such as mylar, the area sampled was counted as double, i.e., both sides of the material were summed as the area tested. If the piece sampled was adsorbent and could have been penetrated by the contamination, the area sampled was counted as single. The normalization to 1.0 meter calculation is as follows:

Normalized Sample Result to 1.0 Square Meter =

1. Area sampled x 2 or 1 (depending on thickness and porosity of paper)
2. Paper area (from 1 above) E 1550 (number of sq. in. in 1 square meter) = % of paper area to 1.0 square meter
3. Sample result (expressed in ug/sample E % (from 2 above) = value in terms of 1.0 square meter

4.4.3 Summary of Results

The results of the paper certification are summarized in Table 8. A comprehensive listing of all of the paper sample results can be found in Appendix VI.

There were no samples that exceeded the 50 ug/m^2 PCB Expert Advisory Panel guideline from the 60 samples collected in each of section's B and D. Out of the 60 samples that were collected in section A, there was one outlying sample taken from a bridge drawing. When the drawing was sampled, ink was absorbed onto the gauze pad. Three additional samples were collected from the same box which contained the bridge drawing. These three results, were all below the guideline of 50 ug/m^2. The results also are shown in Appendix VI. In section C there were 5 out of 60 samples that exceeded the guideline.

Four of the five failed samples were from the vinyl and leather permanent covers of field notebooks. In addition, other field notebooks showed significant positive levels of PCB although below the 50 ug/m^2 guideline. A frequency distribution of the PCB sample results collected from the section C field notebooks is shown in Table 9. Three additional samples were collected from the box which contained the one paper sample that exceeded the guideline value which was not a field notebook. The results of these three samples are summarized in Table 8 and the individual results are shown in Appendix VI. All of the results were below the guideline.

Based on the sample results, all of the paper was released from sections A, B, C and D. All of the field notebooks were isolated and the inside pages from each of the field notebooks were sampled and found to be below the 50 ug/m^2 guideline. The covers from the field notebooks that showed contamination in excess of the guideline were removed and the notebooks were rebound and released.

4.5 Certification of Movable Equipment

4.5.1 Introduction

There were approximately 380 pieces of movable electronic equipment that were sampled separately for certification. This equipment consisted of computers, typewriters, reproduction equipment, photographic and blueprint equipment, microfilm readers and other electronic office equipment. The equipment was decontaminated using Freon 113 to flush the contaminated equipment during the disassembled stage with specialized equipment in situ. After Freon-cleaning, the equipment was subjected to quality control sampling. Over 121 samples were collected by SOS Environmental Engineering. Following Freon-cleaning and quality control sampling, the equipment was moved from the General Office Building to an off-site warehouse.

The equipment was divided into three groups for certification sampling; each group was made up of lots. The New Mexico State Environmental Improvement Division implemented the sampling plan.

The first group was made up of the equipment that was away from the highly contaminated areas around the vault. Equipment from this group was separated into lots of eight. One PCB wipe sample was collected from each lot of eight pieces. This equipment was sampled for certification in January 1986.

The second group was made up of the equipment that was closest to the vault in the more highly contaminated areas. Equipment from this second group was divided into lots of eight or ten with two or three PCB wipe samples collected from each lot. This equipment was sampled for certification in January 1986.

The third group was made up of equipment which was known to be heavily contaminated and was considered for disposal. The one lot in group one which failed certification sampling was re-cleaned and re-sampled with group three.

After decontamination, the contractor quality control sampled every piece of equipment. Of these all equipment showing PCB concentrations over 50 ug/m^2 were discarded and those below 50 ug/m^2 were submitted for formal certification sampling by EID. Equipment from the third group was divided into lots of 10 and 3 pieces from each lot were sampled. This group was sampled for certification in March 1986.

One lot from group three failed certification sampling and was removed from group three. The equipment which was considered of lesser value was disposed of and the remaining equipment was individually tested for certification. The results from this sampling showed that all of the equipment was below the 50 ug/m^2 guideline and that lot was certified in June 1986.

4.5.2 Sampling Design and Method

The sampling protocol that was used for certification sampling of the equipment is the wet wipe surface sampling protocol for PCB described in the final test plan found in Appendix I. If it was feasible, a 0.25 m^2 template was used to define the sampling area. If there was not a flat

area large enough to accommodate the template, than a 0.25 m^2 area was measured and marked on the piece of equipment. If the piece of equipment that was being sampled was not large enough to allow a 0.25 m^2 sampling area, than an area as close to 0.25 m^2 was measured, marked and the actual area was recorded.

All of the sampling results were normalized to a standard 1.0 m^2 area. The calculation utilized is as follows:

Normalized Sample Result to 1.0 Meter =

1. Area sampled E 1550 (number of sq. in. in 1.0 square meter) = % of sample area to 1.0 square meter
2. Sample result (expressed in ug/sample) E % (from 1 above) = value in terms of 1.0 square meter

This permitted all of the sample results to be compared to the PCB Expert Advisory Panel guideline of 50 ug/m^2.

4.5.3 Summary of Results

The first group of equipment that was tested in January indicated that there was residual concentration of PCB in one lot. This lot was removed from the population, re-cleaned and submitted for certification re-sampling with group 3. The remaining equipment from group one was certified. The results from the second group of equipment that was sampled in January indicated that the decontamination efforts were successful with all the levels being below the guideline of 50 ug/m^2. This group was certified for re-use.

The third group of equipment was sampled in March. This group included equipment that was the most heavily contaminated and the lot that failed testing from group one. The sampling from group three indicated that one lot did not meet the 50 ug/m^2 guideline. The remaining equipment was certified.

The one lot that failed certification sampling was removed from group three. The equipment which was considered of less value was disposed of and the remaining equipment was individually tested for certification. The results from this sampling showed that all of the equipment was below the 50 ug/m^2 guideline and that lot was certified.

A summary of the equipment sample results can be found in Table 10. An individual listing can be found in Appendix VII. Certification Letters can be found in Appendix XV.

4.6 Certification of Furniture Frames

4.6.1 Introduction

There were approximately 328 pieces of upholstered furniture that were sampled for certification. SOS Environmental Engineering removed the soft upholstery and decontaminated the frames. This furniture was placed in off-site storage after being decontaminated while waiting to be sampled for certification. After being certified, this furniture was sent to the prison facilities to be re-upholstered.

4.6.2 Sampling Design and Method

The total population of 328 pieces was grouped together as one lot for certification sampling. Based on a random 10 percent sample population selected by the New Mexico State Environmental Improvement Division, 36 pieces were randomly selected and an area of the surface on the frame of each piece was sampled. The results of this certification sampling showed that all but 2 of the samples were below the Panel guideline. These two pieces were re-cleaned and re-introduced into the remaining furniture population and the entire population was re-cleaned. The remaining 34 pieces from the initial certification sampling were excluded from the furniture population and considered clean. The certification re-sampling of furniture frames consisted of the remaining population of 298 pieces. This population was also re-sampled on a 10 percent basis. Thirty samples were collected.

The New Mexico State Environmental Improvement Division implemented the sampling plan. The thirty samples were collected using the standard wet wipe protocol as described in Appendix I for surface PCB sampling. If a 0.25 m^2 template could not be used for identifying the sampling area, than an appropriate area was measured and recorded. Generally, this area was 0.25 m^2. However, the actual sample size was measured and the sample result was normalized to a standard area of 1.0 m^2.

In addition to the thirty samples, four field blanks were collected to monitor any variations in the analytical results due to the collection methodology.

4.6.3 Summary of Results

During the initial certification sampling of the 328 pieces of furniture frames, all but two pieces were under the 50 ug/m^2 Advisory Panel guideline. The initial testing showed residual concentrations ranging from none detected (0.6 ug/m^2) to 57.6 ug/m^2 (n = 36, mean = 4.8 std. dev. = 12.6). The failed pieces were 57.6 ug/m^2 and 53.8 ug/m^2.

The results from certification re-sampling showed residual concentrations of PCB ranging from none detected (.03 ug/m^2) to 16.0 ug/m^2 (n = 30, mean = 2.3 std. dev. = 4.0).

The results of the furniture frame certification are summarized in Table 11. A comprehensive listing of all the furniture results is shown in Appendix VIII.

The results of the certification sampling indicated that all of the sample results were below the 50 ug/m^2 Panel guideline. All the furniture was released to the State Highway Department by way of the attached release form (Appendix XVI).

4.7 SOS Environmental Engineering Quality Control Samples

4.7.1 Introduction

During the course of the decontamination of the General Office and Annex Buildings, SOS Environmental Engineering collected over 2500 PCB samples. These samples were used to identify sources of contamination, monitor decontamination progress and provide a basis for decision making on disposal items. These samples were also used to determine readiness for certification sampling.

The various quality control sample surfaces included PCB wipe samples from desks, tables, cabinets, doors, ceilings, walls, floors, paper materials and documents, electrical and mechanical equipment, and the interior surfaces of the heating, ventilation and air conditioning (HVAC) system including supply and return duct work.

Numerous PCB air samples were also collected during the decontamination phases of the project. PCB air samples were collected throughout the buildings for several purposes:

1. To establish the use of minimum personal protective equipment in certain areas of the building.

2. To support the use of minimum personal protective equipment in certain areas of the building.

3. To monitor for re-deposition and cross-contamination during decontamination activities.

4. To monitor air conditions during "flushing" of inside air to the outside.

5. To monitor the air conditions during normal operation of the HVAC system.

6. To determine building readiness for certification sampling.

4.7.2 Sampling Design and Method

The quality control PCB wipe samples were collected using the stardard wet wipe protocol as described in Appendix I for surface PCB sampling. If a 0.25 m^2 template could not be used for identifying the sampling area, then an appropriate area was measured and recorded. Generally, this area was 0.25 m^2. However, if the sample surface was less than 0.25 m^2, the actual sample size was measured and the sample result was normalized to a standard area of 1.0 m^2.

The quality control samples were collected using Best Engineering Judgment, random sample selection and historical building data. A cleanup action level was established for PCB surfaces at 25 ug/m^2.

4.7.3 Summary of Results

The SOS Environmental Engineering final quality control sample results are summarized in Table 12. The individual sample results are listed in Appendix IX. The sample results discussed below emphasize those results that were below the Panel guidelines in that these levels were used to distinguish quality control samples from those used in defining the contamination.

There were a total of 415 PCB surface samples collected from interior surfaces in the General Office Building. Of these, 118 had values which were none detectable (1.0 ug/m^2).

There were a total of 172 PCB surface samples collected from the General Office Building HVAC system, supply duct work and return duct work. Of these samples 18 had values which were none detectable (2.0 ug/m^2).

There were a total of 328 PCB surface samples collected from the General Office Building paper materials and documents. Of these samples, 258 had values which were none detectable (0.8 ug/m^2).

There were a total of 121 PCB surface samples collected from General Office Building electronic and mechanical movable machinery and equipment. Of these, 57 had values which were none detectable (2.0 ug/m^2).

There were a total of 9 PCB surface samples collected from furniture frames from which the upholstery had been removed. Of these samples, 7 had values which were none detectable (3.0 ug/m^2).

There were a total of 113 PCB air samples collected from the General Office Building during various stages of the decontamination project. Of these samples, 50 had values which were none detectable (0.02 ug/m^3).

There were a total of 39 PCB surface samples collected from interior surfaces in the Annex. Of these samples, 25 had values which were none detectable (1.0 ug/m^2).

There were a total of 17 PCB surface samples collected from the Annex Building HVAC system, supply duct work and return duct work. Of these samples, 4 had values which were none detectable (0.2 ug/m^2).

There were a total of 22 PCB air samples collected from the Annex Building during various stages of the decontamination project. Of these samples, 15 had values which were none detectable (0.03 ug/m^3).

4.8 Certification of the Annex Building

4.8.1 Introduction

The Annex Building is an office building consisting of two floors and a basement totaling approximately 30,000 square feet. It is located directly south of the General Office Building. It is attached to the General Office Building by a breezeway on the first floor and a corridor in the basement. Both of these access routes contain fire doors.

The initial contamination in the Annex Building was less than the contamination in the General Office Building. The surface concentrations of PCB ranged from 17 to 46 ug/m^2. The air concentrations of PCB ranged from 0.17 to 0.35 ug/m^3. The air concentration of PCDF/PCDD (based on a single sample obtained in the basement corridor) showed a concentration of 0.9 pg/m^3.

The HVAC system and other utilities for the Annex are operated independently and separately from the Main Building. The two physical connections between the buildings and the continued operation of the Annex's HVAC system during the transformer failure, resulted in the low level contamination of the Annex. It is postulated that with the General Office Building's HVAC system out of operation and that with the Annex remaining operative, the basement corridor connecting the two buildings served as both a return air and contamination transport "duct" for the operating system. A bulk sample of fiberglass filter obtained from the air handling unit (intake side of fan) contained a PCB concentration of approximately 7,300 ug per gram of fiberglass material.

The entire Annex Building (basement and floors one and two) was decontaminated. These efforts included removal of suspended ceiling tile and decontamination of the HVAC system, air handling unit and ventilation ducts, exterior surfaces of equipment, desks, tables, cabinets, floors, walls and other exposed surfaces. SOS Environmental Engineering collected 48 PCB quality control surface wipe samples (to include the HVAC system) and 22 PCB quality control air samples (Table 14). Based on these test results, which showed that the residual PCB surface concentrations were below the 50 ug/m^2 guideline, the contractor recommended the Annex for final certification testing by NIOSH. The final test plan was implemented by NIOSH on September 16 through 21, 1985.

4.8.2 Sampling Design and Method

The Final Annex Certification Test Plan (Appendix X) was designed by NIOSH based on the Best Engineering Judgment (BEJ) sampling strategy. The certification testing was conducted with the ventilation and temperature conditions in the building representative of the conditions that would be present when the building is in "normal occupancy". The testing included measurement of both surface and airborne concentrations of PCB and PCDF/PCDD within the basement and floors one through two according to the methodology described in the Final Test Plan (Appendix X).

The certification test plan used in September 1985 for the Annex Building consisted of collection and analysis of 39 PCB and 9 PCDF/PCDD surface samples from work surfaces throughout the building; 13 PCB and 3 PCDF/PCDD surface samples from interior surfaces of the HVAC system and duct work; and 7 PCB and 4 PCDF/PCDD air samples. In addition, 9 PCB surface samples were collected from paper material and documents that were selected from locations throughout the building.

4.8.3 PCB and PCDF/PCDD Air Sampling Results

The airborne concentrations of PCB and PCDF/PCDD (converted to TCDD-equivalents) are summarized in Table 13. (The individual sample results are contained in Appendix XI.) The airborne concentrations of PCB ranged from none detected (0.02 ug/m^3) to 0.05 ug/m^3 (n = 7, mean = 0.2, std. dev. 0.2). The maximum airborne concentration (0.05 ug/m^3) is approximately 10% of the guideline value (0.5 ug/m^3). Background concentrations of PCB measured by NIOSH researchers in office buildings in Santa Fe ranged from none detected (0.05 ug/m^3) to 0.18 ug/m^3 (n = 24, mean = 0.04, std. dev. = 0.05).

The airborne concentrations of PCDF/PCDD in the Annex ranged from 0.26 to 0.70 pg/m^3 (n = 4, mean = 0.48, std. dev. = 0.19). The maximum airborne concentration (0.70 pg/m^3), which was measured at the ambient fresh air intake to the building, is approximately 35% of the guideline (2 pg/m^3). Background concentrations of PCDF/PCDD measured by NIOSH researchers in office buildings in Santa Fe ranged from 0.01 to 1.39 pg/m^3 (n = 13, mean = 0.28, std. dev. 0.37).

Comparison of the mean concentrations of airborne PCB (0.02 ug/m^3) and PCDF/PCDD (0.48 pg/m^3) measured in the Annex Building with those measured as background in Santa Fe (0.04 ug/m^3 and 0.28 pg/m^3, respectively), show that there is no significant difference between the concentration levels.

4.8.4 PCB and PCDF/PCDD Surface Sampling Results

The surface concentrations of PCB and PCDF/PCDD (converted to TCDD-equivalents) are summarized in Table 15. (The individual sample results are contained in Appendix XI.) The test results are grouped according to building surfaces (i.e., desks, tables, floors, walls); surfaces interior to the HVAC system; and paper and related documents.

The building surfaces showed concentrations of PCB ranging from none detected (0.56 ug/m^2) to 5.6 ug/m^2 (n = 39, mean = 1.5, std. dev. = 1.3) and PCDF/PCDD concentration ranging from 0.03 to 0.32 ng/m^2 (n = 9, mean = 0.20, std. dev. = 0.12). The maximum surface concentrations measured for both PCB and PCDF/PCDD were below the respective Panel guidelines of 50 ug/m^2 and 1.0 ng/m^2.

The surface concentrations of PCB measured in the HVAC system ranged from none detected (1.9 ug/m^2) to 64 ug/m^2 (n = 13, mean = 12.0 std. dev. = 17.0). All of the samples showed concentrations below the 50 ug/m^2 guideline, except one. This sample (64 ug/m^2) was collected in the air supply plenum of the air handling unit. The air supply plenum and primary distribution duct work were re-cleaned on October 23-25, 1985. Certification re-sampling conducted for NIOSH by a representative of the New Mexico State Environmental Improvement Division showed that the residual PCB concentration was none detectable (1.0 ug/m^2) and within the recommended guidelines. The surface concentrations of PCDF/PCDD (range 0.09 - 0.28 ng/m^2) were below the guideline of 1 ng/m^2.

Measurable surface concentrations of PCB were shown in only one of the nine paper samples collected. This sample showed a level of 2.1 ug/m^2 which is approximately 4 percent of the guideline value (50 ug/m^2).

4.8.5 Conclusions

A Final Test Plan was implemented to determine, by state-of-the-art methodologies, the residual surface and airborne concentrations of PCB and PCDF/PCDD within the basement and floors one through two of the Annex Building.

The final test results showed that the air and surface concentrations of PCB and PCDF/PCDD were all below the guidelines recommended by the Panel. The maximum concentration levels reported for the samples is shown below:

	AIR	SURFACE
PCB	0.05 ug/m^3	26.0 ug/m^2
PCDF/PCDD TCDF-Equivalents	0.70 pg/m^3	0.32 ng/m^2

Based on these test results, it is concluded that under the conditions of these contaminants measured, the Annex Building is acceptable for occupancy and the contents contained therein also are safe and acceptable for use.

5.0 BACKGROUND SAMPLING STUDY

5.1 Introduction

A background sampling study was conducted by NIOSH with assistance from the New Mexico Environmental Improvement Division and SOS Environmental Engineering on November 1-3, 1985. The objective of the study was to determine the background concentrations of PCB and PCDF/PCDD in air and on surfaces in office buildings in Santa Fe, New Mexico.

The re-occupancy criteria established by the PCB Expert Advisory Panel for the Highway Department Building are based on the maximum levels of PCB and PCDF/PCDD (converted to 2,3,7,8-TCDD Equivalents) that will not result in a significant human health risk if a person were exposed to these levels, inhalation and direct skin contact, for 30 years. In addition to establishing those guidelines, the PCB Expert Advisory Panel requested that a study be conducted to determine how these guideline levels compared to the normal levels of background contamination that exist in buildings similar to the State Highway Department Building in Santa Fe.

A detail presentation of the background sampling study is presented in a separate NIOSH report [13].

5.2 Study Design

The intent of the background study was to test buildings that were similar in both architectural design and age (constructed prior to 1970) to the General Office Building; and had no history of experiencing an electrical transformer fire or failure.

Three office buildings were selected for testing. The tests were conducted with the HVAC system operating under normal occupancy conditions. Each of the buildings was tested for air and surface concentrations of PCB and PCDF/PCDD. The testing was conducted according to the same methodology described in the Final Test Plan used to certify the Annex and General Office Building (Appendix I).

The air sampling locations were selected to yield the most representative concentration distributions of these contaminants in the building. In addition, ambient fresh air intake samples were collected to determine the concentrations of these contaminants entering the building. Testing conducted by NIOSH as part of the Annex certification testing in September, 1985 showed ambient air concentrations of 0.70 pg/m^3 PCDF/PCDD and 0.05 ug/m^3 PCB. Testing conducted in Santa Fe in June 1985 showed an ambient air concentration of PCB of 0.07 ug/m^3 [2].

The surfaces tested were limited to high skin contact surfaces, i.e., those surfaces (desks, tables, cabinets) most frequently contacted by occupants of the buildings. The distribution and total numbers of air and surface samples collected are presented below:

	Number of Surface Samples		Number of Air Samples	
Building	PCB	PCDF/PCDD	PCB	PCDF/PCDD
1	8	3	6	3
2	17	4	9	5
3	18	5	9	6
Total	43(6)*	12(1)	24(3)	14(1)

* Values in parentheses are quality assurance samples.

5.3 Results

The analyses of 37 samples collected on high skin contact surfaces are summarized by building in Table 16. In building one, none (0/6) of the surface samples exceeded the detection limit (1.0 ug/m^2). In buildings two and three, 13/15 and 2/16 samples, respectively, exceeded the same detection limit. Overall, the surface concentrations ranged from non-detected (1.0 ug/m^2) to 5.9 ug/m^2 (arithmetic mean = 1.3 ug/m^2). The PCB was identified as Aroclors 1242, 1254 and 1260.

The analyses of six samples collected from surfaces within the fresh-air intake plenums of the buildings is presented in Table 17. Overall, the surface concentrations ranged from non-detected (1.0 ug/m^2) to 34 ug/m^2 (arithmetic mean = 9.9 ug/m^2); five of the six samples showed concentrations above the detection limit. The PCB was identified as Aroclors 1254 and 1260.

The surface concentrations of PCBs measured are all below the 50 ug/m^2 guideline value. The higher levels are present in the air intake plenums which are less frequently cleaned, as well as, less likely to be contacted on a frequent and prolonged basis.

The analysis of 12 samples collected on high skin contact surfaces for tetra- through octa-chlorinated PCDF/PCDD congeners and the respective 2,3,7,8-tetra isomer are summarized in Table 18. The concentrations of PCDFs ranged from 0.35 to 4.3 ng/m^2 (arithmetic mean = 1.4 ng/m^2). The 2,3,7,8-TCDF isomer was present above the detection limit in all of the samples (range 0.02 to 0.76 ng/m^2, (arithmetic mean = 0.29 ng/^{2}); the field blanks did not show detectable levels at a detection limit of 0.01 ng/m^2. The surface concentrations of PCDDs ranged from 1.9 to 24 ng/m^2 (arithmetic mean = 8.5 ng/m^2). The 2,3,7,8-TCDD isomer was not present above the detection limit (0.02 ng/m^2) in any of the samples. The calculated concentrations of TCDD-equivalents ranged from 0.04 to 0.42 ng/m^2 (arithmetic mean = 0.15 ng/m^2), which are below the 1 ng/m^2 surface guideline.

A total of 24 air samples were collected for PCB analysis (Table 19). Twenty-one of these samples were collected in the occupied space of the buildings; and three samples were collected in the fresh-air intake plenums. In buildings one and two, none of the samples (five and eight samples, respectively) showed concentrations above the detection limit (0.03 ug/m^3). In the third building, four of eight samples showed concentrations above the detection limit. Overall, the air concentrations ranged from non-detected

(0.03 ug/m^3) to 0.18 ug/m^3 (arithmetic mean = 0.04 ug/m^3), which are below the guidelines of 0.50 ug/m^3. The ambient air samples did not show detectable levels of PCBs at a detection limit of 0.03 ug/m^3.

A total of 13 air samples were collected for tetra- through octa-chlorinated PCDDs/PCDFs congeners and the 2,3,7,8-tetra isomers. Nine samples were collected in the occupied workspace of the buildings (Table 20); and four samples were collected in the fresh-air intake plenums (Table 21). The concentrations of PCDFs in the building air ranged from 0.49 to 162 pg/m^3 (arithmetic mean = 22 pg/m^3. The 2,3,7,8-TCDF isomer was present above the detection limit in two of the nine samples at a concentration of 1.0 pg/m^3 in both samples. The corresponding concentrations of PCDDs ranged from 2.4 to 221 pg/m^3 (arithmetic mean = 96 pg/m^3). The 2,3,7,8-TCDD isomer was not present above the detection limit (0.09 to 0.49 pg/m^3) in any of the samples. The concentrations of PCDFs and PCDDs in ambient air ranged from 0.65 to 4.5 pg/m^3 and 19 to 193 pg/m^3, respectively. The respective 2,3,7,8-tetra isomers were not detected in any of the samples. The calculated concentrations of TCDD-equivalents for the interior building samples ranged from 0.15 to 1.5 pg/m^3 (arithmetic mean = 0.50 pg/m^3), and that for the ambient air samples ranged from 0.01 to 0.21 pg/m^3). All of the samples showed concentrations below the 2.0 pg/m^3 guideline.

5.4 Conclusions

A study was conducted to determine the background concentrations of PCBs, PCDDs and PCDFs in air and on surfaces in three commercial office buildings in Santa Fe, New Mexico. Measurable air and surface concentrations of these contaminants were present in the buildings. Comparison of the data to the cleanup guidelines developed by the Governor's Advisory Panel for the State Highway Department Building show that the levels of PCBs and PCDD/PCDFs (converted to 2,3,7,8-TCDD equivalents) present as normal contamination in these office buildings are below guidelines.

The maximum air and surface concentration levels are shown below:

	Air	% of Guideline	Surface	% of Guideline
PCB	0.18 ug/m^3	36	34 ug/m^2	68
PCDF/PCDD	1.5 pg/m^3	70	0.42 ng/m^2	42

6.0 CONCLUSIONS

The National Institute for Occupational Safety and Health (NIOSH) was requested by the State of New Mexico to design and implement a Final Test Plan to certify that the New Mexico State Highway Department General Office Building and Annex were decontaminated according to the guidelines recommended by the Governor's Expert Advisory Panel.

The certification testing included measurement of both surface and airborne concentrations of polychlorinated biphenyls (PCB), polychlorinated dibenzofurans (PCDF) and polychlorinated dibenzo-p-dioxins (PCDD) within the basement and floors one through two of both buildings. The testing was conducted according to the methodology described in the Final Test Plan. The surfaces tested included desks, tables, cabinets, doors, ceilings, walls, floors, paper materials and documents, electrical and mechanical equipment, and the interior of the heating, ventilation and air-conditioning (HVAC) system.

The total number of NIOSH certification samples collected in the Annex and General Office Buildings (excluding the Quality Control samples) during the period between September 16, 1985, and July 11, 1986 were as follows:

	Annex Building		General Office Building	
	Air	Surface	Air	Surface
PCB	7	52	38	347
PCDF/PCDD	4	12	13	36

The Final Test Plan for the Annex Building was implemented by NIOSH on September 16-20, 1985. The Final Test Plan for the General Office Building was implemented by NIOSH on January 16-19, May 28-30 and July 11-13, 1986. The test results showed that the concentrations of PCB and PCDF/PCDD were all below the guidelines recommended by the Governor's PCB Expert Advisory Panel. Based on these test results, it is concluded that under the conditions measured, the Annex and General Office Buildings are acceptable for occupancy and the contents contained therein also are safe and acceptable for use.

7.0 RECOMMENDATIONS

It is recommended that both the Annex and the General Office building be retested to verify that the conditions with regard to the contamination have not significantly changed since the Environmental Improvement Division (based on the recommendation from NIOSH and the Governor's Expert Advisory Panel) judged these buildings to be acceptable for re-occupancy. The testing should be conducted approximately 12-months following complete occupancy of the General Office Building.

8.0 REFERENCES

1. Orris, P., Kominsky, J.R., Hocyhorczuk, D. and Melius, J.M. Exposure to Polychlorinated Biphenyls From An Overheated Transformer. Chemosphere, Vol. 15, No. 9-12: 1305-1311 (1986).

2. Interim test report. Test Results of Air, Surface and Bulk Materials in the New Mexico State Highway Department Building. [Unpublished report submitted to New Mexico State Highway Department by Blackmon-Mooring Steamatic Catastrophe, Inc., Fort Worth, Texas, July 11, 1985.]

3. Kushner, E.J. On Determining the Statistical Parameters for Pollution Concentration From A Truncated Data Set. Atmospheric Environment Volume 10, pgs. 975-979 (1976).

4. Nehls, G.H. and Akland G.G. Procedures for Handling Aerometric Data. J. Air Pollution Control Assoc. Volume 23, pgs. 180-184 (1973).

5. D'Agostino, R.B., An omnibus test of normality for moderate and large samples, Biometrika, 58, 341-348.

6. Owen, D.B. Factors for one-Sided tolerance limits and for variables sampling plans. Sandia Corporation Monograph, SCR-607, March, 1963.

7. Eadon G.; K. Aldous, G. Frenkel, et al. 1982. Comparisons of Chemical and Biological Data on Soot Samples from the Binghamton State Office Building. Albany, NY: Center for Laboratories and Research, New York State Department of Health. March, 1982.

8. Kim NK, Hawley J. Re-entry guidelines Binghamton State Office Building. [Report prepared by New York State Department of Health, Bureau of Toxic Substance Assessment,. Division of HEalth Risk Control, Albany, New York, July 1985].

9. O'Keefe PW, Silkworth JB, Gierthy JF, et al. Chemical and biological investigations of a transformer accident at Binghamton, NY. Environ Health Perspect 1985;60:201-9.

10. MacLeod, K.E. Polychlorinated Biphenyls in Indoor Air. Environ. Sci Tech. 15(8): 926-928, 1981.

11. Kominsky, J.R. Melius; J.P. Flesch. 1983. Assessing PCB Contamination from Electrical Equipment Failures. Paper Presented at the American Industrial Hygiene Conference, Philadelphia, Pa, May 22-27, 1983.

12. Seiler FA, Davis HT, Kominsky JR, Ronan RJ, and Kwoka CD. Use of Risk Assessment Methods in the Certification of Decontaminated Building, (Accepted for publication in the International Journal of Risk Analyses, April 1987).

13. Kominsky JR, Commercial Office Building - Santa Fe, NM. Health Hazard Evaluation Report 86-112- . National Institute for Occupational Safety and Health, Cincinnati, Ohio 45226, 1987.

9.0 AUTHORSHIP AND ACKNOWLEDGEMENTS

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TABLE 1

SUMMARY OF CERTIFICATION SAMPLING AND CERTIFICATION RE-SAMPLING RESULTS
AIRBORNE CONCENTRATIONS OF PCB AND PCDF/PCDD
GENERAL OFFICE BUILDING

Date	Description	n/N**	PCB - ug/m^3 Range**	Mean	Std.Dev.	No. of Samples	PCDF/PCDD - pg/m^3 Range	Mean	Std.Dev.
1/15/86	Basement	11/11	0.04 -0.78	0.32	0.21	4	0.29-0.57	0.40	0.12
1/15/86	Floor 1	9/9	0.10 -0.74	0.38	0.22	4	0.17-0.40	0.31	0.10
1/15/86	Floor 2	5/5	0.24 -0.95	0.63	0.30	4	0.03-1.21	0.44	0.54
5/28/86	Basement	5/5	0.03 -0.28	0.13	0.10	-	-	-	-
5/28/86	Floor 1	3/5	(0.02)-0.15	0.06	0.06	-	-	-	-
5/28/86	Floor 2	6/7	(0.02)-0.26	0.12	0.11	-	-	-	-
7/12/86	Basement	7/7	0.04 -0.26	0.14	0.08	-	-	-	-
7/12/86	Floor 1	5/5	0.06 -0.25	0.17	0.08	-	-	-	-
7/12/86	Floor 2	4/4	0.08 -0.16	0.14	0.04	-	-	-	-

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 2

WEIGHTED RANDOM SAMPLES SELECTED PCB SURFACE CONCENTRATIONS

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
JANUARY 18, 1986:						
WP 1222	1	PERIM	X01	216	DRAFTING TABLE	ND(.04)**
WP 1436	3	PERIM	X04	215	CEILING	1.12
WP 1219	4*	PERIM	X04	215	HC WALL	2.4
WP 1226	6*	PERIM	X08	214	LARGE DESK	1.48
WP 1231	7*	PERIM	X08	213	DRAFTING TABLE	4.16
WP 1227	8*	PERIM	X08	214	HC PARTITION	ND(.04)
WP 1232	9*	PERIM	X09	211	FLOOR	10.4
WP 1234	10*	PERIM	X10	209A	LC WALL	ND(.04)
WP 1244	11	PERIM	X15	MENS	HC PARTITION	7.2
WP 1087	12*	PERIM	X28	205	FLOOR	26.4
WP 1088	13*	PERIM	X28	205	LARGE DESK	8.4
WP 1094	14*	PERIM	X28	205	DRAFTING TABLE	0.4
WP 1095	15*	PERIM	X28	205	CABINET	3.44
WP 1089	16*	PERIM	X28	205	HC WALL	3.68
WP 1091	17	PERIM	X28	205	LC WALL	0.52
WP 1093	18	PERIM	X28	205	HC PARTITION	ND(0.9)
WP 1438	19	PERIM	X36	208	CEILING	2.36
WP 1129	20	PERIM	X36	208	LC WALL	10.4
WP 1132	21*	PERIM	X38	210	HC WALL	0.8
WP 1136	22	PERIM	X38	210	LC WALL	5.2
WP 1138	23	PERIM	X42	212B	DRAFTING TABLE	6.56
WP 1343	24*	PERIM	Y71	HALL	LC WALL	0.52
WP 1396	25*	PERIM	Y79	ELEC P	LC WALL	12.4
WP 1324	26	PERIM	Y06	134	FLOOR	ND(0.9)
WP 1326	27	PERIM	Y06	134	HC WALL	0.76
WP 1317	28	PERIM	Y07	CLOSET	HC WALL	2.0
WP 1288	29	PERIM	Y09	133	FLOOR	0.36
WP 1314	30*	PERIM	Y09	133	LARGE DESK	2.32
WP 1330	31	PERIM	Y13	131A	FLOOR	4.72
WP 1329	32	PERIM	Y13	131A	LC WALL	2.08
WP 1334	33	PERIM	Y15	131D	LC WALL	0.32
WP 1336	34*	PERIM	Y17	129A	HC WALL	1.16
WP 1338	35	PERIM	Y18	129	DOORKNOB	4.8
WP 1339	36	PERIM	Y18	129	LC WALL	1.8
WP 1340	37	PERIM	Y18	129	LC PARTITION	0.52
WP 1355	38*	PERIM	Y26	WOMEN	HC PARTITION	0.76
WP 1354	39*	PERIM	Y26	WOMEN	LC PARTITION	6.8
WP 1378	40*	PERIM	Y42	116	HC WALL	2.44
WP 1383	41	PERIM	Y44	118	LC WALL	0.68

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 1252	42*	PERIM	Y63	INF	HC COUNTER	8.8
WP 1434	43	PERIM	Y67	126	CEILING	1.52
WP 1383	44*	PERIM	Y44	118	WALL	0.68
WP 1311	44	VAULT	Y60	103	FLOOR	12.0
WP 1264	44*	PERIM	Y67	126	SMALL DESK	4.8
WP 1312	45*	VAULT	Y60	103	WALL	8.8
WP 1266	45	PERIM	Y67	126	LC WALL	2.32
WP 1263	46	PERIM	Y67	126	HC PARTITION	1.32
WP 1031	47*	PERIM	Z01	B22	FLOOR	4.0
WP 1033	48*	PERIM	Z01	B22	SMALL DESK	0.68
WP 1030	48	PERIM	Z01	B22	DOORKNOB	1.92
WP 1032	50*	PERIM	Z01	B22	LIGHTSWITCH	0.68
WP 1028	51	PERIM	Z02	B22	DOORKNOB	0.6
WP 1026	52	PERIM	Z40	B20	DOORKNOB	1.28
WP 1020	53	PERIM	Z07	HALL	LC WALL	0.64
WP 1018	55	PERIM	Z10	CAFE	HC WALL	0.84
WP 1048	56*	PERIM	Z12	B15	LC WALL	1.76
WP 1052	57*	PERIM	Z13	B13	SMALL DESK	0.84
WP 1051	58*	PERIM	Z13	B13	HC WALL	1.96
WP 1054	59	PERIM	Z15	B11	HC WALL	0.36
WP 1071	60*	PERIM	Z16	B9	SMALL DESK	1.4
WP 1148	61*	PERIM	Z17	WOMEN	DOOR KNOB	80.0
WP 1149	62*	PERIM	Z18	WOMEN	DOORKNOB	2.88
WP 1216	63*	PERIM	Z30	B4	FLOOR	8.8
WP 1293	64	PERIM	Z30	B4	LIGHTSWITCH	4.4
WP 1295	65*	PERIM	Z30	B4	HC WALL	5.2
WP 1152	68*	PERIM	Z44	B7	FLOOR	4.24
WP 1154	69	PERIM	Z44	B7	LIGHTSWITCH	8.8
WP 1153	70*	PERIM	Z44	B7	LC WALL	10.4
WP 1067	71	PERIM	Z47	B8	LC WALL	1.04
WP 1063	72*	PERIM	Z48	B10	LIGHTSWITCH	1.04
WP 1062	73	PERIM	Z48	B10	HC WALL	ND(1.0)**
WP 1044	74*	PERIM	Z50	B14	HC WALL	0.72
WP 1437	75	PERIM	Z51	216	LIGHTSWITCH	0.72
WP 1223	76	PERIM	Z51	216	HC WALL	2.36
WP 1144	77	PERIM	Z55	215	DRAFTING TABLE	2.72
WP 1406	78*	VAULT	Z39	114	WALL	8.8
WP 1435	78	PERIM	Z57	215	CEILING	1.88
WP 1228	79	PERIM	X08	214	DRAFTING TABLE	1.84
WP 1092	80	PERIM	X28	205	FILE CABINET	4.4
WP 1130	81	PERIM	X36	208	DRAFTING TABLE	2.92
WP 1356	82*	PERIM	X42	MENS	MEN'S FLOOR	21.6
WP 1139	82	PERIM	X42	212B	LC WALL	0.56
WP 1128	83	PERIM	X43	HALL	LC WALL	14.0

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 1321	84*	PERIM	Y01	134	LIGHTSWITCH	1.12
WP 1316	85	PERIM	Y09	133	HC WALL	2.08
WP 1346	86	PERIM	Y21	125	LIGHTSWITCH	1.56
WP 1351	87	PERIM	Y23	123	LC WALL	0.4
WP 1377	88*	PERIM	Y41	113	HC WALL	1.72
WP 1388	89	PERIM	Y48	120	DOORKNOB	4.4
WP 1256	90	PERIM	Y63	INF	LC WALL	8.0
WP 1261	91	PERIM	Y67	124	LC WALL	4.0
WP 1022	92	PERIM	Z06	B18	FLOOR	12.4
WP 1050	93*	PERIM	Z13	B13	SMALL TABLE	1.08
WP 1147	94	PERIM	Z16	B9	LIGHTSWITCH	1.28
WP 1297	95*	PERIM	Z30	B4	OTHER CABINET	3.36
WP 1042	96*	PERIM	Z51	B16	HC WALL	0.8
WP 1036	97	PERIM	Z55	B21	DOORKNOB	0.96
WP 1059	98	PERIM	Z57	HALL	LC WALL	ND(0.5)**
WP 1284	99*	PERIM	Y81	AUD	LC WALL	4.8
WP 1240	101	VAULT	X16	207	HC WALL	6.4
WP 1112	102	VAULT	X17	WOMEN	HC WALL	5.2
WP 1115	104*	VAULT	X20	200	FLOOR	8.4
WP 1120	105*	VAULT	X20	200	LARGE DESK	17.2
WP 1117	106*	VAULT	X20	200	DRAFTING TABLE	2.48
WP 1119	107*	VAULT	X20	200	HC WALL	6.8
WP 1080	109	VAULT	X22	204	SMALL DESK	9.6
WP 1081	110*	VAULT	X22	204	LARGE DESK	10.4
WP 1082	111*	VAULT	X22	204	HC WALL	3.08
WP 1079	112	VAULT	X22	204	LC WALL	6.4
WP 1083	113	VAULT	X22	204	LC PARTITION	5.2
WP 1075	114	VAULT	X24	204B	FLOOR	5.6
WP 1101	115*	VAULT	X29	203A	FLOOR	15.2
WP 1096	116	VAULT	X29	203B	LIGHTSWITCH	5.2
WP 1102	117*	VAULT	X29	203A	DRAFTING TABLE	1.04
WP 1103	118*	VAULT	X29	203	HC WALL	7.2
WP 1106	119	VAULT	X30	201	FLOOR	9.2
WP 1107	120*	VAULT	X30	201	LC WALL	18.4
WP 1100	121*	VAULT	X44	HALL	HC WALL	12.4
WP 1114	122	VAULT	X44	HALL	LC WALL	0.6
WP 1272	123*	VAULT	Y73	LOBBY	FLOOR	10.8
WP 1274	124	VAULT	Y73	AUD	DOORKNOB	14.4
WP 1275	125*	VAULT	Y73	ENT	HC WALL	40.0

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 1273	126*	VAULT	Y73	LOBBY	LC WALL	2.12
WP 1376	127*	VAULT	Y77	110	LC WALL	40.0
WP 1306	128*	VAULT	Y77	HALL	HC WALL	12.0
WP 1249	129	VAULT	Y28	LOBBY	HC WALL	10.8
WP 1251	130	VAULT	Y28	LOBBY	LC WALL	11.6
WP 1358	131*	VAULT	Y30	MENS	SINK	9.2
WP 1357	132*	VAULT	Y30	MENS	HC PARTITION	8.0
WP 1411	133*	VAULT	Y32	106	FLOOR	9.2
WP 1407	134*	VAULT	Y33	108	HC WALL	7.2
WP 1405	135*	VAULT	Y34	114	HC WALL	5.2
WP 1399	137	VAULT	Y37	112	FLOOR	5.72
WP 1403	138*	VAULT	Y39	114	LARGE DESK	6.8
WP 1372	139*	VAULT	Y56	109	HC WALL	11.6
WP 1367	140	VAULT	Y57	107A	LARGE DESK	3.76
WP 1369	141*	VAULT	Y57	107A	HC WALL	16.4
WP 1368	142	VAULT	Y57	107A	LC WALL	21.6
WP 1362	143*	VAULT	Y59	105	HC WALL	17.6
WP 1311	144*	VAULT	Y60	103	FLOOR	12.0
WP 1312	145*	VAULT	Y60	103	LC WALL	8.8
WP 1307	147*	VAULT	Y61	101	LOCKER	9.2
WP 1359	148	VAULT	Z21	B5	CEILING	11.6
WP 1161	149	VAULT	Z21	MECH	HC WALL	8.0
WP 1162	150	VAULT	Z22	MECH	LC WALL	1.68
WP 1191	152*	VAULT	Z26	B5	FLOOR	12.8
WP 1211	153	VAULT	Z27	B3	LARGE DESK	10.8
WP 1210	154	VAULT	Z27	B3	DOORKNOB	6.0
WP 1208	155*	VAULT	Z27	B3	HC WALL	22.6
WP 1299	156	VAULT	Z29	DUP	FLOOR	23.2
WP 1298	157	VAULT	Z31	B4	HC WALL	8.36
WP 1213	158*	VAULT	Z32	B4	EQUIPMENT	28.4
WP 1214	159	VAULT	Z32	B4	HC WALL	9.2
WP 1419	160	VAULT	Z33	CLOSET	CEILING	35.2
WP 1212	161	VAULT	Z33	B4	HC WALL	12.4
WP 1184	162*	VAULT	Z36	B4A	OTHER CABINET	8.4
WP 1179	163*	VAULT	Z38	B1A	LC WALL	3.72
WP 1180	164*	VAULT	Z39	B1A	LC WALL	2.24
WP 1178	165*	VAULT	Z40	B1A	HC WALL	3.12
WP 1176	166*	VAULT	Z40	B1A	LC WALL	5.2
WP 1170	167	VAULT	Z41	B1	FLOOR	10.8

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room	Surface	PCB Level ug/m^2
MAY 28, 1986:					
WP 3099	226	VAULT	X16 207	DRAFTING TABLE	4.4
WP 3100	254	VAULT	X16 207	HC WALL	ND(0.7)**
WP 3098	288	VAULT	X16 207	LC WALL	2.52
WP 3103	282	VAULT	X18 WOMEN	LC PARTITION	1.2
WP 3112	281	VAULT	X20 202	FLOOR	2.28
WP 3107	224	VAULT	X20 200	DOORKNOB	5.2
WP 3109	223	VAULT	X20 200	DRAFTING TABLE	4.0
WP 3114	230	VAULT	X20 202	DRAFTING TABLE	2.72
WP 3111	231	VAULT	X20 202	DRAFTING TABLE	5.2
WP 3116	259	VAULT	X20 202	DRAFTING TABLE	6.4
WP 3110	290	VAULT	X20 200	DRAFTING TABLE	5.6
WP 3115	278	VAULT	X20 202	LC WALL	36.8
WP 3105	284	VAULT	X20 200	LC WALL	2.2
WP 3118	245	VAULT	X22 204	DOORKNOB	16.8
WP 3120	240	VAULT	X22 204	LARGE DESK	4.0
WP 3121	283	VAULT	X22 204	LARGE DESK	2.48
WP 3122	229	VAULT	X22 204	HC WALL	1.76
WP 3119	243	VAULT	X22 204	HC WALL	1.84
WP 3123	244	VAULT	X22 204	LC WALL	2.08
WP 3124	274	VAULT	X24 204B	LC WALL	14.4
WP 3126	232	VAULT	X25 204A	LC WALL	6.0
WP 3131	219	VAULT	X29 203B	DRAFTING TABLE	2.52
WP 3133	225	VAULT	X29 203A	DRAFTING TABLE	3.48
WP 3132	237	VAULT	X29 203A	DRAFTING TABLE	0.64
WP 3134	252	VAULT	X29 203A	DRAFTING TABLE	1.36
WP 3130	217	VAULT	X29 203A	LC WALL	2.6
WP 3129	248	VAULT	X29 203B	LC WALL	1.84
WP 3097	214	VAULT	X32 HALL	LIGHTSWITCH	7.6
WP 3095	228	VAULT	X33 HALL	FLOOR	5.6
WP 3096	275	VAULT	X33 HALL	HC WALL	4.4
WP 3138	233	VAULT	X44 CLOSET	DOORKNOB	64.0
WP 3104	256	VAULT	X44 HALL	HC WALL	12.8
WP 3127	287	VAULT	X44 HALL	HC WALL	10.4
WP 3135	234	VAULT	X44 HALL	LC WALL	4.4
WP 3128	239	VAULT	X44 HALL	LC WALL	2.08
WP 3117	241	VAULT	X44 HALL	LC WALL	3.2
WP 3054	250	VAULT	Y73 BREEZE	HC WALL	7.2
WP 3069	216	VAULT	Y77 HALL	LIGHTSWITCH	23.2
WP 3060	220	VAULT	Y77 HALL	HC WALL	20.8
WP 3089	242	VAULT	Y77 HALL	HC WALL	29.6

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 1171	168	VAULT	Z41	B1	LIGHTSWITCH	92.0
WP 1173	169*	VAULT	Z41	B1	LC WALL	60.0
WP 1167	170	VAULT	Z58	HALL	FLOOR	8.4
WP 1166	171	VAULT	Z58	HALL	HC WALL	24.4
WP 1188	172	VAULT	Z58	B5	LC WALL	5.2
WP 1190	173	VAULT	Z61	STAIRS	HC WALL	6.4
WP 1164	174	VAULT	Z62	STAIRS	LC WALL	4.4
WP 1242	180	VAULT	X16	207	FLOOR	38.8
WP 1116	181	VAULT	X20	202	FLOOR	1.8
WP 1078	183	VAULT	X24	204B	HC WALL	6.0
WP 1098	184	VAULT	X29	203B	DRAFTING TABLE	2.16
WP 1124	185*	VAULT	X34	STAIRS	LC WALL	25.6
WP 1420	186	VAULT	Y77	HALL	CEILING	4.8
WP 1250	187*	VAULT	Y28	LOBBY	LC WALL	21.6
WP 1410	188	VAULT	Y33	108	SMALL DESK	16.0
WP 1402	189*	VAULT	Y39	114	HC WALL	4.8
WP 1370	190	VAULT	Y57	107A	HC WALL	30.4
WP 1158	192*	VAULT	Z21	MECH	FLOOR	24.8
WP 1195	193*	VAULT	Z26	B5	HC WALL	10.0
WP 1360	194	VAULT	Z41	B1	CEILING	6.0
WP 1187	195	VAULT	Z58	HALL	LC WALL	16.8
WP 1186	196	VAULT	Z58	B4A	FLOOR	6.4
WP 1418	197	VAULT	Z37	B4A	CEILING	10.4
WP 1182	198	VAULT	Z37	B4A	FLOOR	7.6

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 3061	263	VAULT	Y77	HALL	HC WALL	64.0
WP 3079	264	VAULT	Y77	HALL	HC WALL	24.8
WP 3068	276	VAULT	Y77	HALL	LC WALL	18.8
WP 3049	206	VAULT	Y28	LOBBY	DOORKNOB	18.8
WP 3052	227	VAULT	Y28	LOBBY	HC WALL	3.72
WP 3050	260	VAULT	Y28	LOBBY	HC WALL	5.6
WP 3055	201	VAULT	Y29	MENS	LC WALL	72.0
WP 3059	267	VAULT	Y30	MENS	HC WALL	5.6
WP 3056	212	VAULT	Y30	MENS	HC PARTITION	5.2
WP 3057	222	VAULT	Y30	MENS	HC PARTITION	4.8
WP 3058	235	VAULT	Y30	MENS	HC PARTITION	16.0
WP 3059	266	VAULT	Y30	MENS	HC PARTITION	5.6
WP 3063	258	VAULT	Y33	106	HC WALL	6.8
WP 3066	270	VAULT	Y34	110	DOORKNOB	6.8
WP 3067	251	VAULT	Y34	110	SMALL TABLE	6.8
WP 3070	202	VAULT	Y36	112	HC WALL	2.28
WP 3071	268	VAULT	Y37	112	HC WALL	2.8
WP 3078	210	VAULT	Y39	114	LIGHTSWITCH	15.2
WP 3076	291	VAULT	Y39	114	LC WALL	2.52
WP 3073	209	VAULT	Y40	114	HC WALL	3.48
WP 3075	218	VAULT	Y40	114	HC WALL	4.4
WP 3074	246	VAULT	Y40	114	HC WALL	3.28
WP 3072	255	VAULT	Y40	114	HC WALL	5.6
WP 3080	247	VAULT	Y55	111	LIGHTSWITCH	4.4
WP 3081	221	VAULT	Y56	109	LARGE DESK	1.88
WP 3082	269	VAULT	Y56	109	HC WALL	3.2
WP 3083	203	VAULT	Y57	107A	HC WALL	25.2
WP 3084	280	VAULT	Y58	107	LARGE DESK	10.8
WP 3086	204	VAULT	Y59	105	LIGHTSWITCH	22.0
WP 3085	286	VAULT	Y59	105	LARGE DESK	1.56
WP 3087	207	VAULT	Y60	103	LC WALL	25.6
WP 3090	292	VAULT	Y61	101	HC WALL	12.0
WP 3094	265	VAULT	Y62	CLOSET	HC WALL	29.6
WP 3093	293	VAULT	Y62	CLOSET	LC WALL	16.0
WP 3022	253	VAULT	Z21	MECH	DOORKNOB	8.0
WP 3018	261*	VAULT	Z21	MECH	DOORKNOB	64.0
WP 3023	279	VAULT	Z21	MECH	LIGHTSWITCH	9.2
WP 3020	277	VAULT	Z21	MECH	EQUIPMENT	60.0
WP 3021	208	VAULT	Z21	MECH	HC WALL	13.2

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room	Surface	PCB Level ug/m^2
WP 3028	271	VAULT	Z26 B5	HC WALL	10.0
WP 3024	285	VAULT	Z26 B5	HC WALL	76.0
WP 3027	236	VAULT	Z26 B5	LC WALL	24.8
WP 3030	289	VAULT	Z27 B3	SMALL TABLE	12.0
WP 3042	249	VAULT	Z36 B2	SMALL DESK	64.0
WP 3038	213	VAULT	Z38 B2B	HC WALL	12.8
WP 3040	215	VAULT	Z39 B2A	LC WALL	3.56
WP 3039	273	VAULT	Z39 B2A	LC WALL	5.2
WP 3043	211	VAULT	Z41 B1	LIGHTSWITCH	21.6
WP 3032	238	VAULT	Z58 HALL	HC WALL	1.52
WP 3031	257	VAULT	Z58 HALL	HC WALL	0.88
WP 3045	272	VAULT	Z62 CLOSET	HC WALL	38.4
WP 3046	205	VAULT	Z62 CLOSET	LC WALL	11.6

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 3205	304	VAULT	X44	HALL	LC WALL	4.0
WP 3182	328	VAULT	X44	HALL	LC WALL	1.48
WP 3216	372	VAULT	X44	HALL	LC WALL	0.52
WP 3222	303	VAULT	Y73	BREEZE	DOORKNOB	1.6
WP 3224	333	VAULT	Y73	BREEZE	HC WALL	2.92
WP 3221	318	VAULT	Y73	BREEZE	LC WALL	3.36
WP 3236	323	VAULT	Y77	DW1	DOORKNOB	3.12
WP 3248	316	VAULT	Y77	HALL	HC WALL	2.72
WP 3237	376	VAULT	Y77	HALL	LC WALL	7.6
WP 3240	388	VAULT	Y78	ENT	LIGHTSWITCH	4.4
WP 3220	309	VAULT	Y28	LOBBY	LC WALL	2.64
WP 3232	362	VAULT	Y29	MENS	DOORKNOB	8.4
WP 3225	336	VAULT	Y29	MENS	LIGHTSWITCH	1.0
WP 3234	313	VAULT	Y29	MENS	LC WALL	29.2
WP 3228	306	VAULT	Y30	MENS	HC PARTITION	7.2
WP 3229	314	VAULT	Y30	MENS	HC PARTITION	6.4
WP 3230	327	VAULT	Y30	MENS	HC PARTITION	4.0
WP 3231	339	VAULT	Y30	MENS	HC PARTITION	19.2
WP 3227	343	VAULT	Y30	MENS	HC PARTITION	8.4
WP 3226	366	VAULT	Y30	MENS	HC PARTITION	3.48
WP 3235	337	VAULT	Y33	108	DOORKNOB	4.4
WP 3238	393	VAULT	Y36	112	LC WALL	5.6
WP 3239	354	VAULT	Y40	114A	HC WALL	2.08
WP 3241	335	VAULT	Y55	111	WINDOW HANDLE	23.2
WP 3242	391	VAULT	Y55	111	SMALL TABLE	3.92
WP 3244	340	VAULT	Y56	109	LC WALL	2.96
WP 3246	371	VAULT	Y59	105	HC WALL	3.16
WP 3247	326	VAULT	Y59	105	LC WALL	1.84
WP 3245	332	VAULT	Y59	105	LC WALL	10.4
WP 3249	342	VAULT	Y61	101	HC WALL	4.4
WP 3251	377	VAULT	Y61	101	HC WALL	14.4
WP 3250	390	VAULT	Y61	101	HC WALL	7.2
WP 3259	305	VAULT	Z21	MECH	LIGHTSWITCH	9.6
WP 3258	382	VAULT	Z21	MECH	LIGHTSWITCH	16.8
WP 3256	387	VAULT	Z21	MECH	LIGHTSWITCH	5.2
WP 3257	308	VAULT	Z21	MECH	LC WALL	1.76
WP 3260	310	VAULT	Z21	MECH	LC WALL	2.68
WP 3261	351	VAULT	Z26	B5	HC WALL	1.96
WP 3262	349	VAULT	Z26	B5	LC WALL	2.92

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room	Surface	PCB Level ug/m^2
JULY 11, 1986:					
WP 3181	311	VAULT	X16 207	DRAFTING TABLE	3.0
WP 3180	347	VAULT	X16 207	HC WALL	ND(0.6)**
WP 3177	320	VAULT	X18 MENS	HC WALL	2.4
WP 3178	321	VAULT	X18 MENS	HC WALL	1.12
WP 3179	350	VAULT	X18 MENS	HC PARTITION	1.72
WP 3188	307	VAULT	X20 200	DRAFTING TABLE	1.16
WP 3195	330	VAULT	X20 200	DRAFTING TABLE	20.0
WP 3189	345	VAULT	X20 200	DRAFTING TABLE	1.2
WP 3190	346	VAULT	X20 200	DRAFTING TABLE	1.12
WP 3191	365	VAULT	X20 200	DRAFTING TABLE	1.44
WP 3192	367	VAULT	X20 200	DRAFTING TABLE	1.16
WP 3186	392	VAULT	X20 200	DRAFTING TABLE	3.16
WP 3194	334	VAULT	X20 200	LC WALL	2.04
WP 3187	344	VAULT	X20 200	LC WALL	0.44
WP 3184	368	VAULT	X20 200	LC WALL	5.6
WP 3185	381	VAULT	X20 200	LC WALL	0.52
WP 3201	364	VAULT	X22 204	LARGE DESK	1.64
WP 3202	301	VAULT	X22 204	HC WALL	1.96
WP 3204	352	VAULT	X22 204	HC WALL	1.92
WP 3200	374	VAULT	X22 204	LC WALL	2.8
WP 3198	373	VAULT	X24 204B	HC WALL	5.6
WP 3199	361	VAULT	X25 204A	LC WALL	2.84
WP 3206	325	VAULT	X27 STAIRS	LC WALL	1.88
WP 3208	358	VAULT	X29 203A	DOOR KNOB	6.8
WP 3210	319	VAULT	X29 203A	DRAFTING TABLE	0.76
WP 3212	348	VAULT	X29 203A	DRAFTING TABLE	3.48
WP 3211	357	VAULT	X29 203A	DRAFTING TABLE	1.32
WP 3214	360	VAULT	X29 203A	DRAFTING TABLE	1.92
WP 3207	375	VAULT	X29 203B	DRAFTING FILE	2.08
WP 3217	324	VAULT	X29 203	LARGE TABLE	1.36
WP 3215	369	VAULT	X29 203A	HC WALL	2.44
WP 3209	378	VAULT	X29 203A	HC PARTITION	ND(0.6)**
WP 3219	312	VAULT	X32 CLOSET	LIGHTSWITCH	8.0
WP 3175	341	VAULT	X33 LOBBY	HC WALL	1.28
WP 3174	386	VAULT	X33 LOBBY	LC WALL	2.84
WP 3176	384	VAULT	X44 MENS	DOORKNOB	14.8
WP 3218	315	VAULT	X44 HALL	HC WALL	10.0
WP 3197	317	VAULT	X44 HALL	HC WALL	4.4
WP 3196	338	VAULT	X44 HALL	HC WALL	7.6

TABLE 2 (Continued)

Sample Number	WRS	Strata	Room		Surface	PCB Level ug/m^2
WP 3264	355	VAULT	Z28	CLOSET	LC WALL	3.44
WP 3265	329	VAULT	Z36	CLOSET	LIGHTSWITCH	2.12
WP 3268	302	VAULT	Z36	B4A	SMALL TABLE	4.0
WP 3266	356	VAULT	Z36	B4A	HC WALL	2.32
WP 3267	359	VAULT	Z36	B4A	HC WALL	1.4
WP 3269	331	VAULT	Z36	B4A	LC WALL	1.28
WP 3270	370	VAULT	Z38	B2B	LIGHTSWITCH	8.0
WP 3271	363	VAULT	Z41	B1	HC WALL	12.0
WP 3272	383	VAULT	Z41	B1	HC WALL	1.64
WP 3252	353	VAULT	Z43	HALL	LC WALL	1.0
WP 3255	389	VAULT	Z58	HALL	HC WALL	1.24
WP 3276	322	VAULT	Z58	HALL	LC WALL	1.68
WP 3274	380	VAULT	Z58	HALL	LC WALL	8.4
WP 3275	385	VAULT	Z58	HALL	LC WALL	5.2
WP 3254	379	VAULT	Z62	ELEV	LC WALL	32.0

* These samples represent locations selected by both Best Engineering Judgement and Weighted Random Sampling.

** None detected. Value in parentheses is the limit of detection.

TABLE 3

BEST ENGINEERING JUDGEMENT SAMPLES
PCB SURFACE CONCENTRATIONS

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
OCTOBER 4, 1986:					
WP-068	E	PERIM	216	DUCT	1.24
WP-069	E	PERIM	215	DUCT	9.6
WP-070	E	PERIM	HALLWAY 2ND	DUCT	16.0
WP-071	E	PERIM	HALLWAY	DUCT	6.4
WP-072	E	PERIM	210	DUCT	5.2
WP-073	E	PERIM	209	DUCT	5.2
WP-074	E	VAULT	201	DUCT	148.0
WP-075	E	VAULT	HALLWAY	DUCT	20.8
WP-076	E	VAULT	202	DUCT	15.2
WP-077	E	VAULT	204	DUCT	3.88
WP-078	E	PERIM	205	DUCT	25.2
WP-079	E	PERIM	205	DUCT	18.8
WP-081	E	PERIM	131	DUCT	8.4
WP-082	E	PERIM	HALLWAY 1ST	DUCT	1.72
WP-083	E	PERIM	134	DUCT	0.84
WP-084	E	PERIM	HALLWAY	DUCT	1.84
WP-085	E	PERIM	122	DUCT	1.8
WP-086	E	PERIM	127	DUCT	ND(0.6)**
WP-087	E	VAULT	HALLWAY	DUCT	18.0
WP-088	E	VAULT	105	DUCT	2.64
WP-089	E	VAULT	106	DUCT	64.0
WP-090	E	VAULT	114	DUCT	8.4
WP-091	E	PERIM	116	DUCT	8.0
WP-092	E	PERIM	115	DUCT	10.4
WP-093	E	PERIM	B4	DUCT	14.8
WP-095	E	VAULT	HALLWAY	DUCT	172.0
WP-096	E	VAULT	HALLWAY B	DUCT	23.6
WP-097	E	VAULT	B4	DUCT	17.6
WP-098	E	VAULT	B2	DUCT	48.0
WP-099	E	VAULT	HALLWAY	DUCT	10.4
WP-100	E	PERIM	HALLWAY	DUCT	6.4
WP-101	E	PERIM	CAFE	DUCT	22.4
WP-102	E	PERIM	B22	DUCT	1.48
WP-103	E	VAULT	MECH	DUCT	152.0
WP-104	E	VAULT	MECH	DUCT	33.6
WP-105	E	VAULT	MECH	DUCT	80.0
WP-106	E	VAULT	HALLWAY	DUCT	140.0
WP-107	E	VAULT	102	DUCT	640.0
WP-109	E	VAULT	101	DUCT	188.0

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1237	E-34	PERIM	MEN'S	DOOR	4.4
WP-1238	E-20	VAULT	207	CABINET	7.2
WP-1239	E-21	VAULT	207	DESK	3.0
WP-1243	E-19	VAULT	207	WALL	16.0
WP-1245	E-22	VAULT	HALL 107	WALL	14.4
WP-1246	E-79	VAULT	LOBBY	FLOOR	11.2
WP-1247	E-78	VAULT	LOBBY	FLOOR	13.2
WP-1248	E-77	VAULT	ELEVATOR 1ST	DOOR	15.6
WP-1250	RE-187*	VAULT	LOBBY	WALL	21.6
WP-1252	RE-42*	PERIM	INFORM	COUNTER SURFACE	8.8
WP-1254	E-53	VAULT	INFORM	FLOOR	25.6
WP-1255	E-70	PERIM	INFORM	WALL	1.88
WP-1257	E-71	PERIM	INFORM	SWITCHBOARD	6.4
WP-1258	E-66	PERIM	122	FLOOR	7.2
WP-1259	E-68	PERIM	122	DESK	4.4
WP-1260	E-67	PERIM	122	WALL	2.64
WP-1262	E-69	PERIM	124	DESK	7.2
WP-1264	RE-44*	PERIM	126	DESK	4.8
WP-1267	E-65	PERIM	128	FLOOR	ND(0.9)
WP-1268	E-64	PERIM	128	DESK	4.0
WP-1269	E-63	PERIM	132	WALL	3.2
WP-1270	E-62	PERIM	132	TABLE	2.5
WP-1271	E-52	PERIM	HALL 131	FLOOR	13.6
WP-1272	RE-123*	VAULT	LOBBY BY AUDIT	FLOOR	10.8
WP-1273	RE-126*	VAULT	LOBBY	WINDOW	2.12
WP-1275	RE-125*	PERIM	BREEZEWAY	WALL	40.0
WP-1276	E-203	PERIM	WOMEN'S LOBBY	WALL	19.2
WP-1278	E-202	PERIM	MEN'S LOBBY	FLOOR	48.0
WP-1279	E-205	PERIM	AUDIT	FLOOR	25.3
WP-1280	E-207	PERIM	AUDIT	SEAT	19.2
WP-1281	E-208	PERIM	AUDIT	SEAT	22.8
WP-1282	E-209	PERIM	AUDIT	SEAT	12.12
WP-1283	E-206	PERIM	AUDIT	SEAT	16.4
WP-1284	RE-99*	PERIM	STAGE	WALL	4.8
WP-1285	E-154	VAULT	STAIRWAY	FLOOR	200.0
WP-1286	E-153	VAULT	STAIRWELL	WALL	15.6
WP-1287	E-51	PERIM	HALL 133	WALL	0.52
WP-1290	E-123	PERIM	B4	EDP	11.6
WP-1291	E-122	PERIM	B4	TABLE	6.8
WP-1292	E-120	PERIM	B4	EDP	5.6
WP-1294	E-121	PERIM	B4	WOOD TOP	64.0

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1295	RE-65*	PERIM	B4	WALL	5.2
WP-1296	E-124	PERIM	B4	EDP	13.6
WP-1297	RE-95*	PERIM	B4	STEEL SHELVES	3.36
WP-1300	E-118	PERIM	DUP ROOM	WALL	66.0
WP-1302	E-119	PERIM	DUP ROOM	EDP	21.2
WP-1303	E-117	VAULT	STAIRWELL	WALL	26.4
WP-1304	E-80	VAULT	HALL	FLOOR	76.0
WP-1305	E-14	VAULT	DW#2	INSIDE	2,760.0
WP-1306	RE-128*	VAULT	HALL	WALL	12.0
WP-1307	RE-147*	VAULT	101	LOCKER	9.2
WP-1308	E-90	VAULT	101	WALL	19.6
WP-1309	E-89	VAULT	101	WALL	20.4
WP-1310	E-88	VAULT	101	TABLE	10.0
WP-1311	RE-144*	VAULT	103	FLOOR	12.0
WP-1312	RE-145*	VAULT	103	WALL	8.8
WP-1314	RE-30*	VAULT	133	TABLE	2.32
WP-1315	E-50	VAULT	133	TELEPHONE	0.96
WP-1318	E-48	PERIM	134	DESK	2.96
WP-1319	E-47	PERIM	134	EDP	1.8
WP-1320	E-46	PERIM	134	DESK	1.44
WP-1321	RE-84*	PERIM	134	WALL	1.12
WP-1322	E-45	PERIM	134	CABINET	1.76
WP-1323	E-44	PERIM	134	TABLE	3.08
WP-1327	E-49	PERIM	134	DESK	2.0
WP-1328	E-43	PERIM	STAIRWAY	DOOR	1.28
WP-1331	E-56	PERIM	131	CABINET	2.0
WP-1332	E-55	PERIM	131	WALL	1.16
WP-1333	E-54	PERIM	131	DESK	9.2
WP-1335	E-57	PERIM	129	DESK	5.6
WP-1336	RE-34*	PERIM	129	WALL	1.16
WP-1341	E-58	PERIM	129	TELEPHONE	1.88
WP-1342	E-59	PERIM	129	TABLE	3.0
WP-1343	RE-24*	PERIM	HALL 127	WALL	0.52
WP-1344	E-60	PERIM	127	WALL	1.12
WP-1345	E-61	PERIM	127	DESK	5.2
WP-1347	E-73	PERIM	125	DESK	4.4
WP-1348	E-72	PERIM	125	WALL	2.36
WP-1350	E-75	PERIM	123	FLOOR	14.3
WP-1352	E-74	PERIM	123	WALL	0.56
WP-1353	E-76	PERIM	123	DESK	3.68

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1119	RE-107*	VAULT	200	WALL	6.8
WP-1120	RE-105*	VAULT	200	TABLE	17.2
WP-1122	E-16	VAULT	LANDING	FLOOR	9.6
WP-1123	E-17	VAULT	LANDING	WALL	4.8
WP-1124	RE-185*	VAULT	LANDING	WALL	25.6
WP-1125	E-27	PERIM	206	TABLE	3.72
WP-1126	E-26	PERIM	206	WALL	6.4
WP-1127	E-23	PERIM	HALL 208	FLOOR	37.6
WP-1131	E-28	PERIM	208	SHELVES	2.24
WP-1132	RE-21*	PERIM	210	WALL	0.8
WP-1134	E-30	PERIM	210	TABLE	4.88
WP-1135	E-29	PERIM	210	DESK	4.8
WP-1137	E-24	PERIM	HALL 211	WALL	8.4
WP-1140	E-33	PERIM	212A	BOOK SHELF	2.6
WP-1141	E-32	PERIM	212A	WALL	3.12
WP-1142	E-31	PERIM	212	TABLE	6.0
WP-1143	E-25	PERIM	215	DOOR	15.48
WP-1146	E-156	PERIM	B9	WALL	2.16
WP-1148	RE-61*	PERIM	WOMEN'S BASE	DOOR	80.0
WP-1149	RE-62*	PERIM	WOMEN'S BASE	DOOR	2.88
WP-1150	E-158	PERIM	MEN'S BASE	WALL	3.8
WP-1151	E-157	PERIM	MEN'S BASE	WALL	2.08
WP-1152	RE-68*	PERIM	B7	FLOOR	4.24
WP-1153	RE-70*	PERIM	B7	WALL	10.4
WP-1155	E-201	PERIM	B7	DESK	3.6
WP-1156	E-149	VAULT	MECH ROOM	DOOR	128.0
WP-1158	RE-192*	VAULT	MECH ROOM	FLOOR	24.8
WP-1159	E-150	VAULT	MECH ROOM	SWITCH GEAR	11.2
WP-1160	E-151	VAULT	MECH ROOM	ELE MOTOR	232.0
WP-1163	E-148	VAULT	ELEVATOR	DOOR	72.0
WP-1165	E-146	VAULT	JANITOR'S	ELE PANEL	20.0
WP-1168	E-147	VAULT	VAULT	J-BOX	72.0
WP-1172	E-144	VAULT	B1	TABLE	9.2
WP-1173	RE-169*	VAULT	B1	WALL	60.0
WP-1174	E-145	VAULT	B1	CABINET	14.4
WP-1175	E-143	VAULT	B1	WALL	56.0
WP-1176	RE-166*	VAULT	B1A	WALL	5.2
WP-1177	E-142	VAULT	B1A	DESK	36.4
WP-1178	RE-165*	VAULT	B1A	WALL	3.12

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1179	RE-163	VAULT	B1A DARKROOM	WALL	3.72
WP-1180	RE-164	VAULT	B1A DARKROOM	WALL	2.24
WP-1183	E-146	VAULT	B4B	WALL	0.92
WP-1184	RE-162*	VAULT	B4A	CABINET	8.4
WP-1185	E-140	VAULT	B4A	DOOR FRAME	2.28
WP-1189	E-152	VAULT	DW #1	DOOR	184.0
WP-1191	RE-152*	VAULT	B5	FLOOR	12.8
WP-1192	E-136	VAULT	B5	MOVE FILE	68.0
WP-1194	E-135	VAULT	B5	WALL	8.8
WP-1195	RE-193*	VAULT	B5	WALL	10.0
WP-1196	E-134	VAULT	B5	WALL	8.4
WP-1197	E-135	VAULT	B5	WALL	16.0
WP-1198	E-133	VAULT	B3	COLUMN	13.6
WP-1199	E-132	VAULT	B3	MAP FILE	20.4
WP-1200	E-137	VAULT	B3	EDP	8.8
WP-1201	E-139	VAULT	B3	EDP	52.0
WP-1202	E-130	VAULT	B3	WALL	14.8
WP-1203	E-138	VAULT	B3	CABINET	38.4
WP-1204	E-128	VAULT	B3	EDP	184.0
WP-1206	E-131	VAULT	B3	WALL	24.0
WP-1207	E-129	VAULT	B3	EDP	44.0
WP-1208	RE-155*	VAULT	B3	WALL	22.6
WP-1209	E-127	VAULT	B3	EDP	8.4
WP-1213	RE-158*	PERIM	B4	EDP	28.4
WP-1215	E-126	PERIM	B4	EDP	2.92
WP-1216	RE-63*	PERIM	B4	FLOOR	8.8
WP-1218	E-39	PERIM	215	DESK	2.24
WP-1219	RE-4*	PERIM	215	WALL	2.4
WP-1220	E-41	PERIM	216	WALL	0.88
WP-1221	E-40	PERIM	216	DESK	2.52
WP-1224	E-42	PERIM	STAIRWELL	WALL	8.0
WP-1225	RE-5*	PERIM	214	FLOOR	6.8
WP-1226	RE-6*	PERIM	214	DESK	1.48
WP-1227	RE-8*	PERIM	214	WALL	ND(0.36)
WP-1230	E-38	PERIM	213	DESK	2.84
WP-1231	RE-07*	PERIM	213	DRAFT TABLE	4.16
WP-1232	RE-09*	PERIM	211	FLOOR	10.4
WP-1233	E-37	PERIM	211	DESK	2.24
WP-1234	RE-10*	PERIM	209A	WALL	ND(0.36)
WP-1235	E-36	PERIM	209	WALL	9.6
WP-1236	E-35	PERIM	209	DESK	1.6

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
JANUARY 19, 1986:					
WP-1001	E-169	PERIM	CAFE	FLOOR	30.0
WP-1002	E-177	PERIM	CAFE	FLOOR	18.0
WP-1004	E-168	PERIM	CAFE	TABLE	1.92
WP-1005	E-167	PERIM	CAFE	CABINET	1.32
WP-1006	E-165	PERIM	CAFE	WALL	1.04
WP-1007	E-164	PERIM	CAFE	WALL	2.64
WP-1008	E-176	PERIM	CAFE	COUNTER	4.8
WP-1009	E-175	PERIM	CAFE	BOOTH SEAT	4.0
WP-1010	E-171	PERIM	CAFE	TABLE	2.72
WP-1011	E-178	PERIM	CAFE	TABLE	1.52
WP-1012	E-173	PERIM	CAFE	BOOTH SEAT	4.4
WP-1014	E-172	PERIM	CAFE	BOOTH SEAT	1.72
WP-1015	E-174	PERIM	CAFE	WALL	8.4
WP-1016	E-179	PERIM	CAFE	COLUMN	0.84
WP-1017	E-176	PERIM	CAFE	TABLE	3.28
WP-1019	E-180	PERIM	SO. STAIRWELL	WALL	4.8
WP-1021	E-181	PERIM	B18 HALL	DOOR	0.84
WP-1023	E-182	PERIM	B18	WALL	ND(0.32)
WP-1024	E-183	PERIM	B18	DESK	1.04
WP-1027	E-184	PERIM	B20	DESK	1.48
WP-1029	E-185	PERIM	B28	DESK	1.56
WP-1031	RE-47*	PERIM	B22	FLOOR	4.0
WP-1032	RE-50*	PERIM	B22	WALL	0.68
WP-1033	RE-48*	PERIM	B22	DESK	0.68
WP-1034	E-187	PERIM	B27	TABLE	0.36
WP-1035	E-186	PERIM	B22	DESK	2.4
WP-1038	E-188	PERIM	B21	TABLE	0.76
WP-1039	E-189	PERIM	B19	TABLE	1.16
WP-1040	E-190	PERIM	B19	WALL	ND(0.2)
WP-1041	E-191	PERIM	B16	TABLE	5.6
WP-1042	RE-76*	PERIM	B16	WALL	0.8
WP-1044	RE-74*	PERIM	B14	WALL	0.72
WP-1045	E-192	PERIM	B14	CABINET	ND(0.2)
WP-1046	E-166	PERIM	DW #3	DOOR	13.6
WP-1047	E-163	PERIM	B15	FLOOR	14.4
WP-1048	RE-56*	PERIM	B15	WALL	1.76
WP-1050	RE-93*	PERIM	B13	TABLE	1.08
WP-1051	RE-58*	PERIM	B13	WALL	1.96
WP-1052	RE-57*	PERIM	B13	TABLE	0.84
WP-1053	E-162	PERIM	B11	FLOOR	8.4

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1055	E-160	PERIM	B11	WALL	1.0
WP-1056	E-161	PERIM	B11	TABLE	0.92
WP-1057	E-193	PERIM	B12	CABINET	3.6
WP-1058	E-194	PERIM	B12	CABINET	4.8
WP-1060	E-196	PERIM	B10	FLOOR	2.76
WP-1063	RE-72*	PERIM	B10	WALL	1.04
WP-1064	E-195	PERIM	B10	DESK	1.24
WP-1065	E-197	PERIM	B8	DOOR	7.6
WP-1066	E-200	PERIM	B8	TABLE	1.12
WP-1068	E-199	PERIM	B8	DESK	2.32
WP-1069	E-198	PERIM	B8	WALL	1.44
WP-1070	E-159	PERIM	B9	FLOOR	8.8
WP-1071	RE-60*	PERIM	B9	DESK	1.4
WP-1072	E-155	PERIM	B9	DOOR	4.8
WP-1074	E-6	PERIM	HALL 205	FLOOR	27.2
WP-1076	E-4	VAULT	204B	DESK	2.08
WP-1077	E-5	VAULT	204B	WALL	2.08
WP-1081	RE-110*	VAULT	204	DESK	10.4
WP-1082	RE-111*	VAULT	204	WALL	3.08
WP-1084	E-2	VAULT	2ND LAND	FLOOR	10.4
WP-1086	E-3	VAULT	2ND LAND	WALL	16.8
WP-1087	RE-12*	PERIM	205	FLOOR	26.4
WP-1088	RE-13*	PERIM	205	DESK	8.4
WP-1089	RE-16*	PERIM	205	WALL	3.68
WP-1090	E-1	PERIM	205	DESK	6.0
WP-1094	RE-14*	PERIM	205	DRAFT TABLE	0.4
WP-1095	RE-15*	PERIM	205	CABINET	3.44
WP-1099	E-9	VAULT	203B	CABINET	6.0
WP-1100	RE-121*	VAULT	HALL 202	WALL	12.4
WP-1101	RE-115*	VAULT	203A	FLOOR	15.2
WP-1102	RE-117*	VAULT	203A	DRAFT TABLE	1.04
WP-1103	RE-118*	VAULT	203	WALL	7.2
WP-1104	E-10	VAULT	203	TABLE	10.0
WP-1105	E-11	VAULT	203	EDP	6.8
WP-1107	RE-120*	VAULT	201	WALL	18.4
WP-1108	E-12	VAULT	201	DRAFT TABLE	20.4
WP-1110	E-13	VAULT	JANITOR'S	WALL	6.0
WP-1111	E-7	VAULT	HALL WOMEN'S	WALL	16.4
WP-1113	E-15	VAULT	WOMEN'S	PARTITION	6.0
WP-1115	RE-104*	VAULT	200	FLOOR	8.4
WP-1117	RE-106*	VAULT	200	DRAFT TABLE	2.48
WP-1118	E-8	VAULT	200	WALL	104.0

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1408	E-97	VAULT	108	WALL	40.0
WP-1410	RE-188*	VAULT	108	DESK	16.0
WP-1411	RE-133*	VAULT	106	FLOOR	9.2
WP-1412	E-87	VAULT	106	WALL	9.2
WP-1413	E-86	VAULT	106	WALL	10.8
WP-1414	E-85	VAULT	104	WALL	16.8
WP-1415	E-84	VAULT	102	WALL	44.0
WP-1416	E-83	VAULT	102	WALL	76.0
WP-1417	E-134	VAULT	B5	WALL	124.0
WP-1421	E	VAULT	203	DUCT	44.0
WP-1422	E	VAULT	200	DUCT	56.0
WP-1423	E	VAULT	203	DUCT	68.0
WP-1424	E	VAULT	104	DUCT	80.0
WP-1425	E	VAULT	102	DUCT	204.0
WP-1427	E	VAULT	HALLWAY	DUCT	23.6
WP-1428	E	VAULT	101	DUCT	16.8
WP-1429	E	VAULT	HALLWAY	DUCT	104.0
WP-1430	E	VAULT	HALLWAY/BASEMENT	DUCT	72.0
WP-1431	E	VAULT	HALLWAY/BASEMENT	DUCT	108.0
WP-1432	E	VAULT	MECH	DUCT	60.0
WP-1439	E	VAULT	INSIDE FRESH AIR INTAKE	DUCT	44.0

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-1354	RE-39*	PERIM	WOMEN'S FIRST	WALL	6.8
WP-1355	RE-38*	PERIM	WOMEN'S FIRST	WALL	0.76
WP-1356	RE-82*	PERIM	MEN'S FIRST	FLOOR	21.6
WP-1357	RE-132*	VAULT	MEN'S FIRST	PARTITION	8.0
WP-1362	RE-143*	VAULT	105	WALL	17.6
WP-1363	E-94	VAULT	105	DESK	19.6
WP-1364	E-91	VAULT	107	TABLE	13.2
WP-1365	E-92	VAULT	107	WALL	16.4
WP-1366	E-93	VAULT	107	FLOOR	9.6
WP-1369	RE-141*	VAULT	107-109	WALL	16.4
WP-1371	E-95	VAULT	109	CABINET	6.0
WP-1372	RE-139*	VAULT	109	WALL	11.6
WP-1374	E-96	VAULT	111	DESK	11.6
WP-1375	E-81	VAULT	111	FLOOR	14.4
WP-1376	RE-127*	VAULT	110	DOOR	40.0
WP-1377	RE-88*	PERIM	113	WALL	1.72
WP-1378	RE-40*	PERIM	116	WALL	2.44
WP-1379	E-103	PERIM	116	TABLE	12.4
WP-1380	E-105	PERIM	116	FLOOR	4.0
WP-1381	E-116	PERIM	118	WALL	2.24
WP-1382	E-106	PERIM	118	DESK	3.44
WP-1383	RE-44*	PERIM	118	WALL	0.68
WP-1384	E-108	PERIM	119	DESK	0.52
WP-1386	E-107	PERIM	119	WALL	0.68
WP-1387	E-109	PERIM	120	FLOOR	256.0
WP-1389	E-104	PERIM	120	CHAIR	1.44
WP-1390	E-110	PERIM	120	WALL	3.28
WP-1391	E-111	PERIM	117	CHAIR	6.8
WP-1392	E-112	PERIM	117	CHAIR	9.6
WP-1393	E-113	PERIM	117	WALL	20.4
WP-1394	E-114	PERIM	115	CHAIR	1.64
WP-1395	E-115	PERIM	115	CHAIR	0.64
WP-1396	RE-25*	PERIM	Y79	ELE PANEL	12.4
WP-1398	E-102	VAULT	112	DESK	3.92
WP-1400	E-101	VAULT	112	WALL	7.6
WP-1401	E-100	VAULT	114	TABLE	7.6
WP-1402	RE-189*	VAULT	114	WALL	4.8
WP-1403	RE-138*	VAULT	114	DESK	6.8
WP-1404	E-99	VAULT	110	CABINET	1.92
WP-1405	RE-135*	VAULT	114	WALL	5.2
WP-1406	RE-78*	VAULT	114	WALL	8.8
WP-1407	RE-134*	VAULT	108	WALL	7.2

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
MAY 28, 1986:					
WP-3018	RE-261*	VAULT	MECH ROOM	SWITCHGEAR	64.0
WP-3019	E-501	VAULT	MECH ROOM	HOT WATER HEATER	22.0
WP-3025	E-507	VAULT	B5	CEILING	28.0
WP-3026	E-506	VAULT	B3	CABINET	38.4
WP-3033	E-508	VAULT	B4	EDP	5.2
WP-3034	E-519	VAULT	B4A	SINK	6.8
WP-3035	E-505	VAULT	B4A	TUMBLER	13.6
WP-3037	E-504	VAULT	B4A SOUTH	ENLARGER	56.0
WP-3044	E-503	VAULT	B1	WALL	8.8
WP-3047	E-502	VAULT	ELEVATOR	DOOR	28.4
WP-3048	E-509	VAULT	LOBBY	FLOOR	5.6
WP-3051	E-510	VAULT	LOBBY	GLASS CASE	ND(0.7)
WP-3062	E-513	VAULT	104	WALL	11.6
WP-3064	E-514	VAULT	108	DESK	12.4
WP-3088	E-512	VAULT	103	WALL	9.2
WP-3091	E-511	VAULT	101	DESK	10.4
WP-3102	E-518	VAULT	WOMEN'S 2ND	HEATER	10.8
WP-3106	E-515	VAULT	200	DESK	4.8
WP-3109	E-516	VAULT	200	WINDOW	3.24
WP-3136	E-517	VAULT	203	DOOR	30.8
WP-3139	E	PERIM	205	DUCT	64.0
WP-3140	E	VAULT	HALLWAY/205	DUCT	2.32
WP-3141	E	VAULT	203	DUCT	14.8
WP-3142	E	VAULT	200	DUCT	8.8
WP-3143	E	VAULT	HALLWAY	DUCT	18.8
WP-3144	E	PERIM	210	DUCT	44.0
WP-3145	E	PERIM	HALLWAY/131	DUCT	17.2
WP-3146	E	PERIM	216	DUCT	23.6
WP-3147	E	PERIM	HALLWAY/131	DUCT	5.6
WP-3148	E	PERIM	HALLWAY/133	DUCT	4.4
WP-3150	E	PERIM	124	DUCT	4.4
WP-3151	E	PERIM	HALLWAY/1ST	DUCT	4.0
WP-3152	E	VAULT	HALLWAY/1ST	DUCT	48.0
WP-3153	E	VAULT	101	DUCT	10.0
WP-3154	E	VAULT	HALLWAY/ADMIN	DUCT	8.8
WP-3155	E	PERIM	ADMIN	DUCT	7.2
WP-3156	E	PERIM	CAFE	DUCT	4.8
WP-3157	E	PERIM	HALLWAY	DUCT	5.2

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
WP-3158	E	PERIM	HALLWAY	DUCT	6.8
WP-3159	E	VAULT	MECH	DUCT	31.6
WP-3160	E	VAULT	MECH	DUCT	16.8
WP-3161	E	VAULT	MECH	DUCT	6.8
WP-3164	E	VAULT	MECH	DUCT	33.2
WP-3165	E	VAULT	AID ROSER	DICT	52.0
WP-3166	E	VAULT	B3	DUCT	10.4
WP-3167	E	VAULT	B4	DUCT	11.2
WP-3168	E	PERIM	B4	DUCT	30.4
WP-3170	E	VAULT	HALLWAY/B2	DUCT	12.4
WP-3171	E	VAULT	HALLWAY/B2	DUCT	176.0

TABLE 3 (Continued)

Sample Number	BEJ	Strata	Room	Surface	PCB Level ug/m^2
JULY 12, 1986:					
WP-3277	E	VAULT	B1A	DUCT	104.0
WP-3278	E	VAULT	B2	DUCT	25.2
WP-3279	E	VAULT	AUD RISER	DUCT	8.8
WP-3280	E	VAULT	AUD RISER	DUCT	27.2
WP-3281	E	PERIM	205	DUCT	11.6

* These samples represent locations selected by both Best Engineering Judgement and Weighted Random Sampling.

** None detected. Value in parentheses is the limit of detection.

TABLE 4

SUMMARY OF PCB SURFACE CONCENTRATIONS FOR CERTIFICATION SAMPLING
AND CERTIFICATION RE-SAMPLING
GENERAL OFFICE BUILDING

Date	Description	n/N*	PCB Level - ug/m^2 Range**	Mean	Std Dev.
WEIGHTED RANDOM SAMPLES (WRS):					
1/18/86	VAULT STRATA	82/82	0.6 - 92.0	12	13
1/18/86	PERIMETER STRATA	96/100	(0.4)- 80	5.3	9.8
5/28/86	VAULT STRATA	91/92	(0.7)- 76.0	14	18
7/11/86	VAULT STRATA	91/93	(0.3)- 32.0	5.0	5.9
BEST ENGINEERING JUDGEMENT (BEJ):					
1/18/86	VAULT STRATA	79/79	0.9 -2760	67.4	310
1/18/86	PERIMETER STRATA	124/128	(0.2)-256	8.5	24
5/28/86	VAULT STRATA	18/19	(0.7)-56	16	14
WRS AND BEJ COMBINED:					
1/18/86	VAULT STRATA	161/161	0.6 -2760	40	219
1/18/86	PERIMETER STRATA	219/228	(0.2)-256	7.0	19
5/28/86	VAULT	109/111	(0.7)-76	14	18

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 5

SUMMARY OF PCDF/PCDD SURFACE CONCENTRATIONS FOR
CERTIFICATION AND CERTIFICATION RE-SAMPLING
GENERAL OFFICE BUILDING

Date	Description	No. of Samples	PCDD/PCDF - ng/m^2 Range	Mean	Std. Dev.
1/18/86	Basement	12	0.010-0.174	0.07	0.053
1/18/86	Floor 1	9	0.015-0.115	0.058	0.030
1/18/86	Floor 2	6	0.041-0.070	0.052	0.011
	Total	27	0.01 -0.17	0.06	0.04

Table 6

SUMMARY OF "SIDE-BY-SIDE" PCDF/PCDD
AND PCB SURFACE SAMPLING RESULTS

PCDF/PCDD		PCB	
Sample No.	ng/m^2	Sample No.	ug/m^2
WDF-301	0.072	WP-1006	1.04
WDF-302	0.179	WP-1017	3.28
WDF-303	0.113	WP-1088	8.4
WDF-304	0.052	WP-1119	6.8
WDF-305	0.119	WP-1120	17.2
WDF-307	0.064	WP-1142	6.0
WDF-308	0.046	WP-1221	2.52
WDF-309	0.052	WP-1236	1.6
WDF-310	0.075	WP-1245	14.4
WDF-311	0.121	WP-1352	0.56
WDF-313	0.083	WP-1345	5.2
WDF-314	0.072	WP-1414	16.8
WDF-315	0.058	WP-1306	12.0
WDF-316	0.033	WP-1310	10.0
WDF-317	0.038	WP-1364	13.2
WDF-318	0.021	WP-1390	3.28
WDF-319	0.070	WP-1410	16.0
WDF-320	0.038	WP-1290	11.6
WDF-321	0.071	WP-1197	16.0
WDF-322	0.060	WP-1198	13.6
WDF-323	0.086	WP-1199	20.4
WDF-324	0.044	WP-1211	10.8
WDF-325	0.015	WP-1052	0.84
WDF-326	0.022	WP-1064	1.24
WDF-327	0.030	WP-1071	1.4
WDF-328	0.163	WP-1175	56.0
WDF-330	0.097	WP-1416	76.0

TABLE 7

SUMMARY OF HVAC CERTIFICATION SAMPLING
AND CERTIFICATION RE-SAMPLING FOR SURFACE
CONCENTRATIONS OF PCB AND PCDF/PCDD
GENERAL OFFICE BUILDING

Date	n/N*	PCB - ug/m^2 Range**	Mean	Std.Dev.	Number of Samples	PCDF/PCDD - ng/m^2 Range	Mean	Std. Dev.
10/4/85	38/39	(0.6)-640	50.0	110	8	0.03-1.62	0.46	0.55
1/18/86	12/12	16.8 -204	73.4	49.7	-	-	-	-
5/28/86	28/29	(0.7)-176	23.6	33.6	2	0.05-0.15	0.1	0.07
7/11/86	5/5	8.8 -104	35.4	39.2	-	-	-	-

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 8

SUMMARY OF PAPER CERTIFICATION SAMPLING
AND CERTIFICATION RE-SAMPLING
FOR SURFACE CONCENTRATIONS OF PCB
GENERAL OFFICE BUILDING

Date	Description	n/N*	PCB Level - ug/m^2 Range**	Mean	Std. Dev.
1/28/86	Section A***	4/63	(0.1)-66.5	1.4	8.3
1/28/86	Section B	5/60	(0.1)-20.0	1.1	2.8
1/28/86	Section C***	44/63	(0.15)-300	18.7	48.3
1/28/86	Section D	7/60	(0.07)-2.9	0.7	0.5
4/10/86	Field Notebooks++	4/5	(0.4) -7.8	2.3	3.1
3/11/86	Section A Re-sampling	0/3	(0.4)	0.01	0.2
3/11/86	Section C Re-sampling	3/3	2.6 -10.8	5.5	4.6

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

++ The inside pages of fieldnote books were sampled after covers were determined to be high.

*** Three additional samples were collected from box that showed individual sheet of paper over the criteria.

TABLE 9

FREQUENCY DISTRIBUTION OF VINYL COVERED FIELD NOTEBOOKS*
SURFACE CERTIFICATION SAMPLING FOR PCB

Date	Total Number of Samples	Range of PCB Levels - ug/m^2					
		0-10	11-20	21-50	51-100	101-200	201-300
4/10/86	11	1	4	2	0	3	1

* All covers of field notebooks were replaced.

TABLE 10

SUMMARY OF EQUIPMENT CERTIFICATION SAMPLING
AND CERTIFICATION RE-SAMPLING
FOR SURFACE CONCENTRATIONS OF PCB
GENERAL OFFICE BUILDING

Date	Description	n/N*	PCB Level - ug/m^2 Range**	Mean	Std. Dev.
12/16/85	Lots 1-31	31/31	(0.8)-1097	37.7	196
12/16/85	Lots 1-31 Minus Lot 21	30/30	(0.8)-20.0	2.4	3.4
Section C					
12/16/85	Lots 32-35	10/10	(7.6)-11.5	4.6	3.5
3/11/86	Lot A	2/3	(0.4)-20.0	7.8	12.3
3/11/86	Lot B	3/3	1.07- 1.65	1.4	0.3
3/11/86	Lot C	2/3	(0.5)-5072	1692	2928
3/11/86	Lot 21	1/1	2.63	-	-
6/13/86	Lot C	6/6	(3.78)-155	31.6	60.7

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 11

SUMMARY OF FURNITURE CERTIFICATION SAMPLING
AND CERTIFICATION RE-SAMPLING
FOR SURFACE CONCENTRATIONS OF PCB
GENERAL OFFICE BUILDING

Date	n/N	PCB Level - ug/m^2		
		Range	Mean	Std. Dev.
12/16/85	36/36	0.6 -57.6	4.8	12.6
1/29/86	24/30	(0.3)-16.0	2.3	4.0

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 12

SUMMARY OF SOS ENVIRONMENTAL ENGINEERING
SURFACE AND AIR QUALITY CONTROL SAMPLING OF PCB
GENERAL OFFICE BUILDING

Description***	n/N*	PCB Level - ug/m^2 Range	Mean	Std. Dev.
Section A	19/36	(1.0)-42.0	6.7	10.5
Section B	31/46	(2.0)-42.0	11.1	10.5
Section C	209/284	(1.0)-49.0	13.6	13.6
Section D	38/49	(1.0)-41.0	12.5	13.6
HVAC System	154/172	(2.0)-49.0	16.6	13.0
Paper	70/328	(1.0)-48.0	5.4	7.7
Equipment	64/121	(2.0)-46.0	12.2	12.7
Furniture	2/9	3.0 -10.0	4.3	3.0
PCB Air (ug/m^3)	63/113	(0.02)-0.91	0.1	0.14

* n/N is the number of samples above the detection limit/total number of samples collected. With results under 50 ug/m2.

** The limit of detection is in parenthesis.

*** Sections A, B, and D represent the perimeter strata; Section C represents the vault strata.

TABLE 13

SUMMARY OF ANNEX CERTIFICATION SAMPLING
FOR AIRBORNE CONCENTRATIONS
OF PCB and PCDF/PCDD

Date	n/N*	PCB – ug/m^3 Range**	Mean	Std.Dev.	No. of Samples	PCDF/PCDD – pg/m^3 Range	Mean	Std.Dev.
9/16/85	3/7	(0.02)–0.05	0.02	0.02	4	0.26–0.7[a]	0.48	0.19

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parenthesis.

[a] The maximum airborne concentrations of PCBs and PCDF/PCDDs were measured in the fresh air intake plenum for the building.

TABLE 14

SUMMARY OF SOS ENVIRONMENTAL ENGINEERING
PCB SURFACE AND AIR QUALITY CONTROL SAMPLING
ANNEX BUILDING

Date	Description	n/N*	PCB - ug/m^2 Range**	Mean	Std. Dev.	No. of Samples	PCDF/PCDD - ng/m^2 Range	Mean	Std. Dev.
9/16/86	Structure	14/39	(0.56)- 5.6	1.5	1.3	9	0.03-0.32	0.20	0.12
9/16/96	HVAC System	12/13	(1.9) -64.0	12.0	17.0	3	0.09-0.28	0.16	0.10
9/16/86	Paper	1/9	(0.56)- 2.1	0.5	0.6	-	-	-	-
PCB air	(ug/m^3)	7/22	(0.03)- 0.72	0.11	0.18	-	-	-	-

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

TABLE 15

SUMMARY OF ANNEX CERTIFICATION SAMPLING
FOR SURFACE CONCENTRATIONS OF
PCB AND PCDF/PCDD

Date	Description	n/N*	PCB Level - ug/m^2 Range**	Mean	Std. Dev.
9/16/85	Structure	15/48	(0.56)-56	1.3	1.2
9/16/85	HVAC System	12/13	(1.9) -64[a]	12	16
			PCDF/PCDD Level - ng/m^2		
9/16/85	Structure	9/9	0.03 -0.32	0.20	0.12
9/16/85	HVAC System	3/3	0.09 -0.28	0.16	0.10

* n/N is the number of samples above the detection limit/total number of samples collected.

** The limit of detection is in parentheses.

[a] The air supply plenum and primary distributional duct work were re-cleaned; retesting showed a none detected (< 1.0 ug/m^2) residual concentration.

TABLE 16

Level of PCBs on High Skin Contact Surfaces
in Office Buildings in Santa Fe, New Mexico

Building	Aroclor	n/N*	Level - ug/m^2 Mean**	Range
1	-	0/6	<1.0	
2	1260	13/15	2.4 (2.7)	<1.0 - 5.9
3	1242/1254	2/16	0.63 (1.6)	<1.0 - 1.6
Total	-	15/37	1.3 (2.5)	<1.0 - 5.9

* n/N denotes the number of samples above the detection limit/the total number of samples.

** The first number includes non-detected values treated as one half the detection limit; the number in parentheses are the mean of the values above the detection limit.

TABLE 17

Surface Levels of PCBs in Fresh-Air Intake Plenums
in Office Buildings in Santa Fe, New Mexico

Sample Location/Description	Aroclor	Level - ug/m^2
Bldg. 1: floor of air intake plenum	1254/1260	34
Bldg. 1: face of fresh air intake louvers	1260	11
Bldg. 2: floor of air intake plenum	1254	3.3
Bldg. 2: face of fresh air intake louvers	1260	6.0
Bldg. 2: field blank	-	ND(1.0)*
Bldg. 3: floor of air intake plenum	1260	4.8
Bldg. 3: face of fresh air intake louvers	-	ND(1.0)
Bldg. 3: field blank	-	ND(1.0)

* ND denotes non-detected. Value in parentheses is the limit of detection.

TABLE 18

Levels of PCDFs and PCDDs on High Skin Contact Surfaces
in Three Office Buildings in Santa Fe, New Mexico

	Level - ug/m^2	
	Mean*	Range**
2,3,7,8-TCDF	0.29	0.02 - 0.76
TCDFs	0.53	0.13 - 1.6
PeCDFs	0.08	(0.01) - 0.34
HxCDFs	0.17	(0.01) - 0.56
HpCDFs	0.27	(0.02) - 0.84
OCDFs	0.36	0.10 - 1.6
Total PCDFs	1.4	0.35 - 4.3
2,3,7,8-TCDD	0.02	(0.01) - (0.10)
TCDDs	0.02	(0.01) - (0.10
PeCDDs	0.02	(0.01) - (0.11
HxCDDs	0.70	(0.04) - 4.3
HpCDDs	1.7	0.23 - 5.3
OCDDs	6.0	1.6 - 14
Total PCDDs	8.5	1.9 - 24

* Mean calculated on 12 samples; non-detected values treated as one-half the detection limit.

** Value in parentheses is the limit of detection.

TABLE 19

Airborne Levels of PCBs in Office Buildings
and Ambient Air in Santa Fe, New Mexico

Building	Aroclor	n/N*	Level - ug/m^3 Mean**	Range
1	-	0/5	<0.03	-
2	-	0/8	<0.03	-
3	1254/1260	4/8	0.08 (0.14)	<0.03 - 0.18
Total	1254/1260	4/21	0.04 (0.14)	<0.03 - 0.18
Ambient Air	-	0/3	<0.03	-

* n/N denotes the number of samples above the detection limit/the total number of samples.

** The first number includes non-detected values treated as one half the detection limit; the number in parentheses are the mean of the values above the detection limit.

Table 20

Airborne Levels of PCDFs and PCDDs
in Three Office Buildings in Santa Fe, New Mexico

	Level - pg/m^3	
	Mean*	Range**
2,3,7,8-TCDF	0.37	(0.11) - 1.0
TCDFs	1.1	(0.11) - 5.0
PeCDFs	0.62	(0.08) - 4.1
HxCDFs	1.7	(0.05) - 14
HpCDFs	6.8	(0.15) - 53
OCDFs	11	(0.38) - 92
Total PCDFs	22	(0.49) - 162
2,3,7,8-TCDD	0.13	(0.09) - (0.49)
TCDDs	1.14	(0.09) - (0.49)
PeCDDs	0.24	(0.18) - (1.2)
HxCDDs	0.46	(0.23) - 1.5
HpCDDs	15	(0.13) - 26
OCDDs	80	2.0 - 170
Total PCDDs	96	2.4 - 221

* Mean calculated on 9 samples; non-detected values treated as one-half the detection limit.

** Value in parentheses is the limit of detection.

Table 21

Ambient Air Levels of PCDFs and PCDDs
in Santa Fe, New Mexico

	Level - pg/m^3	
	Mean*	Range**
2,3,7,8-TCDF	0.08	(0.11) - (0.18)
TCDFs	0.08	(0.11) - (0.18)
PeCDFs	0.11	(0.07) - (0.28)
HxCDFs	0.10	(0.03) - (0.27)
HpCDFs	1.1	(0.22) - 1.6
OCDFs	1.8	(0.58) - 2.7
Total PCDFs	3.2	(0.65) - 4.5
2,3,7,8-TCDD	0.06	(0.06) - (0.19)
TCDDs	0.06	(0.06) - (0.19)
PeCDDs	0.11	(0.12) - (0.39)
HxCDDs	0.30	(0.16) - (0.72)
HpCDDs	15	4.8 - 22
OCDDs	116	14 - 170
Total PCDDs	132	19 - 193

* Mean calculated on 4 samples; non-detected values treated as one-half the detection limit.

** Value in parentheses is the limit of detection.

FIGURE 1

NEW MEXICO STATE HIGHWAY DEPARTMENT
STATISTICAL DATA INPUT FORM

WRS ROOM # Z-15

ROOM 20 x 19'8"

DATE 4/15/86

NAME DON

		NUMBER			
1	DOOR KNOBS	2			
2	LIGHTSWITCHES	1			
3	HCW DESK SMALL	3			
4	HCW DESK LARGE	2			
5	HCW DRAFTING TABLE		LENGTH IN.	WIDTH IN.	
6	HCW MACHINE FULLTIME				
7	HCW				
8	HCW				
9	HCW				
10	HCW				
11	LCW BOOKSHELVES	2			
12	LCW DRAFTING FILES				
13	LCW STD FILES	2	LENGTH IN.	WIDTH IN.	
14	LCW OTHER CABINETS				
15	LCW TABLES LARGE				
16	LCW TABLES SMALL	2			
17	LCW				
18	LCW				
19	LCW				
			LINEAR FEET		
20	WALLS LINEAR FEET	20 +19'18"+	20 + 19'8"+	+	
21	ROOM DIVIDERS LIN. FT.	+ +	+ +	+	
22	HAND RAILS LIN. FT.	+ +	+ +	+	
23	COMMENTS				
24	COMMENTS				
25	COMMENTS				
26	COMMENTS				

CARPET REMOVAL

FIGURE 2

NEW MEXICO STATE HIGHWAY DEPARTMENT
COMPUTER REDUCED DATA FOR ROOM Z-1

WRS ROOM #	Z-01	ROOM	39	x	38	1482
TYPE		AREA	-----	x	-----	0
			-----	x	-----	0

OFFICE X
HALL
STORAGE

		NUMBER	LENGTH IN.	WIDTH IN.	1482
1	DOOR KNOBS *	1 *			
2	LIGHT SWITCH*S	2 *			
3	HCW DESK SMA*L	7 *			
4	HCW DESK LAR*E	6 *			
5	HCW DRAFTING*TABLE	--------*	LENGTH IN.	WIDTH IN.	AREA
6	HCW MACHINE *ULLTI	--------*	-------*	------*	0
7	HCW *	--------*	-------*	------*	0
8	HCW *	--------*	-------*	------*	0
9	HCW *	--------*	-------*	------*	0
10	HCW *	--------*	-------*	------*	0
11	LCW BOOKSHEL*ES	18 *			
12	LCW DRAFTING*FILES	--------*			
13	LCW STD FILE*	8 *	LENGTH IN.	WIDTH IN.	
14	LCW OTHER CA*INETS	3 *	55 *	56 *	21.38
15	LCW TABLES L*RGE	--------*			
16	LCW TABLES S*ALL	13 *			
17	LCW *	--------*	-------*	------*	0
18	LCW *	--------*	-------*	------*	0
19	LCW *	--------*	-------*	------*	0
20	WALLS LINEAR FEET	156			
21	ROOM DIVIDERS LIN.	144			
22	HAND RAILS LIN. FT.				

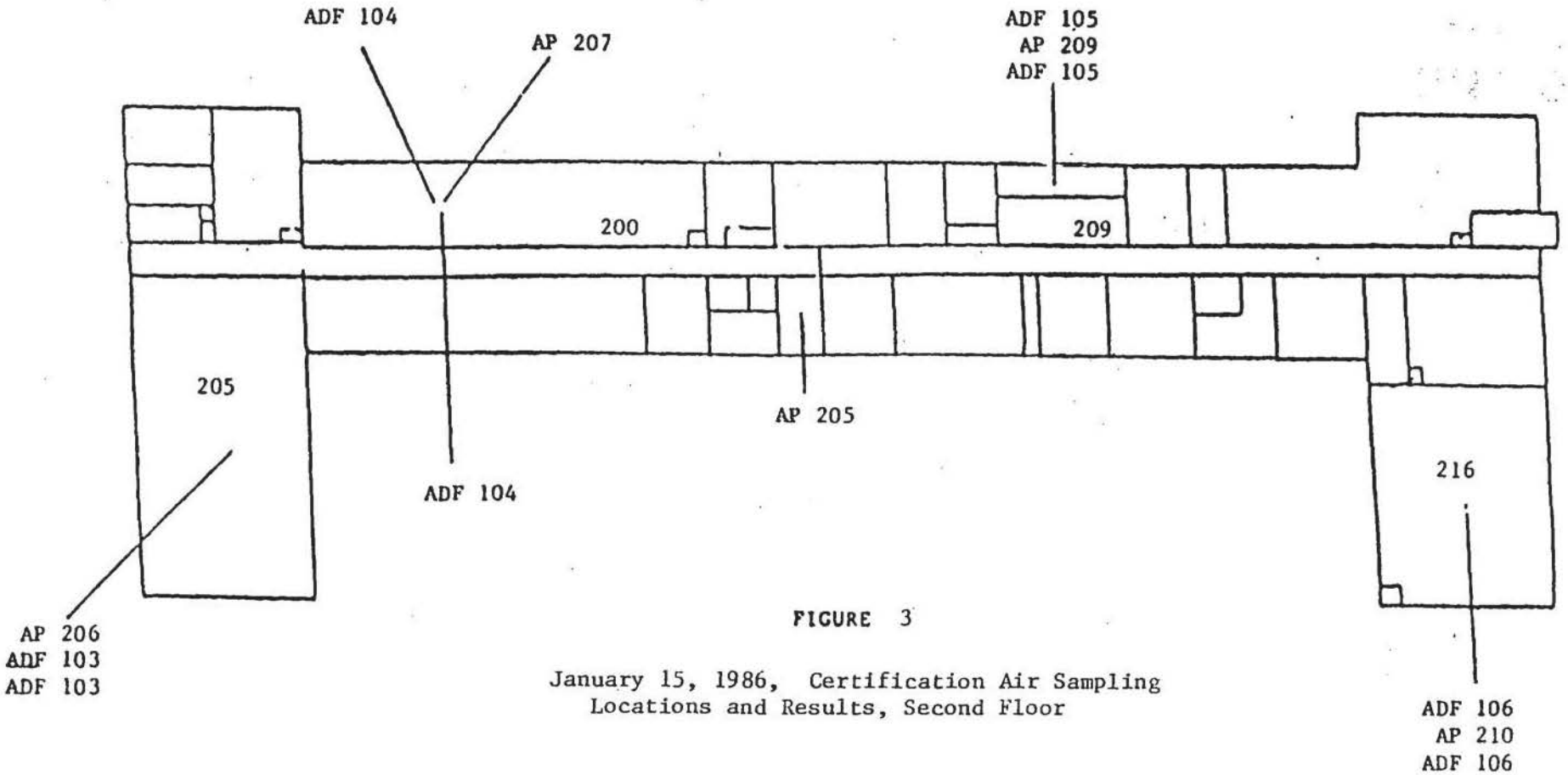


FIGURE 3

January 15, 1986, Certification Air Sampling
Locations and Results, Second Floor

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 3 LEGEND

SAMPLE NUMBER	LOCATION	RESULT
AP-206	Rm. 205	0.78
AP-207	Rm. 202	0.81
AP-208	LOBBY	0.39
AP-209	Rm. 209	0.95
AP-210	Rm. 216	0.24
ADF-103	Rm. 205	0.43
ADF-104	Rm. 200	0.10
ADF-105	Rm. 209	1.21
ADF-106	Rm. 216	0.03

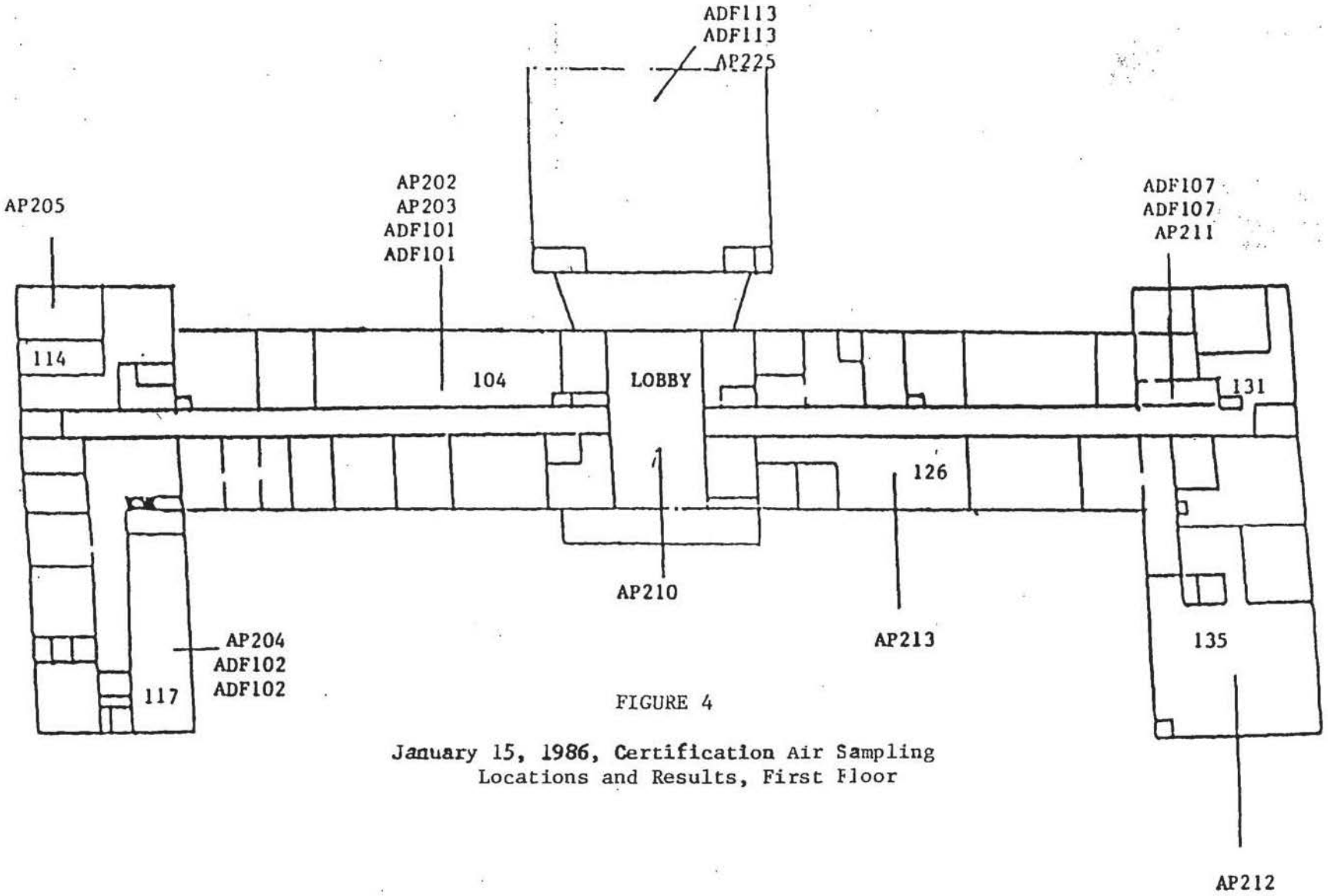


FIGURE 4

January 15, 1986, Certification Air Sampling
Locations and Results, First Floor

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 4 LEGEND

SAMPLE NUMBER	LOCATION	RESULT
AP-201	LOBBY	0.34
AP-202	Rm. 104	0.53
AP-203	Rm. 104	0.59
AP-204	Rm. 117	0.27
AP-205	Rm. 114	0.74
AP-210	LOBBY	0.24
AP-211	Rm. 131	0.24
AP-212	Rm. 135	0.10
AP-213	Rm. 126	0.50
AP-225	Auditorium	0.10
ADF-101	Rm. 104	0.17
ADF-102	Rm. 117	0.38
ADF-107	Rm. 131	0.30
ADF-113	Auditorium	0.40

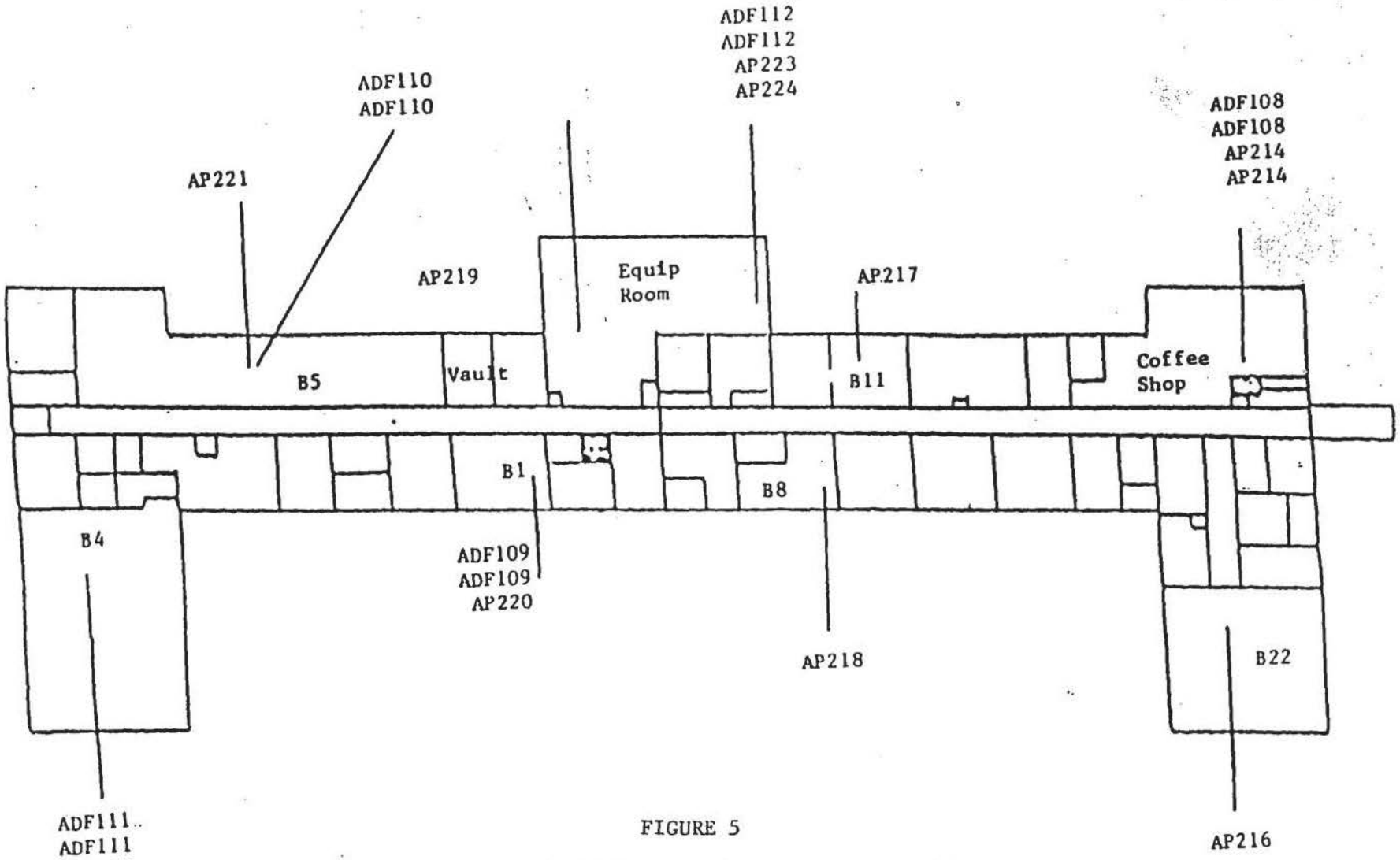


FIGURE 5

January 15, 1986, Certification Air Sampling
Locations and Results, Basement

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 5 LEGEND

SAMPLE NUMBER	LOCATION	RESULT (ug/m^3)
AP-214	CAFETERIA	0.24
AP-215	CAFETERIA	0.25
AP-216	Rm. B22	0.14
AP-217	Rm. B11	0.38
AP-218	Rm. B8	0.41
AP-219	Vault	0.78
AP-220	Rm. B1	0.32
AP-221	Rm. B5	0.53
AP-222	Rm. B4	0.29
AP-223	Mechanical Room	0.12
AP-224	Mechanical Room	0.04
ADF-108	Cafeteria	0.00 SAMPLE LOST
ADF-109	Rm. B1	0.29
ADF-110	Rm. B5	0.57
ADF-111	Rm. B4	0.34
ADF-112	Mechanical Room	0.38

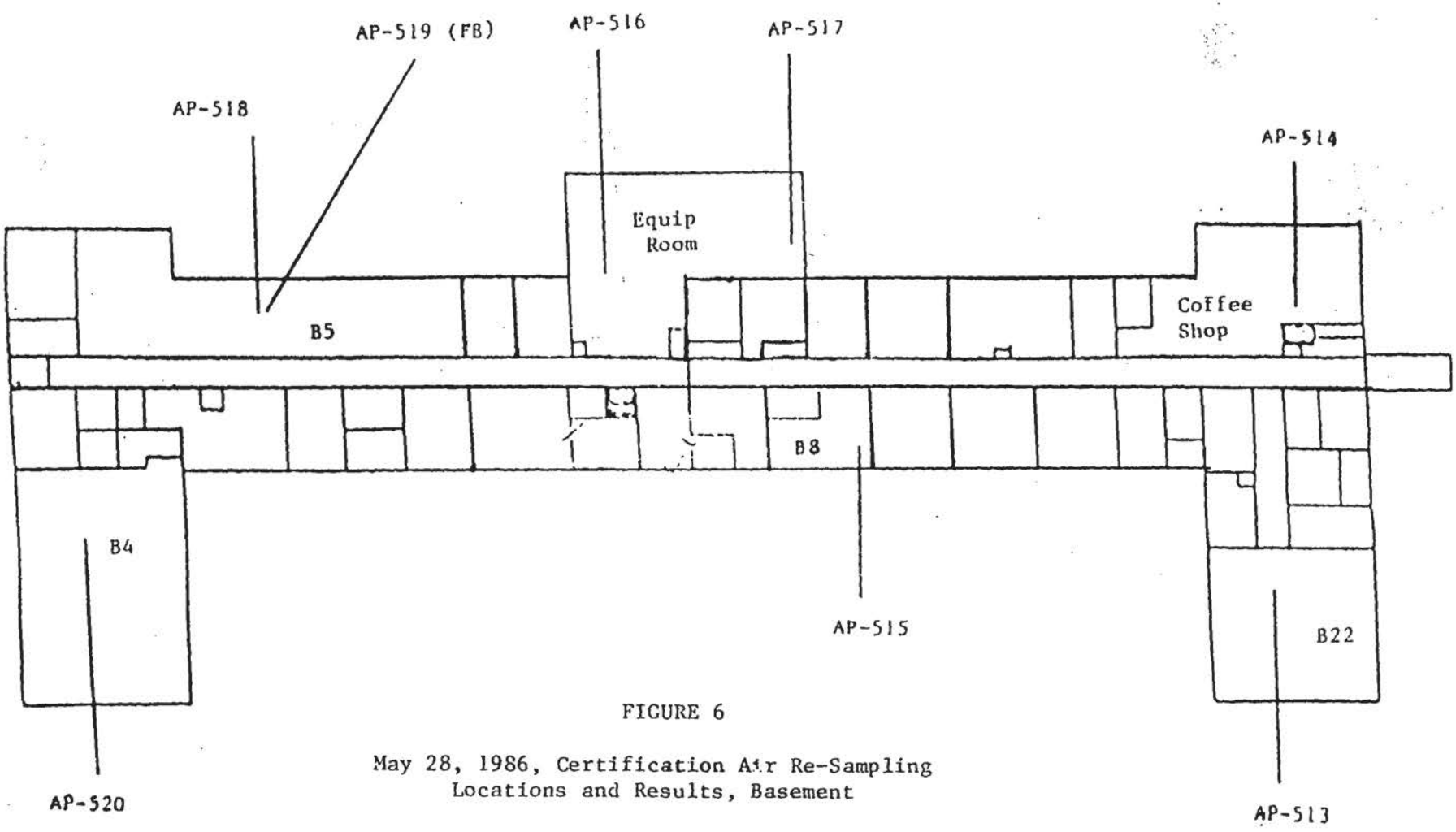


FIGURE 6

May 28, 1986, Certification Air Re-Sampling
Locations and Results, Basement

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 6 LEGEND

SAMPLE NUMBER	LOCATION	RESULT
AP-513	Rm. B22	ND < 0.02
AP-514	Cafeteria	0.04
AP-515	Rm. B8	0.25
AP-516	Mechanical Room	0.26
AP-517	Mechanical Room	0.02
AP-518	Rm. B5	0.18
AP-519	Rm. B5	Field Blank ND<.02
AP-520	Rm. B4	0.08

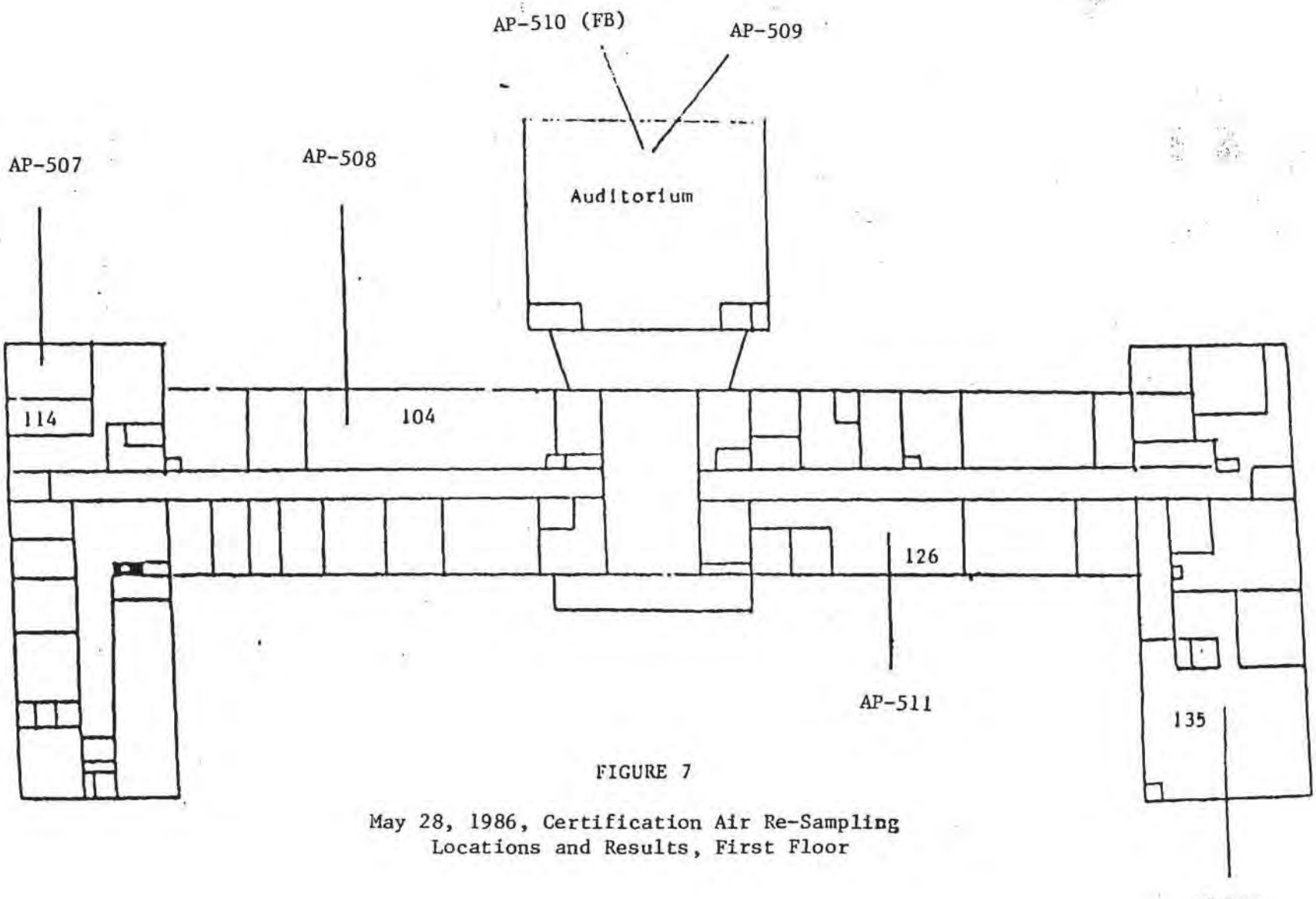


FIGURE 7

May 28, 1986, Certification Air Re-Sampling
Locations and Results, First Floor

NOTE: LEGEND ON FOLLOWING P/

FIGURE 7 LEGEND

SAMPLE NUMBER	LOCATION	RESULT
AP-507	Rm. 114	ND<0.02
AP-508	Rm. 104	0.15
AP-509	Auditorium	0.10
AP-510	Auditorium	ND<.02 Field Blank
AP-511	Rm. 126	ND<·02 Field Blank
AP-512	Rm. 135	0.04

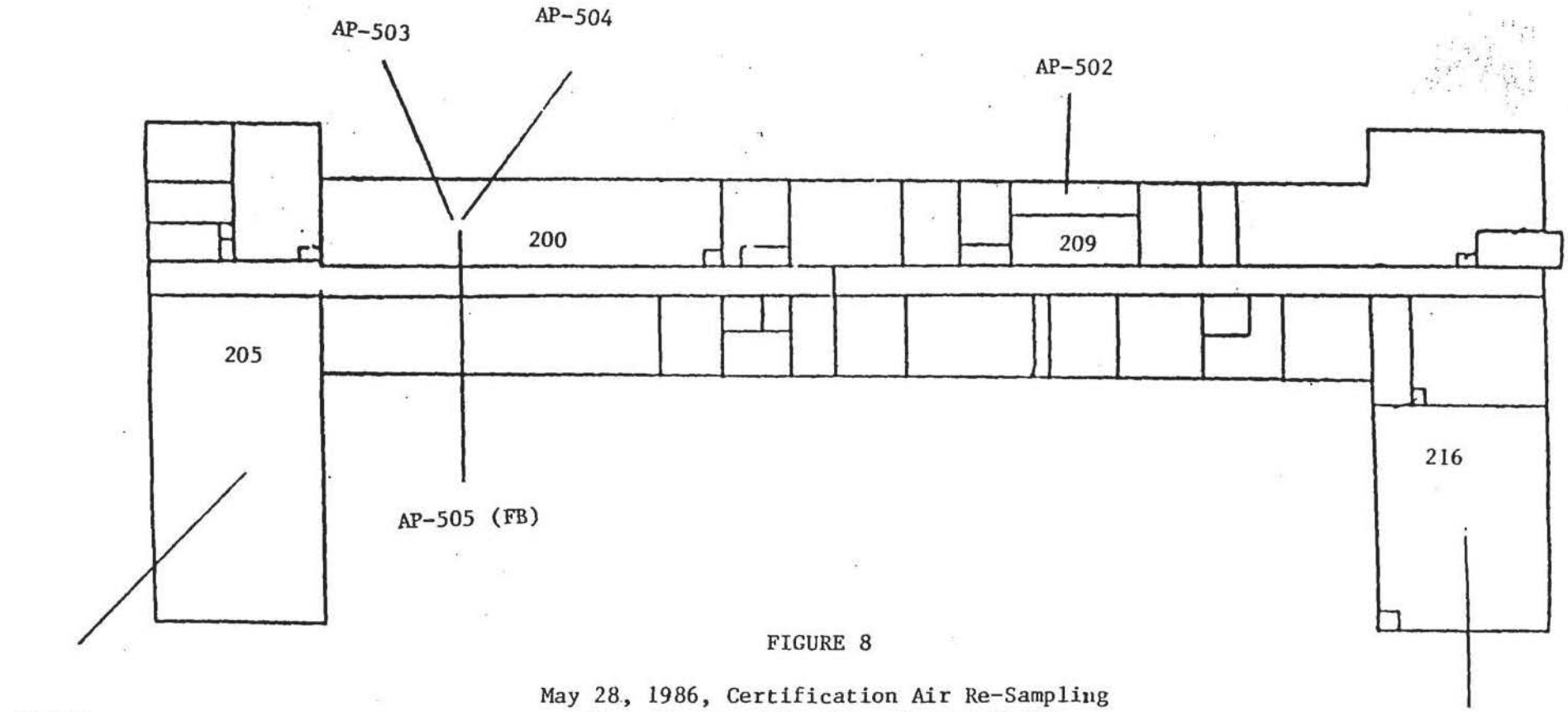


FIGURE 8

May 28, 1986, Certification Air Re-Sampling
Locations and Results, Second Floor

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 8 LEGEND

SAMPLE NUMBER	LOCATION	RESULT	
AP-501	Rm. 216	0.03	
AP-502	Rm. 209	0.07	
AP-503	Rm. 200	0.19	
AP-504	Rm. 200	0.28	
AP-505	Rm. 200	ND<.02	Field Blank
AP-506	Rm. 205	0.07	

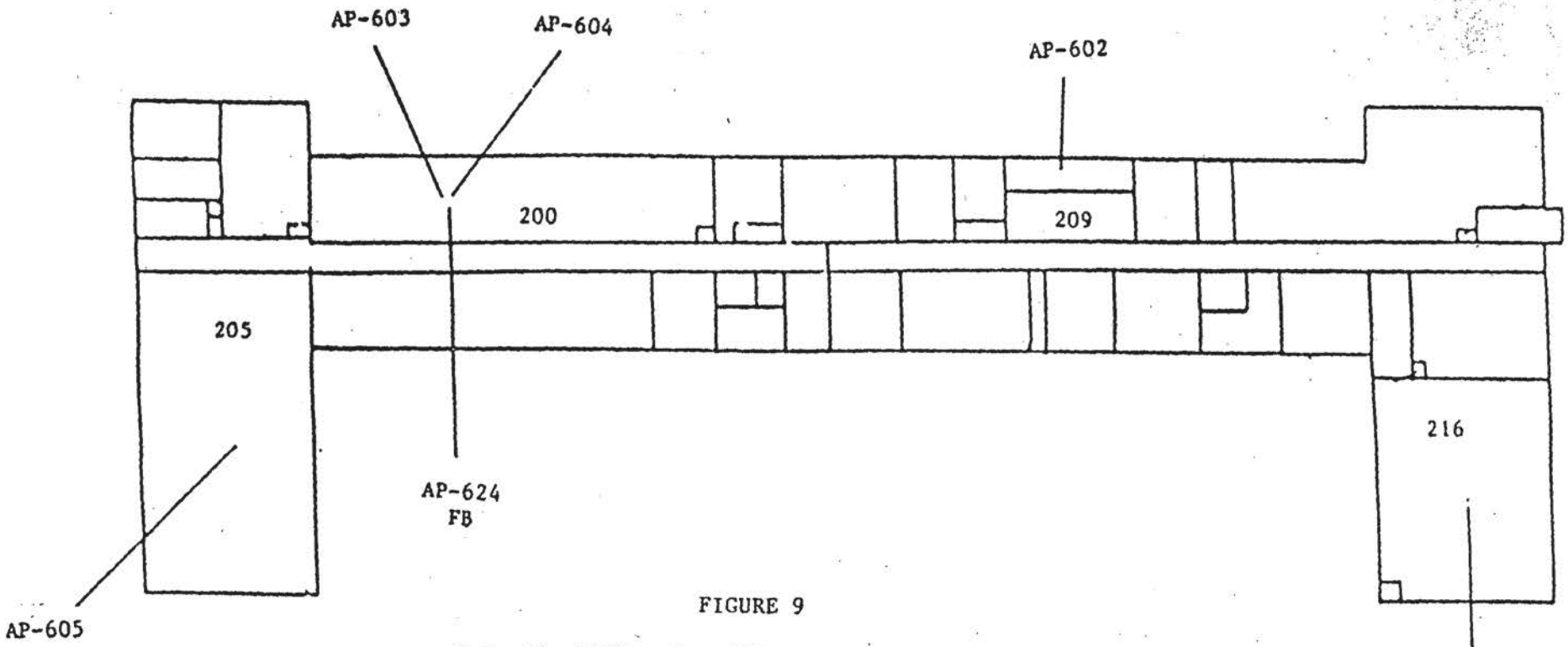


FIGURE 9

July 11, 1986, Certification Air Re-Sampling
Locations and Results, Second Floor

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 9 LEGEND

SAMPLE NUMBER	LOCATION	RESULT	
AP-601	Rm. 216	0.08	
AP-602	Rm. 209	0.16	
AP-603	Rm. 200		
AP-604	Rm. 200	0.16	Duplicate
AP-605	Rm. 205	0.16	
AP-624	Rm. 200 FB	0.03	Field Blank

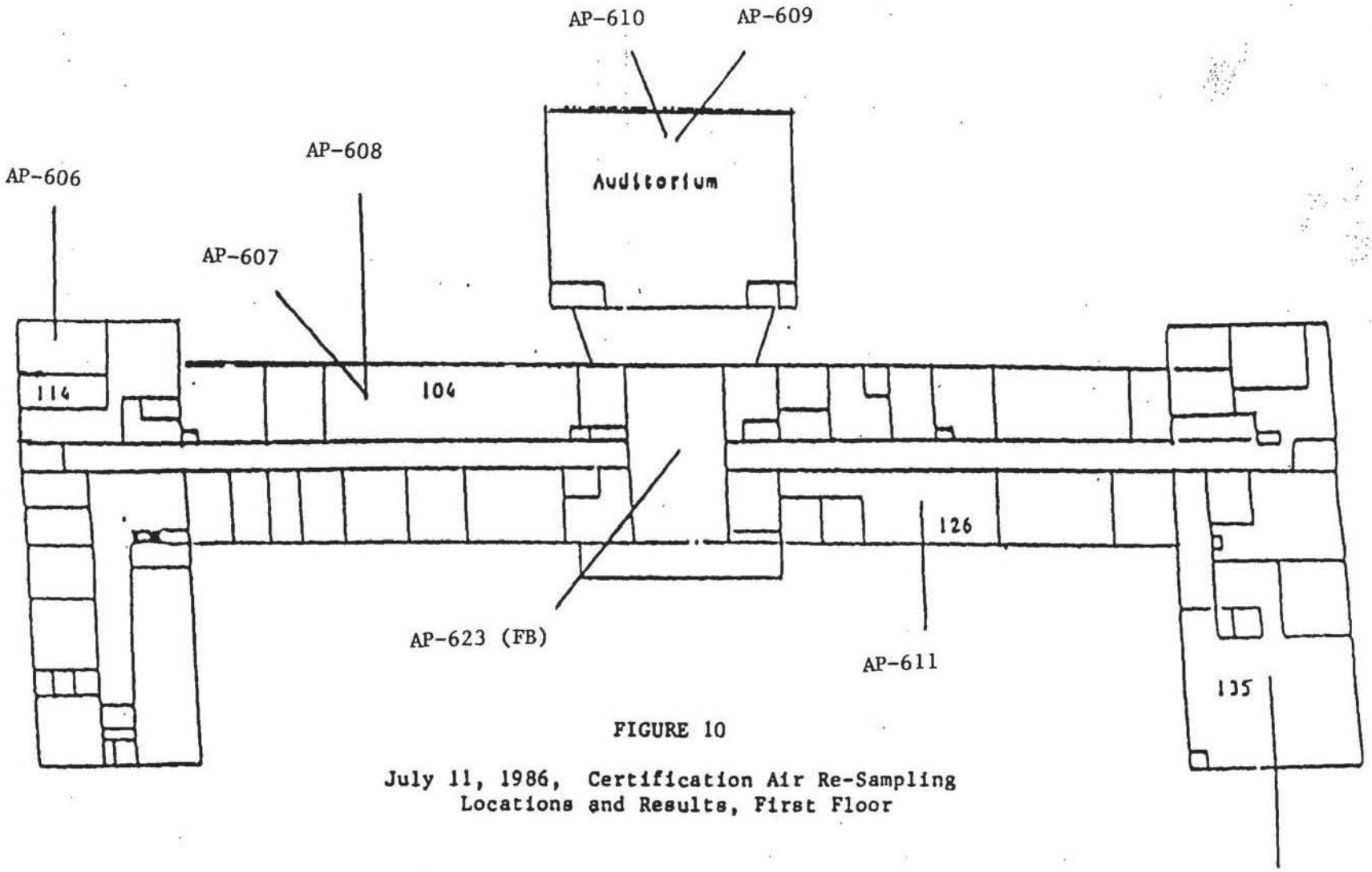


FIGURE 10

July 11, 1986, Certification Air Re-Sampling
Locations and Results, First Floor

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 10 LEGEND

SAMPLE NUMBER	LOCATION	RESULT	
AP-606	Rm. 114	0.25	
AP-607	Rm. 104		
AP-608	Rm. 104	0.25	Duplicate
AP-609	AUDITORIUM		
AP-610	AUDITORIUM	0.16	Duplicate
AP-611	Rm. 126	0.12	
AP-612	Rm. 135	0.06	
AP-623	LOBBY FB	0.03	

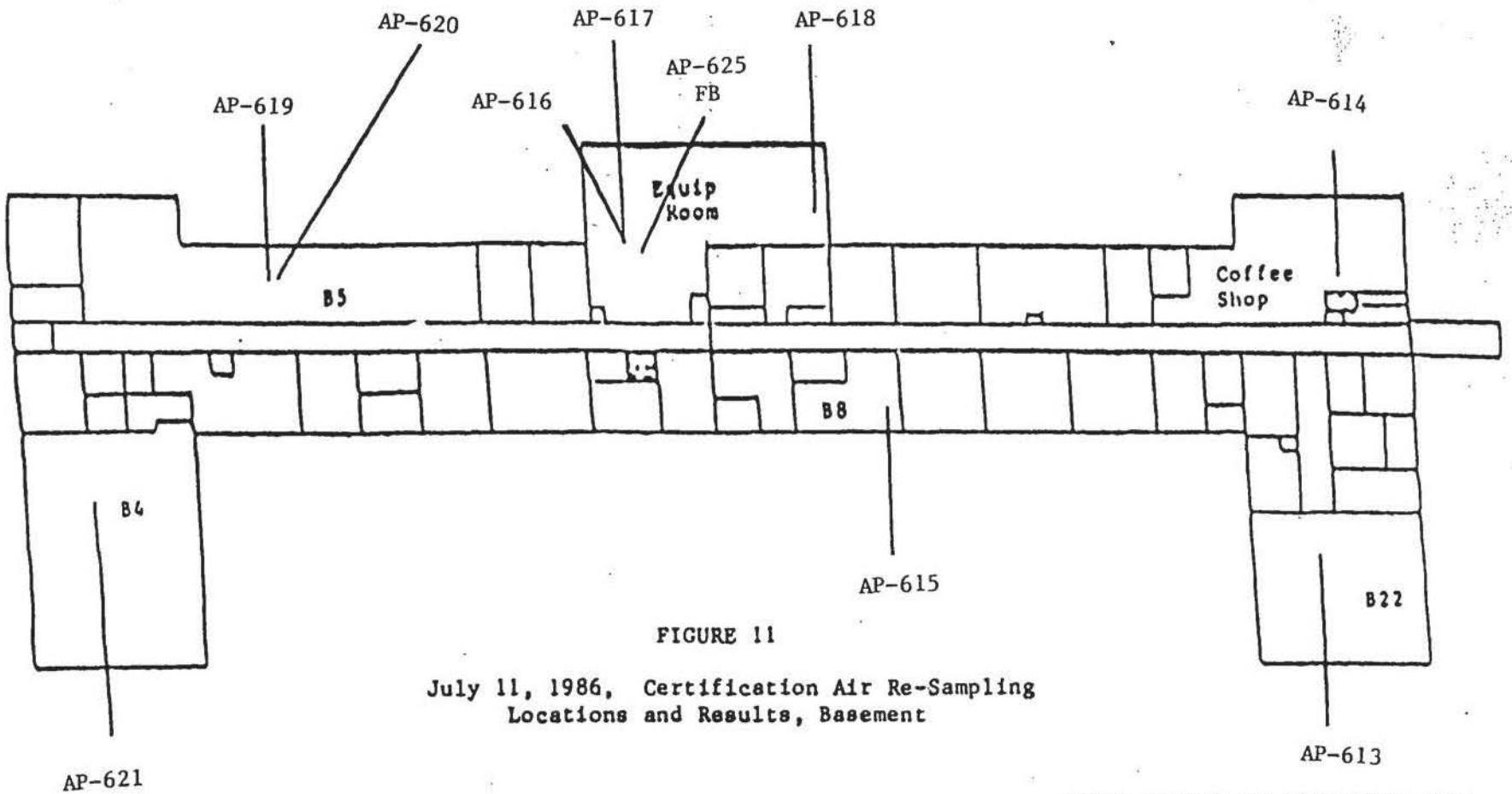


FIGURE 11

July 11, 1986, Certification Air Re-Sampling
Locations and Results, Basement

NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 11 LEGEND

SAMPLE NUMBER	LOCATION	RESULT	
AP-613	Rm. B22	0.04	
AP-614	CAFETERIA	0.08	
AP-615	Rm. B8	0.09	
AP-616	MECHANICAL ROOM		
AP-617	MECHANICAL ROOM	0.22	Duplicate
AP-618	AIR HANDLER	0.18	
AP-619	Rm. B5		
AP-620	Rm. B5	0.26	Duplicate
AP-621	Rm. B4	0.10	
AP-625	MECHANICAL ROOM FB	0.03	

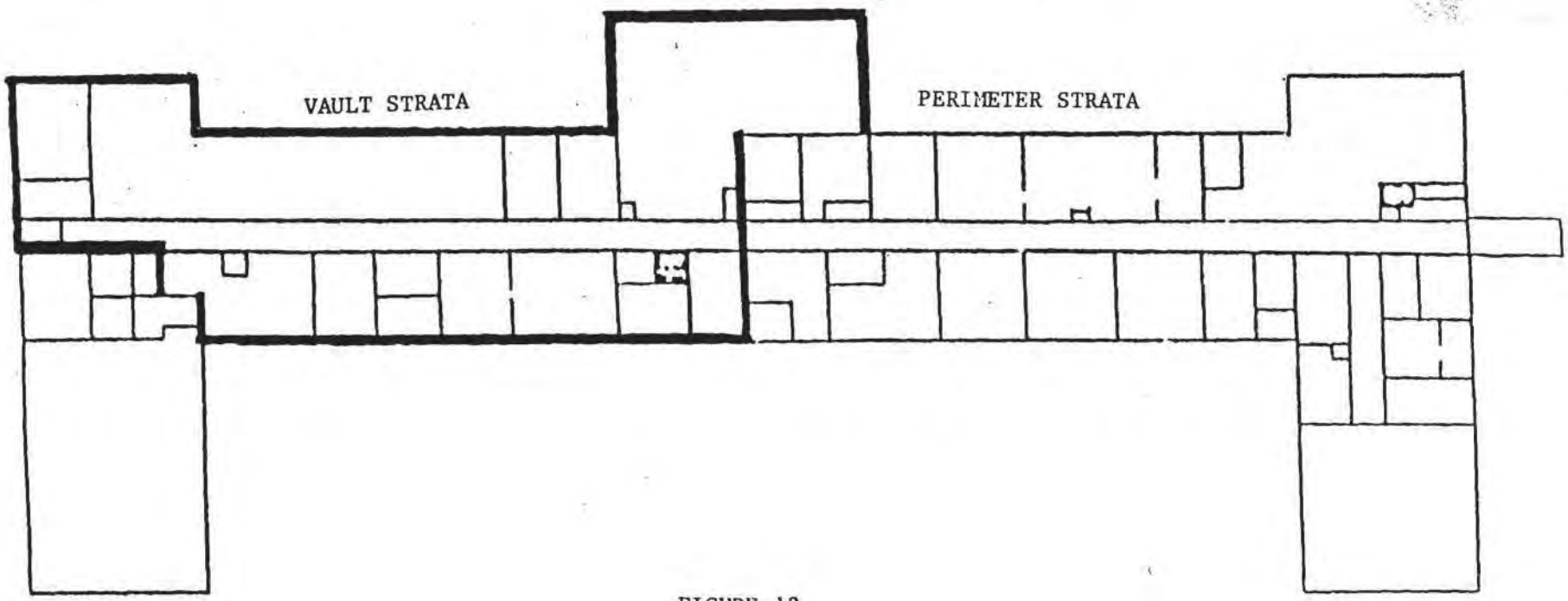


FIGURE 12

FLOOR PLAN AND DIAGRAM OF STRATA

BASEMENT

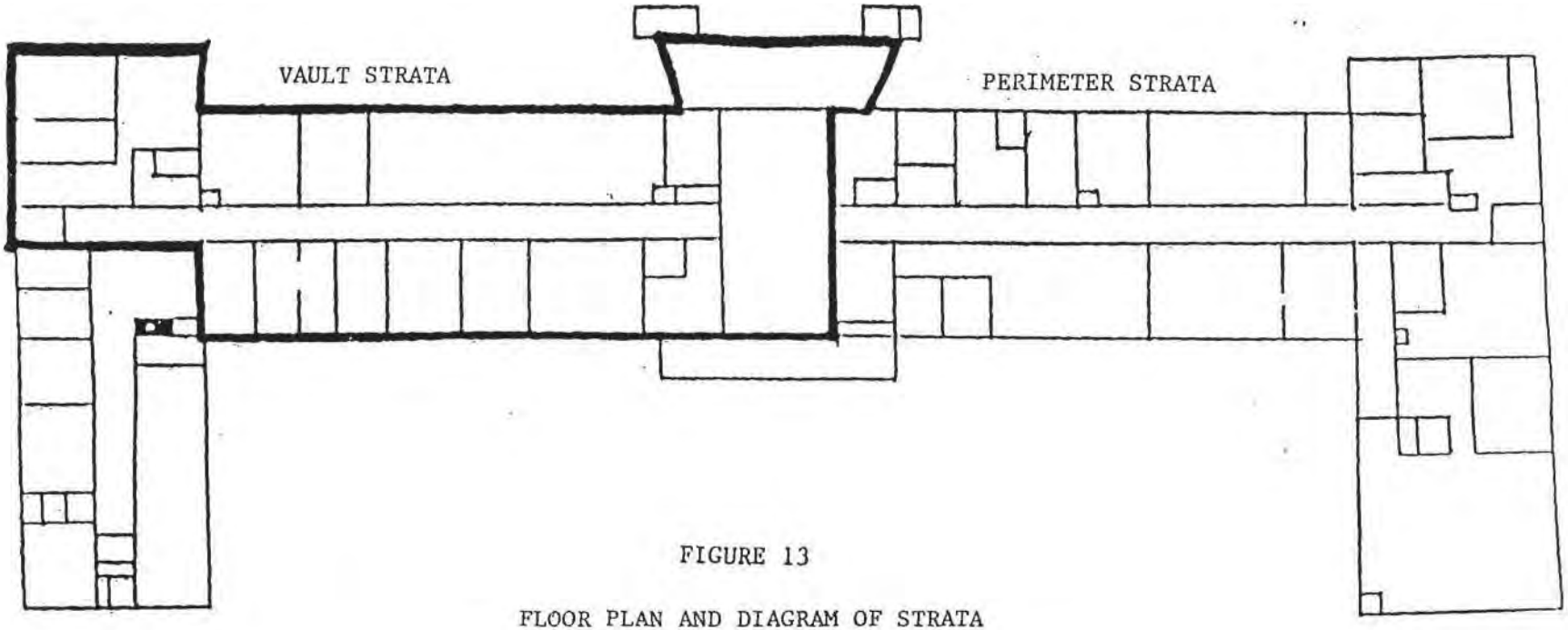


FIGURE 13

FLOOR PLAN AND DIAGRAM OF STRATA

FIRST FLOOR

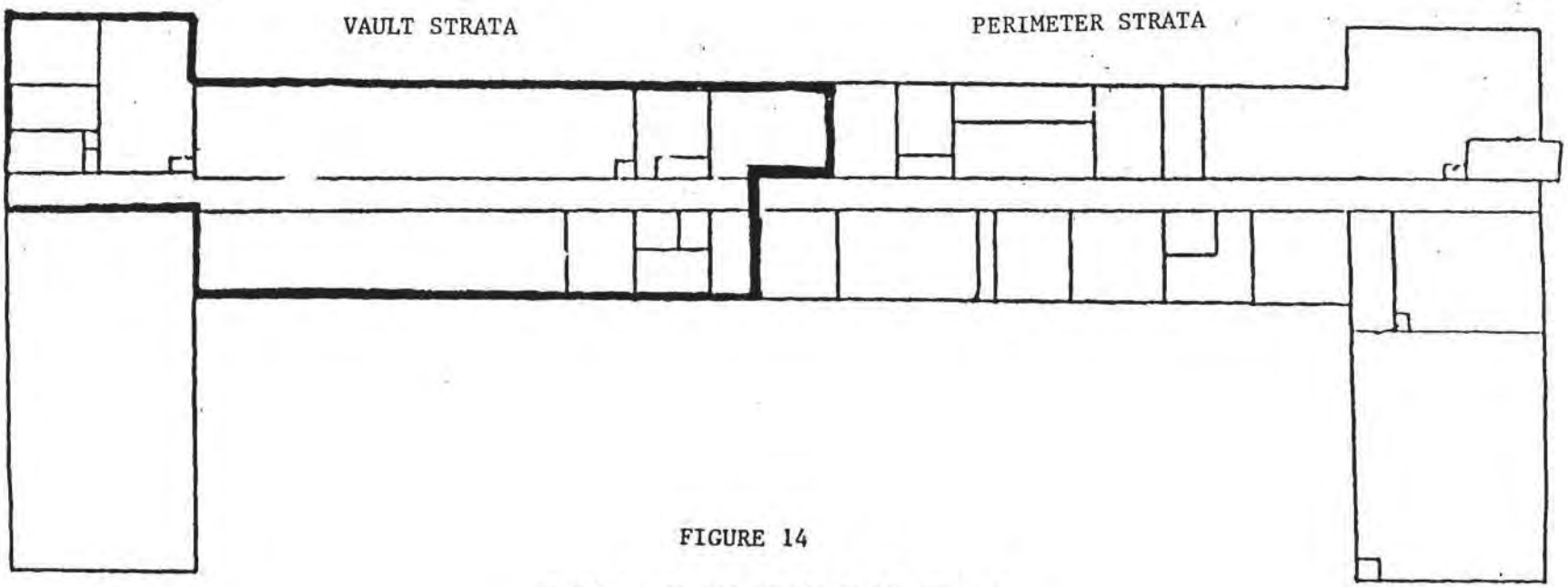


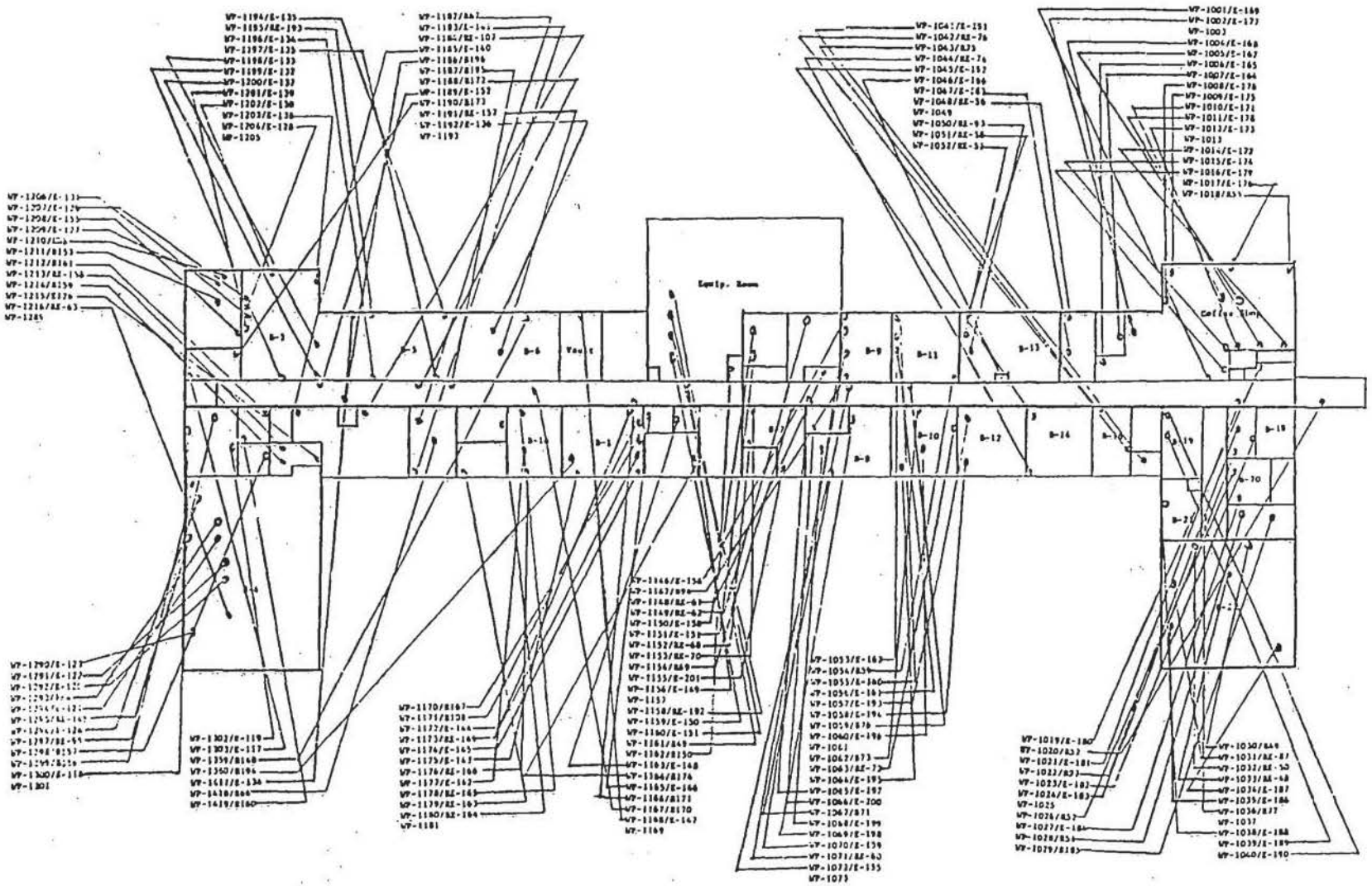
FIGURE 14

FLOOR PLAN AND DIAGRAM OF STRATA

SECOND FLOOR

FIGURE 15

January 15, Certification Surface Wipe Sampling
Locations and Results, Basement



NOTE: LEGEND ON FOLLOWING PAGE

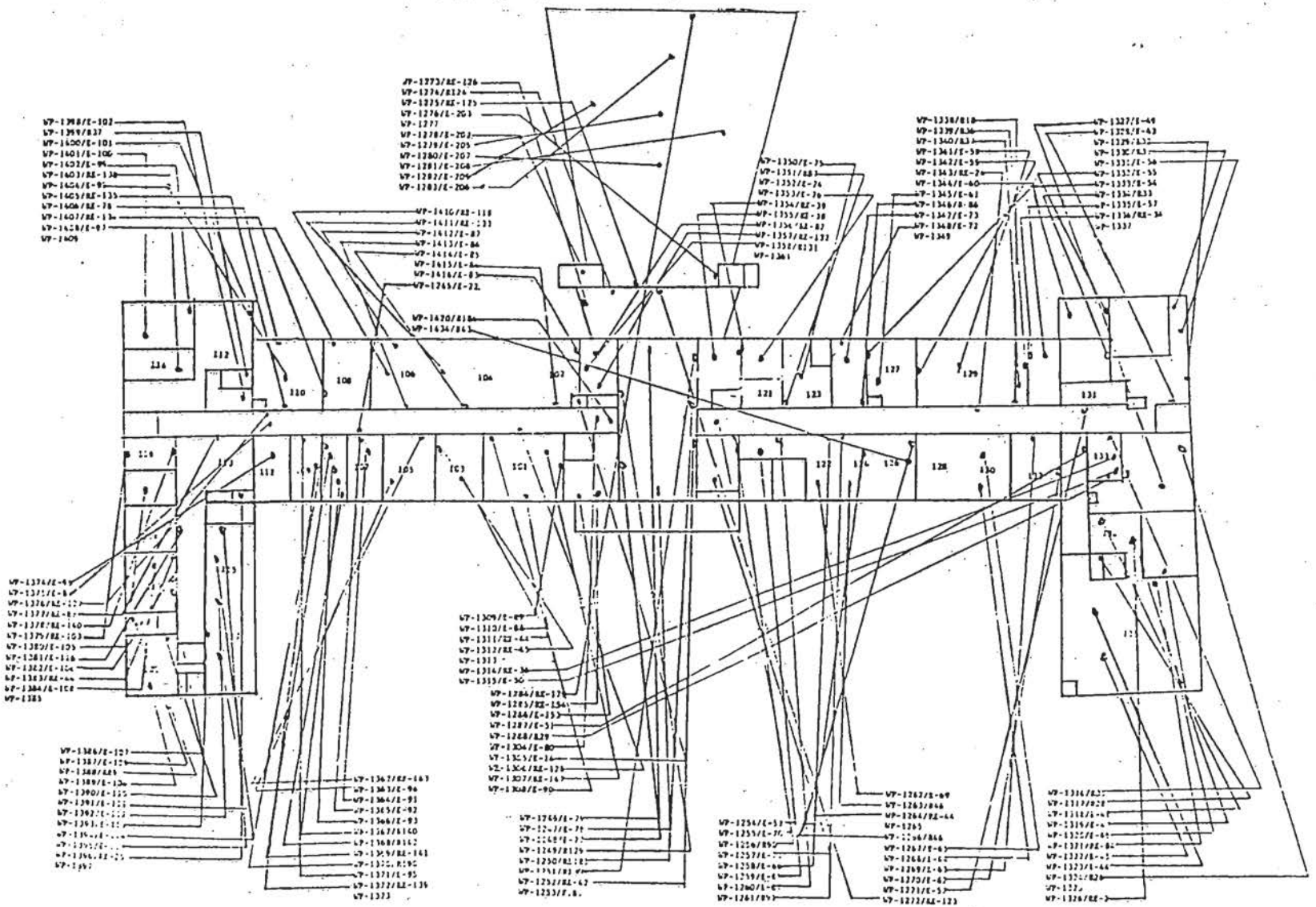
FIGURE 15 LEGEND

BASEMENT
JANUARY CERTIFICATION SAMPLING LOCATIONS AND RESULTS

SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	NUMBER	LOCATION	RESULT
MT1001	CAFE/FLOOR	30.0	1038	RM. B21/DESK	0.76	1147	RM. B9/WALL	1.28	1184	RM. B4A/DESK	8.4	1293	COLUMN	4.4
1002	CAFE/FLOOR	18.0	1039	RM. B19/DESK	1.16	1148	WOMEN/DOOR	80.0	1185	RM. B4A/DOOR	2.28	1294	WALL	64.0
1003	F.B.	ND 0.32	1040	RM. B19/WALL	ND 0.2	1149	WOMEN/STALL	2.88	1186	RM. B4A/FLOOR	6.4	1295	WALL	5.2
1004	CAFE/SERV TABLE	1.92	1041	RM. B257/DESK	5.6	1150	MEN/WALL	3.8	1187	RM. B5/COLUMN	16.3	1296	B4/EDP	13.6
1005	CAFE/TABLE	1.32	1042	RM. B16/WALL	0.80	1151	MEN/STALL	2.08	1188	HALL/WALL	3.2	1297	DESK	3.14
1006	CAFE/WALL	1.04	1043	RM. B16/WALL	1.16	1152	RM. B7/FLOOR	4.24	1189	DUMBWAITER	186.0	1298	WALL	8.36
1007	CAFE/S.B. WALL	2.64	1044	RM. B14/WALL	0.72	1153	RM. B7/WALL	10.4	1190	STAIR/WALL	6.6	1299	Z29/FL	23.2
1008	CAFE/TABLE	4.8	1045	RM. B14/DESK	ND 0.2	1154	RM. B7/WALL	8.8	1191	RM. B5/FLOOR	12.8	1300	Z29/WALL	66.0
1009	CAFE/BOOTH	4.0	1046	DUMBWAITER	13.6	1155	RM. B7/DESK	3.6	1192	RM. B5/MOVE FILE	68.0	1301	FIELD BK	ND0.52
1010	CAFE/TABLE	2.72	1047	RM. B15/FLOOR	14.4	1156	MECH/DOOR	128.0	1193	F.B.	ND 0.5	1302	Z29/EDP	21.7
1011	CAFE/TABLE	1.52	1048	RM. B15/WALL	1.76	1157	F.B.	ND 0.36	1194	RM. B5/WALL	8.8	1303	STR/WALL	26.4
1012	CAFE/TABLE	4.4	1049	F.B.	ND 0.32	1158	MECH/FLOOR	24.8	1195	RM. B5/WALL	10.0	1359	BASE CEIL	11.6
1013	F.B.	ND 0.32	1050	RM. B13/DESK	1.08	1159	MECH/SWITCH	11.2	1196	RM. B5/WALL	8.4	1360	CEILING	6.0
1014	CAFE/TABLE	1.72	1051	RM. B13/WALL	1.96	1160	MECH/ELE MOTOR	232.0	1197	RM. B5/WALL	16.0	1417	B5/WALL	124.0
1015	CAFE/WALL	8.4	1052	RM. B13/DESK	0.84	1161	MECH/WALL	8.0	1198	RM. B3/COLUMN	13.6	1418	B4B CEIL	10.4
1016	CAFE/COLUMN	0.84	1053	RM. B11/FLOOR	8.4	1162	RM. B22/WALL	1.68	1199	RM. B3/DESK	20.4	1419	CLOS/CEIL	35.2
1017	CAFE/TABLE	3.28	1054	RM. B11/WALL	0.36	1163	ELE/DOOR	72.0	1200	RM. B3/DESK	8.8			
1018	CAFE/WALL	0.84	1055	RM. B11/WALL	1.0	1164	STAIR/WALL	4.4	1201	RM. B3/DESK	52.0			
1019	SO. STAIR WALL	4.8	1056	RM. B11/DESK	0.92	1165	JAN/ELE PANEL	20.0	1202	RM. B3/WALL	14.8			
1020	HALL/WALL	0.64	1057	RM. B12/DESK	3.6	1166	HALL/WALL	14.4	1203	RM. B3/DESK	38.4			
1021	HALL/DOOR	0.84	1058	RM. B12/TELE	4.8	1167	HALL/FLOOR	8.4	1204	RM. Z27/DESK	136.0			
1022	RM. B18/FLOOR	12.4	1059	HALL/WALL	ND 0.52	1168	VAULT/J BOX	72.0	1205	F.B.	ND			
1023	RM. B18/WALL	ND 0.32	1060	RM. B10/FLOOR	2.76	1169	F.B.	ND 0.52	1206	RM. B5/WALL	26.0			
1024	RM. B18/DESK	1.04	1061	F.B.	ND 0.92	1170	UNK/FLOOR	10.8	1207	RM. B3/DESK	44.0			
1025	F.B.	ND 0.2	1062	RM. B10/WALL	ND 1.0	1171	RM. B1/WALL	92.0	1208	RM. Z28/WALL	22.6			
1026	RM. B20/DOOR	1.28	1063	RM. B10/WALL	1.04	1172	UNK/DESK	9.2	1209	RM. Z27/WALL	8.4			
1027	RM. B20/DESK	1.48	1064	RM. B10/DESK	1.24	1173	RM. B1/COLUMN	60.0	1210	UNK/WALL	6.0			
1028	RM. B7/DOOR	0.60	1065	RM. B8/DOOR	7.6	1174	RM. B1/DESK	14.4	1211	RM. Z27/DESK	10.1			
1029	RM. B22/DESK	1.56	1066	RM. B8/DESK	1.12	1175	RM. B1/WALL	56.0	1212	RM. Z33/WALL	12.4			
1030	RM. B22/DOOR	1.92	1067	RM. B8/WALL	1.04	1176	RM. B1A/WALL	5.2	1213	RM. B4/DESK	28.6			
1031	RM. B22/FLOOR	4.0	1068	RM. B8/DESK	2.32	1177	RM. B1A/DESK	36.6	1214	RM. B4/WALL	9.2			
1032	RM. B22/WALL	0.68	1069	UNK/WALL	1.44	1178	RM. B1A/WALL	3.12	1215	RM. B4/DESK	2.92			
1033	RM. B22/DESK	0.68	1070	RM. B9/FLOOR	8.8	1179	RM. Z38/WALL	3.72	1216	RM. B4/FLOOR	8.8			
1034	RM. B27/DESK	0.36	1071	RM. B9/DESK	1.4	1180	RM. Z39/WALL	2.24	1289	F.B.	ND 0.5			
1035	RM. B22/DESK	2.4	1072	RM. B9/DOOR	4.8	1181	F.B.	ND 0.52	1290	UNK/EDP	11.6			
1036	RM. B21/DOOR	0.96	1073	F.B.	ND 0.92	1182	RM. B4B/FLOOR	7.6	1291	RM. B4/DESK	6.8			
1037	F.B.	ND 0.2	1146	RM. B9/WALL	2.16	1183	RM. B4B/WALL	0.92	1292	RM. B4/EDP	3.6			

FIGURE 16

January 15, 1986, Certification Surface Wipe Sampling
Locations and Results, First Floor



NOTE: LEGEND ON FOLLOWING PAGE

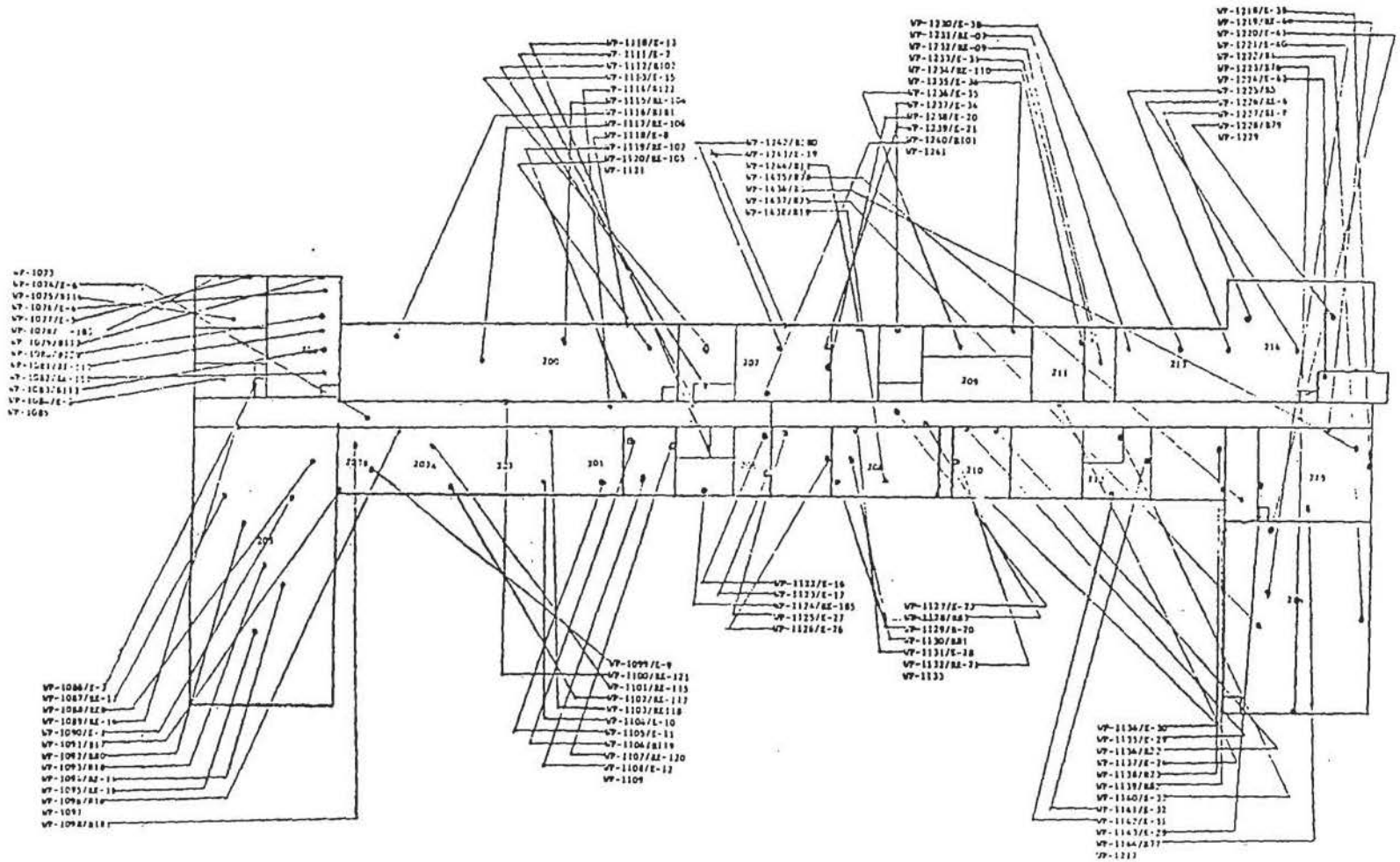
FIGURE 16 LEGEND

FIRST FLOOR
JANUARY CERTIFICATION SAMPLING LOCATIONS AND RESULTS

SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	NUMBER	LOCATION	RESULT
WP1246	LOBBY/FLOOR	11.2	1282	AUDIT/SEAT	12,12	1333	RM. 131C/DESK	9.2	1371	RM. 109/DESK	6.0	1407	108/WALL	7.2
1247	LOBBY/FLOOR	13.2	1283	AUDIT/SEAT	16.4	1334	RM. 131D/WALL	0.32	1372	RM. 109/WALL	11.6	1408	106/WALL	44.0
1248	ELE/DOOR	15.6	1284	AUDIT/WALL	4.8	1335	RM. 129A/DESK	5.6	1373	F.B.	ND<0.3	1409	FIELD BK	ND1.0
1249	LOBBY/WALL	10.8	1285	STAIR/FLOOR	200.0	1336	RM. 129A/WALL	1.16	1374	RM. 111/DESK	11.6	1410	108/DESK	16.0
1250	LOBBY/WALL	21.6	1286	STAIR/WALL	15.6	1337	F.B.	ND<0.52	1375	HALL/FLOOR	14.4	1411	106/FLOOR	9.2
1251	LOBBY/WALL	11.6	1287	HALL/WALL	0.52	1338	RM. 129/DOOR	4.8	1376	RM. 110/DOOR	40.0	1412	106/WALL	9.2
1252	RECEP/COUNTER	8.8	1288	RM. 133/FLOOR	0.36	1339	RM. 129/WALL	1.8	1377	RM. 113/WALL	1.72	1413	106/WALL	10.8
1253	F.B.	ND<0.48	1304	HALL/FLOOR	76.0	1340	RM. 129/WALL	0.52	1378	RM. 116/WALL	2.44	1414	104/WALL	16.8
1254	LOBBY/FLOOR	25.6	1305	DUMBWAITER	2760.0	1341	RM. 129/TELE	1.88	1379	RM. 116/DESK	12.4	1415	102/WALL	44.0
1255	LOBBY/WALL	1.88	1306	HALL/WALL	12.0	1342	RM. 129/DESK	3.0	1380	RM. 116/FLOOR	4.0	1416	102/WALL	76.0
1256	LOBBY/WALL	8.0	1307	RM. 101/DESK	9.2	1343	HALL/WALL	0.52	1381	HALL/WALL	2.26	1265	HALL/WALL	14.4
1257	RECEP/SWITCH	6.4	1308	RM. 101/WALL	19.6	1344	RM. 127/WALL	1.12	1382	RM. 118/DESK	3.44	1420	HALL/CEIL	4.8
1258	RM. 122/FLOOR	7.2	1309	RM. 101/WALL	20.4	1345	RM. 127/DESK	5.2	1383	RM. 118/WALL	0.68	1434	126/CEIL	1.52
1259	RM. 122/DESK	4.4	1310	RM. 101/DESK	10.0	1346	RM. 125/WALL	1.56	1384	RM. 119/DESK	0.52			
1260	RM. 122/WALL	2.64	1311	RM. 103/FLOOR	12.0	1347	RM. 125/DESK	4.4	1385	F.B.	ND<0.5			
1261	RM. 124/WALL	4.0	1312	RM. 103/WALL	8.8	1348	RM. 125/WALL	2.36	1386	RM. 119/WALL	0.68			
1262	RM. 124/DESK	7.2	1313	F.B.	ND<0.52	1349	F.B.	ND<0.52	1387	RM. 120/FLOOR	256.0			
1263	RM. 126/WALL	1.32	1314	RM. 133/DESK	2.32	1350	RM. 123/FLOOR	14.28	1388	RM. 120/DOOR	4.4			
1264	RM. 126/DESK	4.8	1315	RM. 133/TELE	0.96	1351	RM. 123/WALL	0.41	1389	RM. 120/CHAIR	1.44			
1265	F.B.	ND<0.36	1316	RM. 133/WALL	2.08	1352	RM. 123/WALL	0.56	1390	RM. 120/DOOR	3.28			
1266	RM. 126/WALL	2.32	1317	JAN/WALL	2.0	1353	RM. 123A/DESK	3.68	1391	RM. 117/DESK	6.8			
1267	RM. 128/FLOOR	ND<0.92	1318	RM. 134/DESK	2.96	1354	WOMEN/WALL	6.8	1392	RM. 117/CHAIR	9.6			
1268	RM. 128/DESK	4.0	1319	RM. 134/EDP	1.8	1355	WOMEN/STALL	0.76	1393	RM. 117/WALL	20.4			
1269	RM. 132/WALL	3.2	1320	RM. 134/DESK	1.44	1356	MEN/FLOOR	21.6	1394	RM. 115/CHAIR	1.64			
1270	RM. 132/TABLE	2.56	1321	RM. 134/WALL	1.12	1357	MEN/STALL	8.8	1395	RM. 115/CHAIR	0.64			
1271	RM. 131/FLOOR	13.4	1322	RM. 134/DESK	1.76	1358	MEN/SINK	9.2	1396	ADMIN/ELE PANEL	12.4			
1272	LOBBY/ENTRANCE	10.8	1323	RM. 134/DESK	3.08	1361	F.B.	ND<0.52	1397	F.B.	ND<1.0			
1273	LOBBY/WINDOW	2.12	1324	RM. 134/FLOOR	ND<0.95	1362	RM. 105/WALL	17.6	1398	RM. 112/DESK	3.92			
1274	AUDIT/DOOR	14.4	1325	F.B.	ND<0.32	1363	RM. 105/DESK	19.6	1399	RM. 112/FLOOR	5.72			
1275	AUDIT/N. SIDE	40.0	1326	RM. 134/WALL	0.76	1364	RM. 107/DESK	13.2	1400	RM. 112/WALL	7.6			
1276	WOMEN/WALL	19.2	1327	RM. 134/DESK	2.0	1365	RM. 107/WALL	16.4	1401	RM. 114/DESK	7.6			
1277	F.B.	ND<0.28	1328	STAIR/DOOR	1.28	1366	RM. 107/FLOOR	9.6	1402	RM. 114/WALL	4.8			
1278	MEN/FLOOR	48.0	1329	RM. 131A/WALL	2.08	1367	RM. 107A/DESK	3.76	1403	RM. 114/DESK	6.8			
1279	AUDIT/FLOOR	25.28	1330	RM. 131A/FLOOR	4.72	1368	RM. 107/WALL	21.6	1404	RM. 110/DESK	1.92			
1280	AUDIT/SEAT	19.2	1331	RM. 131A/DESK	2.0	1369	RM. 107A/WALL	16.4	1405	RM. 114/WALL	5.2			
1281	AUDIT/SEAT	22.5	1332	RM. 131C/WALL	1.16	1370	RM. 109/WALL	30.4	1406	RM. 114/WALL	8.8			

FIGURE 17

January 15, 1986, Certification Surface Wipe Sampling Locations and Results, Second Floor



NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 17 LEGEND

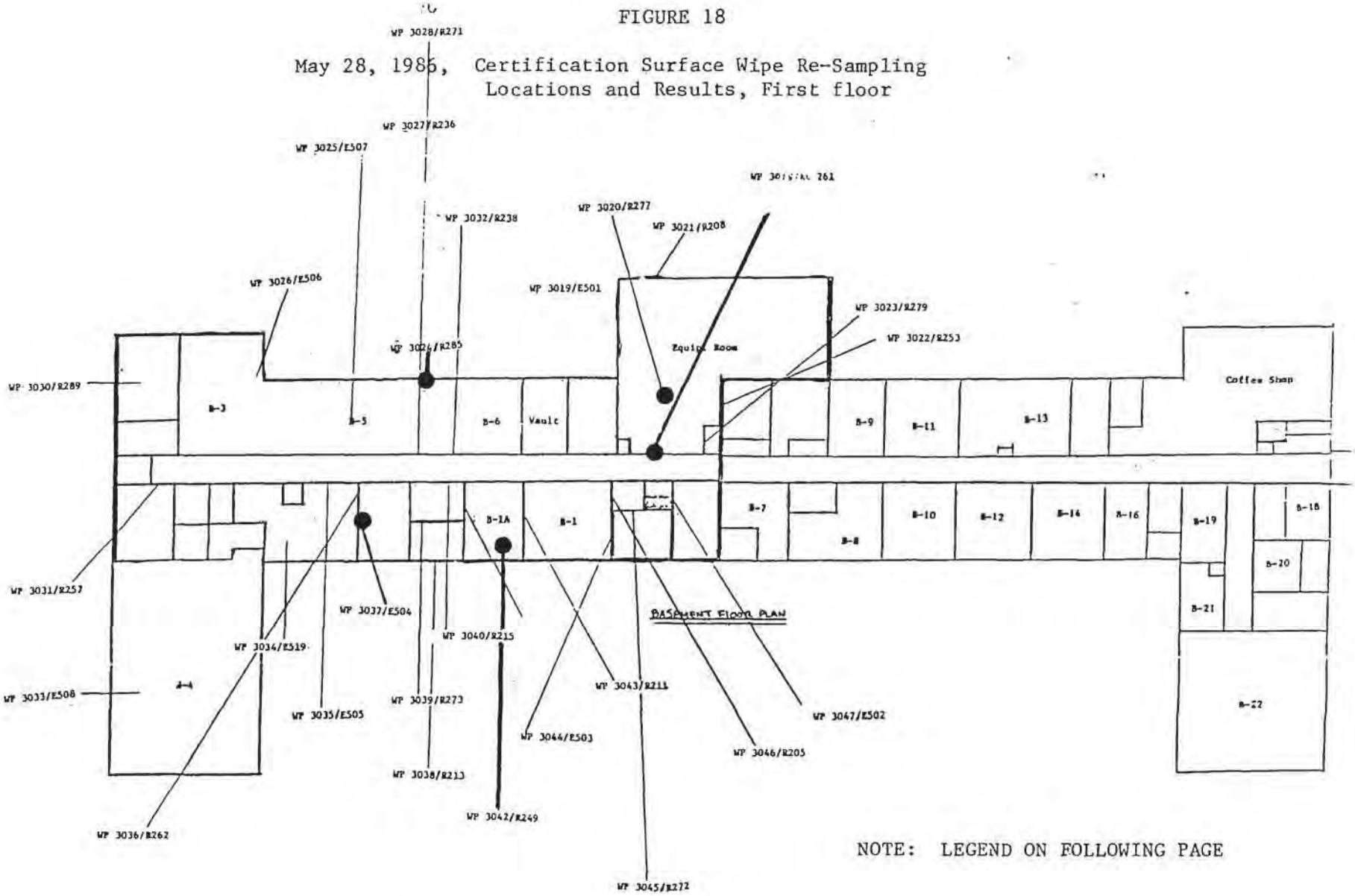
SECOND FLOOR

JANUARY CERTIFICATION SAMPLING LOCATIONS AND RESULTS

SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT	SAMPLE NUMBER	LOCATION	RESULT
WP1073	F.B.	ND 0.92	1106	RM. 201/FLOOR	9.2	1139	RM. 212B/WALL	0.56	1244	MEN/STALL DOOR	7.2
1074	RM. 205/FLOOR	27.2	1107	RM. 201/WALL	18.4	1140	RM. 212A/DESK	2.6	1435	HALL/CEILING	1.88
1075	RM. 204/FLOOR	5.6	1108	RM. 201/DESK	20.4	1141	RM. 212A/WALL	3.12	1436	RM. 215/CEILING	1.12
1076	RM. 204B/DESK	2.08	1109	F.B.	ND 0.36	1142	RM. 212/DESK	6.0	1437	RM. 216/CEILING	0.72
1077	RM. 204B/WALL	2.08	1110	JAN/WALL	6.0	1143	RM. 215/DOOR	15.48	1438	RM. 208/CEILING	2.36
1078	RM. 204B/WALL	6.0	1111	WOMEN/WALL	16.4	1144	RM. 215/DESK	2.72			
1079	RM. 204/WALL	6.4	1112	WOMEN/WALL	5.2	1217	F.B.	ND 0.48			
1080	RM. 204/DESK	9.6	1113	WOMEN/STALL	6.0	1218	RM. 215/DESK	2.24			
1081	RM. 204/DESK	10.4	1114	HALL/WALL	0.6	1219	RM. 215/WALL	2.4			
1082	RM. 204/WALL	3.08	1115	RM. 200/FLOOR	8.4	1220	RM. 216/WALL	0.88			
1083	RM. 204/WALL	5.2	1116	RM. 202/FLOOR	1.8	1221	RM. 216/DESK	2.52			
1084	STAIR/LANDING	10.4	1117	RM. 200/DESK	2.48	1222	RM. 216/DESK	ND 0.36			
1085	F.B.	ND 0.92	1118	RM. 200/WALL	104.0	1223	RM. 216/WALL	2.36			
1086	STAIR LANDING	16.8	1119	RM. 200/WALL	6.8	1224	STAIR/WALL	8.0			
1087	RM. 205/FLOOR	26.4	1120	RM. 200/DESK	17.2	1225	RM. 214/FLOOR	6.8			
1088	RM. 205/ DESK	8.4	1121	F.B.	ND 0.36	1226	RM. 214/DESK	1.48			
1089	RM. 205/WALL	3.68	1122	FLOOR/ELE	9.6	1227	RM. 214/WALL	ND 0.36			
1090	RM. 205/DESK	6.0	1123	HALL/WALL	4.8	1228	RM. 214/DESK	1.84			
1091	RM. 205/WALL	0.52	1124	STAIR/WALL	25.6	1229	F.B.	ND 1.0			
1092	RM. 205/DESK	4.4	1125	RM. 206/DESK	3.72	1230	RM. 213/DESK	2.84			
1093	RM. 205/GLASS	ND 0.92	1126	RM. 206/WALL	6.4	1231	RM. 213/DESK	4.16			
1094	RM. 205/ DESK	0.41	1127	HALL/FLOOR	37.6	1232	RM. 211/FLOOR	10.4			
1095	RM. 205/DESK	3.44	1128	HALL/FLOOR	14.0	1233	RM. 211/DESK	2.24			
1096	RM. 203B/WALL	5.2	1129	RM. 208/WALL	10.4	1234	RM. 209A/WALL	ND 0.36			
1097	F.B.	ND 0.92	1130	RM. 208/DESK	2.92	1235	RM. 209/ WALL	9.6			
1098	RM. 203B/DESK	2.16	1131	RM. 208/DESK	2.24	1236	RM. 209/ DESK	1.6			
1099	RM. 203B/DESK	6.0	1132	RM. 210/WALL	0.80	1237	MEN/STALL DOOR	4.4			
1100	RM. 203A/DESK	12.4	1133	F.B.	ND 0.48	1238	RM. 207/DESK	7.2			
1101	RM. 203A/FLOOR	15.2	1134	RM. 210/DESK	4.88	1239	RM. 207/DESK	3.0			
1102	RM. 203A/DESK	1.04	1135	RM. 210/DESK	4.8	1240	RM. 207/WALL	6.4			
1103	RM. 203/WALL	7.2	1136	RM. 210/WALL	5.2	1241	F.B.	ND 1.0			
1104	RM. 203/DESK	10.0	1137	HALL/WALL	8.4	1242	RM. 207/FLOOR	38.8			
1105	RM. 203/EDP	6.8	1138	RM. 212B/DESK	6.56	1243	RM. 207/WALL	16.0			

FIGURE 18

May 28, 1986, Certification Surface Wipe Re-Sampling
Locations and Results, First floor



NOTE: LEGEND ON FOLLOWING PAGE

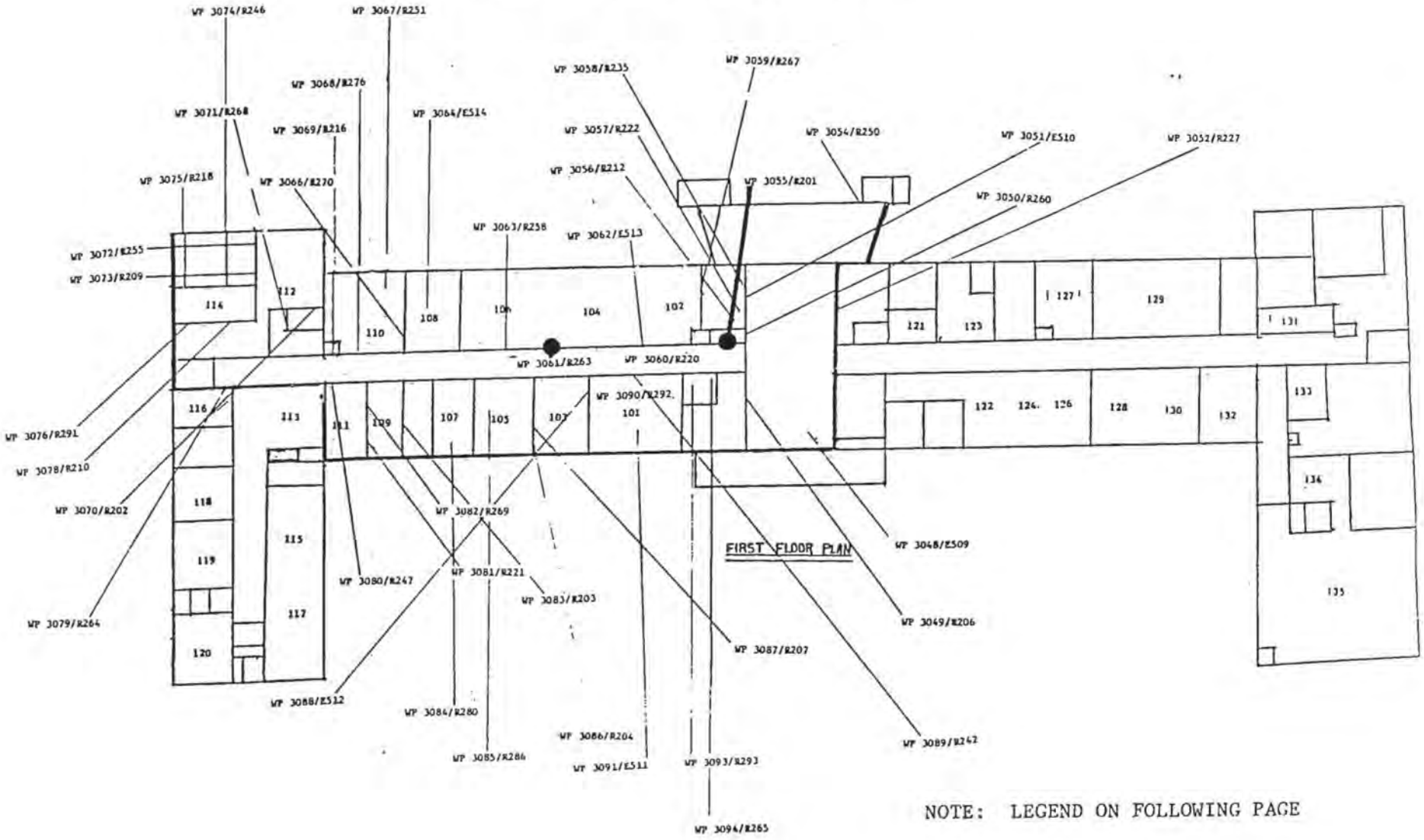
FIGURE 18 LEGEND

LEGEND

WP	3018	RE261	Mechanical/Equipment	64.0
	3019	E501	Mechanical/Equipment	22.0
	3020	R277	Mechanical/Equipment	60.0
	3021	R208	Mechanical/Wall	13.2
	3022	R253	Mechanical/Storage Wall	8.0
	3023	R279	Mechanical/Light Switch	9.2
	3024	R285	B5/N.E. Wall	76.0
	3025	E507	B5/Ceiling	28.0
	3026	E506	B 3 Furnature Top	38.4
	3027	R236	B5/W. Wall	24.8
	3028	R271	B5/W. Wall	10.0
	3029		Field Blank B3	ND<0.7
	3030	R289	B3/Furnature Top	12.0
	3031	R257	N. Basement Hall/W. Wall	0.88
	3032	R238	N. Basement Hall/E. Wall	1.52
	3033	E508	Print Shop/ Equipment	5.2
	3034	E519	B4A/Metal Sink	6.8
	3035	E505	B4A/Tumbler	13.6
	3036	R262	B4A/S. Wall	4.4
	3037	E504	S. B4A/Equipment	56.0
	3038	R213	2nd RM. S. of B4A/W. Wall	12.8
	3039	R273	2nd RM. S. of B4A/W. Wall	5.2
	3040	R215	2nd RM. S. of E. Wall	3.56
	3041		Field Blank/Photo Room	ND<0.7
	3042	R249	B2/Furnature Top	64.0
	3043	R211	B1/Light Switch	21.6
	3044	E503	B1/S. Wall	8.8
	3045	R272	Janitor's Closet/W. Wall	38.4
	3046	R205	Janitor's Closet/W. Wall	11.6
	3047	E502	Elevator Door	28.4

FIGURE 19

May 28, 1986, Certification Surface Wipe Re-Sampling
Locations and Results, First Floor



NOTE: LEGEND ON FOLLOWING PAGE

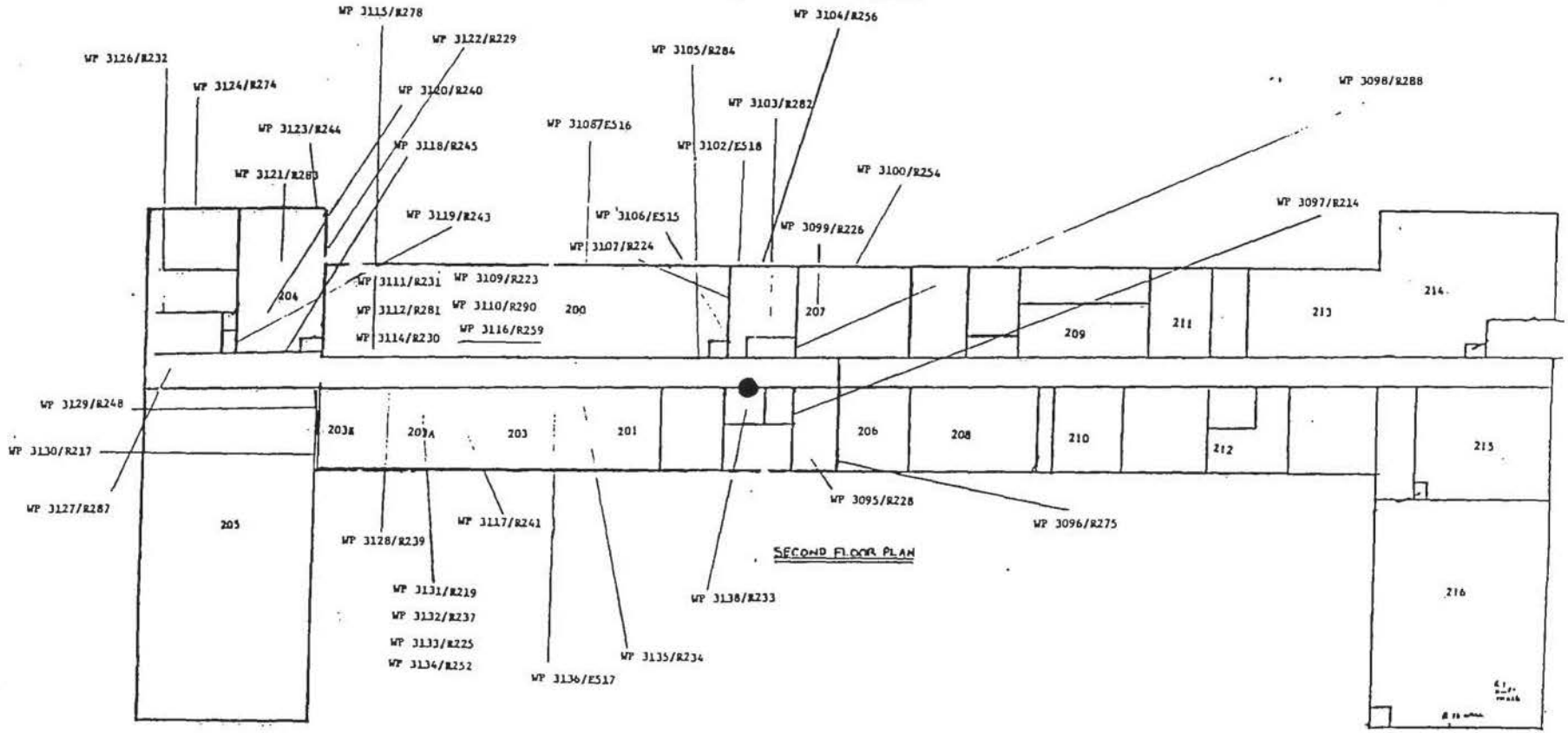
FIGURE 19 LEGEND

LEGEND

WP	3048	E509	Lobby/Floor	5.6
	3049	R206	Lobby/Elevator Switch	18.8
	3050	R260	Lobby/Marble Wall	5.6
	3051	E510	Lobby/Glass Top	ND<0.7
	3052	R227	Lobby/S.E. Marble Wall	3.72
	3053		Field Blank	ND<0.7
	3054	R250	E. Breezeway/Marble Wall	7.2
	3055	R201	Bathroom/W. Wall	72.0
	3056	R212	Bathroom/Partition	5.2
	3057	R222	Bathroom/Partition	4.8
	3058	R235	Bathroom/Partition	16.0
	3059	R267	Bathroom/Ceramic Wall	5.6
	3060	R220	Hallway/Wall	20.8
	3061	R263	Hallway/Wall	64.0
	3062	E513	RM 104/S.W. Wall	11.6
	3063	R258	RM 106/N.W. Wall	6.8
	3064	E514	RM 108/Furnature Top	12.4
	3065		Field Blank/Near hall in 108	ND<0.7
	3066	R270	RM 110/Door Knob	6.8
	3067	R251	RM 110/Furnature Top	6.8
	3068	R276	Hallway/Wall	18.8
	3069	R216	Hallway/Light Switch	23.2
	3070	R202	RM 112/Wood Paneled Wall	2.28
	3071	R269	RM 112/Wood Paneled Wall	2.8
	3072	R255	RM 114/Wood Paneled Wall	5.6
	3073	R209	RM 114 Wood Paneled Wall	3.48
	3074	R246	RM 114 Wood Paneled Wall	3.28
	3075	R218	RM 114 Wood Paneled Wall	4.4
	3076	R291	RM 114/West Wall	2.52
	3077		Field Blank/Room 114	ND<0.7
	3078	R210	RM 114/Light Switch	15.2
	3079	R264	Hallway/ Wall	24.8
	3080	R247	RM 111/Light Switch	4.4
	3081	R221	RM 109/Furnature Top, Glass	1.88
	3082	R269	RM 109/Wood Paneled Wall	3.2
	3083	R203	RM 107A/Wood Paneled Wall	25.2
	3084	R280	RM 107/Furnature Top	10.8
	3085	R286	RM 105/Furnature Top, Glass	1.56
	3086	R204	RM 105/Light Switch	22.0
	3087	R207	RM 103/Wood Paneled Wall	25.6
	3088	E512	RM 103/S.Wall	9.2
	3089	R242	Hallway/Wall	29.6
	3090	R292	RM 101/S. Wall	12.0
	3091	E511	RM 101/Furnature Top	10.4
	3092		Field Blank/Near Room 101	ND<0.7
	3093	R293	Janitor's Closet/Wall	16.0
	3094	R265	Janitor's Closet/Wall	29.6

FIGURE 20

May 28, 1986, Certification Surface Wipe Re-Sampling
Locations and Results, Second Floor



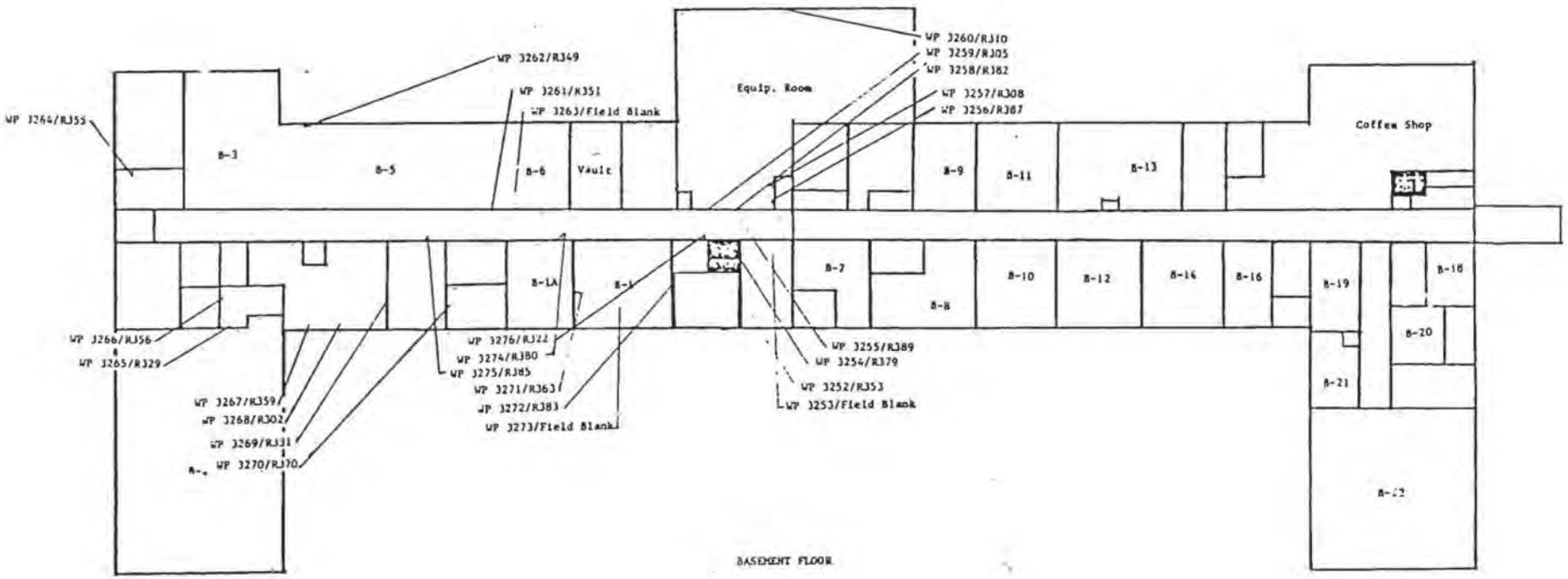
NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 20 LEGEND

WP	3095	R228	Second Floor/Center Stair Well	5.6
	3096	R275	Center Stair Well/Wall	4.4
	3097	R214	Hallway/Elevator Control	7.6
	3098	R288	RM 207/Wall	2.52
	3099	R226	RM 207/Furnature Top	4.4
	3100	R254	RM 207/Window	ND<0.7
	3101		Field Blank	ND<0.7
	3102	E518	BathRoom/Perimeter Heating Unit	10.8
	3103	R282	BathRoom/Wall	1.2
	3104	R256	Hallway/Wall	12.8
	3105	R284	RM 200/Wall	2.2
	3106	E515	RM 200/Furnature Top	4.8
	3107	R224	RM 200/Cabinet Door Knob	5.2
	3108	E516	RM 200/Window	3.24
	3109	R223	RM 200/Furnature Top	4.0
	3110	R290	RM 200/Furnature Top	5.6
	3111	R231	RM 202/Furnature Top	5.2
	3112	R281	RM 202/Floor	2.28
	3113		Field Blank/Room 200	ND<0.7
	3114	R230	RM 202/Furnature Top	2.72
	3115	R278	RM 202/Wall	36.8
	3116	R259	RM 202/Furnature Top	6.4
	3117	R241	Hallway/Wall	3.2
	3118	R245	RM 204Door Knob	16.8
	3119	R243	RM 204/Wall	1.84
	3120	R240	RM 204/Furnature Top	4.0
	3121	R283	RM 204/Furnature Top	2.48
	3122	R229	RM 204/Wall	1.76
	3123	R244	RM 204/Wall	2.08
	3124	R274	RM 204B/Wall	14.4
	3125		Field Blank	ND<0.7
	3126	R232	RM 204A/Wall	6.0
	3127	R287	Hallway/Wall	10.4
	3128	R239	Hallway/Wall	2.08
	3129	R248	RM 203B/Wall	1.84
	3130	R217	RM 203B/Wall	2.6
	3131	R219	RM 203B/Furnature Top	2.52
	3132	R237	RM 203A/Furnature Top	0.64
	3133	R225	RM 203A/Furnature Top	3.48
	3134	R252	RM 203A/Furnature Top	1.36
	3135	R234	Hallway/Wall	4.4
	3136	E517	RM 203/Wooden Door	30.8
	3137		Field Blank/Out Side of 203	ND<0.7
	3138	R233	Janito's Closet/Door	64.0

FIGURE 21

July, 11, 1986, Certification Surface Wipe Re-Sampling
Locations and Results, Basement



NOTE: LEGEND ON FOLLOWING PAGE

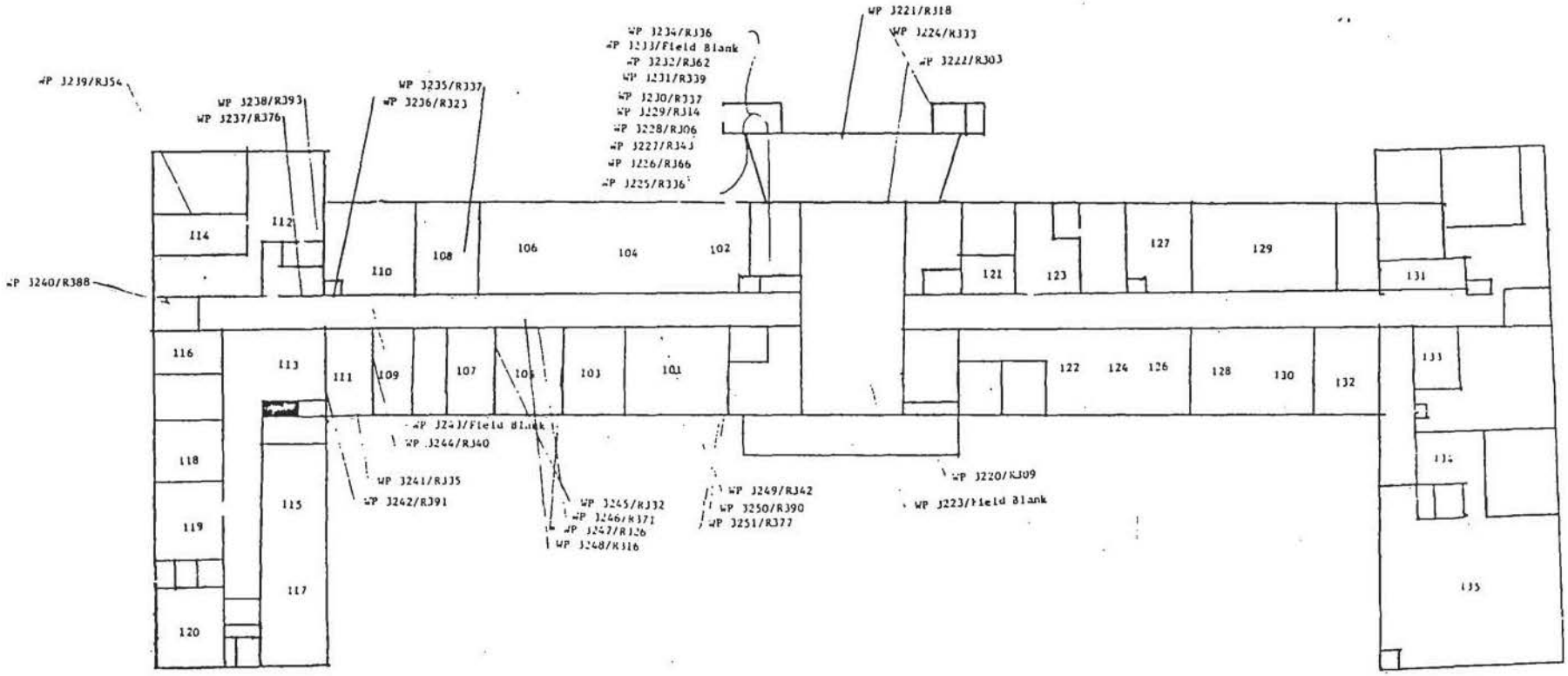
FIGURE 21 LEGEND

LEGEND

BASEMENT				Result
WP	3252	R353	Lobby/LC Wall	1.0
	3253		Field Blank Basement Lobby	ND<0.3
	3254	R379	Elevator Car/LC Wall	32.0
	3255	R389	Hallway/HC Wall	1.24
	3256	R387	Mechanical/Lightswitch	5.2
	3257	R308	Mechanical/LC Wall	1.76
	3258	R382	Mechanical/Control Panel Door	16.8
	3259	R305	Mechanical/Control Panel Face	9.6
	3260	R310	Mechanical/LC Wall	2.68
	3261	R351	Room B5/HC Wall	1.96
	3262	R349	Room B5/LC Wall	2.92
	3263		Field Blank	ND<0.3
	3264	R355	Storage Closet/LC Wall	3.44
	3265	R329	Storage Closet/LC Wall	2.12
	3266	R356	Room B4A/HC Wall	2.32
	3267	R359	Room B4A/HC Wall	1.4
	3268	R302	Room B4A/Table	4.0
	3269	R331	Room B4A/LC Wall	1.28
	3270	R370	Room B2B/Lightswitch	8.0
	3271	R363	Room B1/HC Wall	12.0
	3272	R383	Room B1/HC Wall	1.64
	3273		Field Blank	ND<0.3
	3274	R380	Hallway/LC Wall	8.4
	3275	R385	Hallway/LC Wall	5.2
	3276	R322	Hallway/LC Wall	1.68

FIGURE 22

July 11, 1876, Certification Surface Wipe Re-Sampling
Locations and Results, First Floor



NOTE: LEGEND ON FOLLOWING PAGE

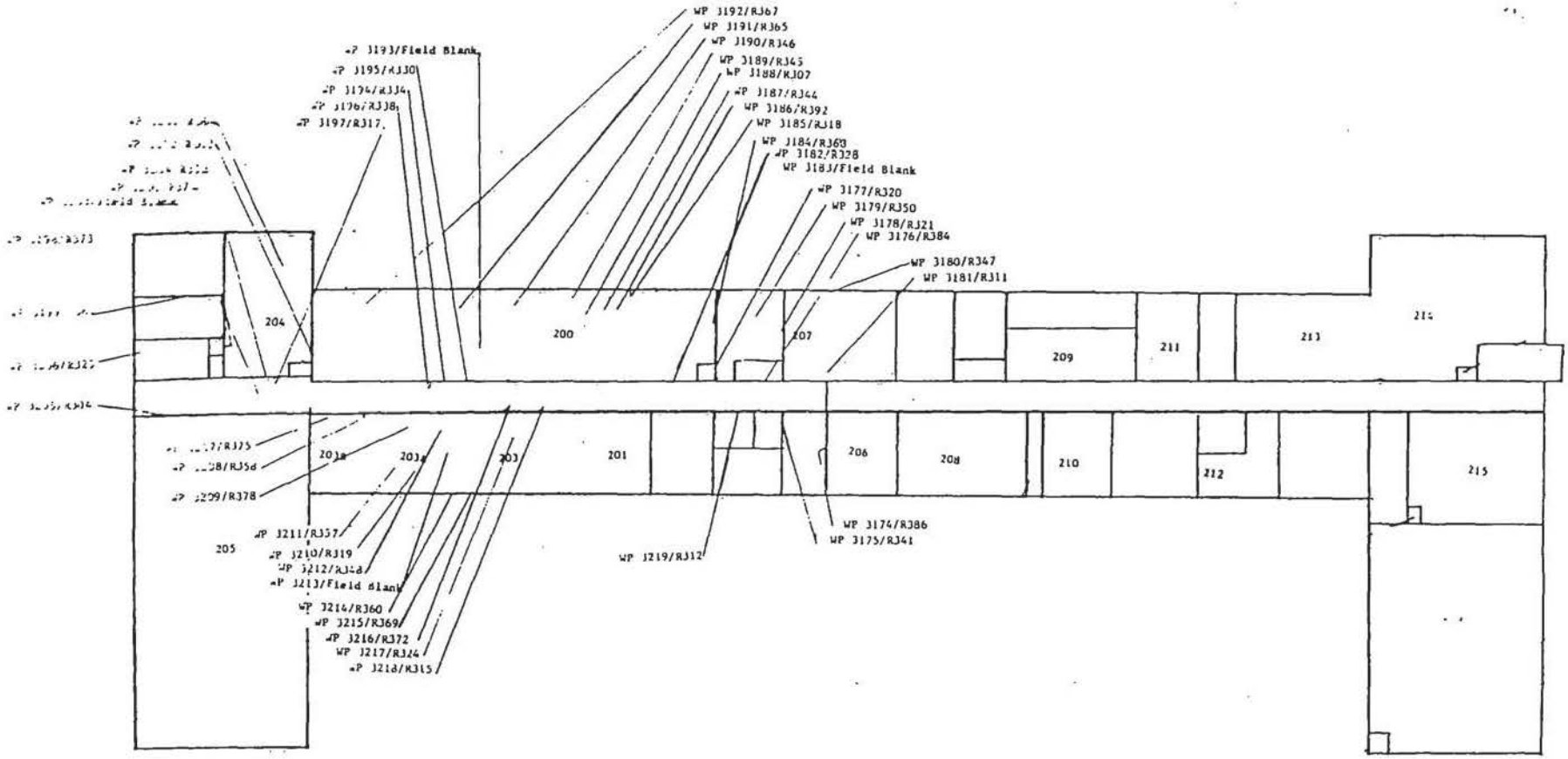
FIGURE 22 LEGEND

LEGEND

FIRST FLOOR				RESULT
WP	3220	R309	Lobby/LC Wall	2.64
	3221	R318	Breezeway/LC Wall	3.36
	3222	R303	Breezeway/Doorknob	1.6
	3223		Field Blank/Breezway	ND<0.3
	3224	R333	Men's Bathroom/Light Switch	2.92
	3225	R336	Men's Bathroom/HC Partician	1.0
	3226	R366	Men's Bathroom/HC Partician	3.48
	3227	R343	Men's Bathroom/HC Partician	8.4
	3228	R306	Men's Bathroom/HC Partician	7.2
	3229	R314	Men's Bathroom/HC Partician	6.4
	3230	R327	Men's Bathroom/HC Partician	4.0
	3231	R339	Men's Bathroom?HC Partician	19.2
	3232	R362	Men's Bathroom/Doorknob	8.4
	3233		Field Blank/1St Floor Hall	ND<0.3
	3234	R313	Men's Bathroom/LC Wall	29.2
	3235	R337	Room 108/HC Cabinet	4.4
	3236	R323	Dumbwaiter I/Door	3.12
	3237	R376	Hallway/LC Wall	7.6
	3238	R393	Room 112/LC Wall	5.6
	3239	R354	Room 114A/HC Wall	2.08
	3240	R388	North Entrance/Lightswitch	4.4
	3241	R335	Room 111/Glass Window	23.2
	3242	R391	Room 111/Glass Top Desk	3.92
	3243		Field Blank	ND<0.3
	3244	R340	Room 109/LC Wall	2.96
	3245	R332	Room 105/LC Wall	10.4
	3246	R371	Room 105/LC Wall	3.16
	3247	R326	Room 105/LC Wall	1.84
	3248	R316	Hallway/HC Wall	2.72
	3249	R342	Room 101/HC Wall	4.4
	3250	R390	Room 101/HC Wall	7.2
	3251	R377	Room 101/HC Wall	14.4

FIGURE 23

July 11, 1986, Certification Surface Wipe Re-Sampling
Locations and Results, Second Floor



NOTE: LEGEND ON FOLLOWING PAGE

FIGURE 23 Legend

LEGEND

SECOND FLOOR				RESULT
WP	3174	R386	Lobby-LC Wall	2.84
	3175	R341	Lobby-HC Wall	1.28
	3176	R384	Doorknob/Bathroom	14.8
	3177	R320	Bathroom/HC Wall	2.4
	3178	R321	Bathroom/HC Wall	1.12
	3179	R350	Bathroom/Partician	1.72
	3180	R347	Room 207/Glass window	ND<0.6
	3181	R311	Room 207/Drafting Table	3.0
	3182	R328	Hallway/LC Wall	1.48
	3183		Field Blank Janitors Closet	ND<0.6
	3184	R368	Room 200/LC Wall	5.6
	3185	R381	Room 200/LC Wall	0.52
	3186	R392	Room 200/Drafting Table	3.16
	3187	R344	Room 200/LC Wall	0.44
	3188	R307	Room 200/Drafting Table	1.16
	3189	R345	Room 200/Drafting Table	1.2
	3190	R346	Room 200/Drafting Table	1.12
	3191	R365	Room 200/Drafting Table	1.44
	3192	R367	Room 200/Drafting Table	1.16
	3193		Field Blank Room 200	ND<0.6
	3194	R334	Room 200/LC Wall	2.04
	3195	R330	Room 200/Drafting Table	20.0
	3196	R338	Hallway/HC Wall	7.6
	3197	R317	Hallway/HC Wall	4.4
	3198	R373	Room 204B/HC Wall	5.6
	3199	R361	Room 204A/LC Wall	2.84
	3200	R374	Room 204/LC Wall	2.8
	3201	R364	Room 204/Table	1.64
	3202	R301	Room 204/HC Wall	1.96
	3203		Field Blank	ND<0.6
	3204	R352	Room 204/HC Wall	1.92
	3205	R304	Hallway/LC Wall	4.0
	3206	R325	Stairwell/LC Wall	1.88
	3207	R375	Room 203B/Map file	2.08
	3208	R358	Room 203B/Doorknob	6.8
	3209	R378	Room 203A/HC Partician	ND<0.6
	3210	R319	Room 203A/Drafting Table	0.76
	3211	R357	Room 203A/Drafting Table	1.32
	3212	R348	Room 203A/Drafting Table	3.48
	3213		Field Blank Room 203-A	ND<0.6
	3214	R360	Room 203A/Drafting Table	1.92
	3215	R369	Room 203A/HC Wall	2.44
	3216	R372	Hallway/LC Wall	0.52
	3217	R324	Room 203/Table	1.36
	3218	R315	Hallway/HC Wall	10.0
	3219	R312	Lightswitch/Janitor's Closet	8.0

FIGURE 24

October 4, 1985, January 15, 1986, May 28, 1986, July 11, 1986
Certification Sampling and Certification Re-Sampling
Locations and Results, HVAC System, Mechanical Room

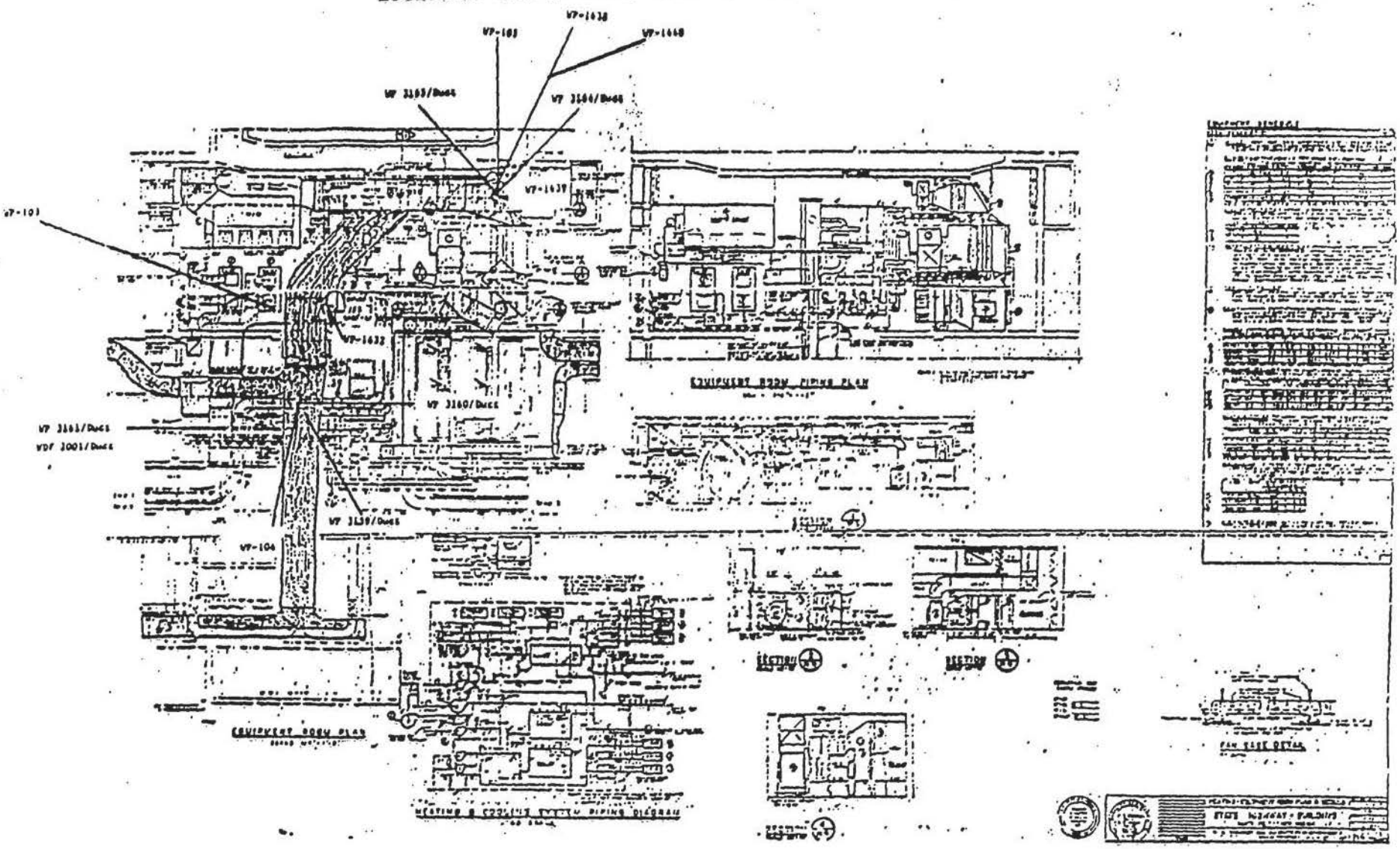


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FIGURE 24 LEGEND

LEGEND

October 4, 1985, Certification Sampling
Locations and Results
HVAC System, Mechanical Room

Sample Number	Location	Result
WP-103	Air Handling #2 Air Supply	152.0
WP-104	Air Handling #1 Air Supply	33.6
WP-105	Air Handling #3 Air Supply	80.0

January 15, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Mechanical Room

Sample Number	Location	Result
WP-1432	Mechanical Room	60.0
WP-1439	Inside Fresh Air Intake	44.0

May 28, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Mechanical Room

Sample Number	Location	Result	
WP-3159	West C Section Supply Mech	31.6	
WP-3160	West D Section Supply Mech	16.8	
WP-3161	Mech, N.W. First Floor	6.8	
WDF-2001	Mech, Lg Duct "C" Section	0.045	ng/m^2
WDF-2002	Field Blank Mech	0.004	ng/m^2
WP-3162	Field Blank Mech	ND .07	
WP-3163	Field Blank Mech	ND .07	
WP-3164	Auditorium Riser Mech	33.2	
WP-3165	Auditorium Riser Mech	52.0	

July 11, 1986 Certification Re- Sampling
Locations and Results
HVAC System, Mechanical Room

Sample Number	Location	Result
WP-3279	Auditorium Riser	8.8
WP-3280	Auditorium Riser	27.2

FIGURE 25

October 4, 1985, January 15, 1986, May 28, 1986, July 11, 1986
Certification Sampling and Certification Re-Sampling
Locations and Results, HVAC System, Basement

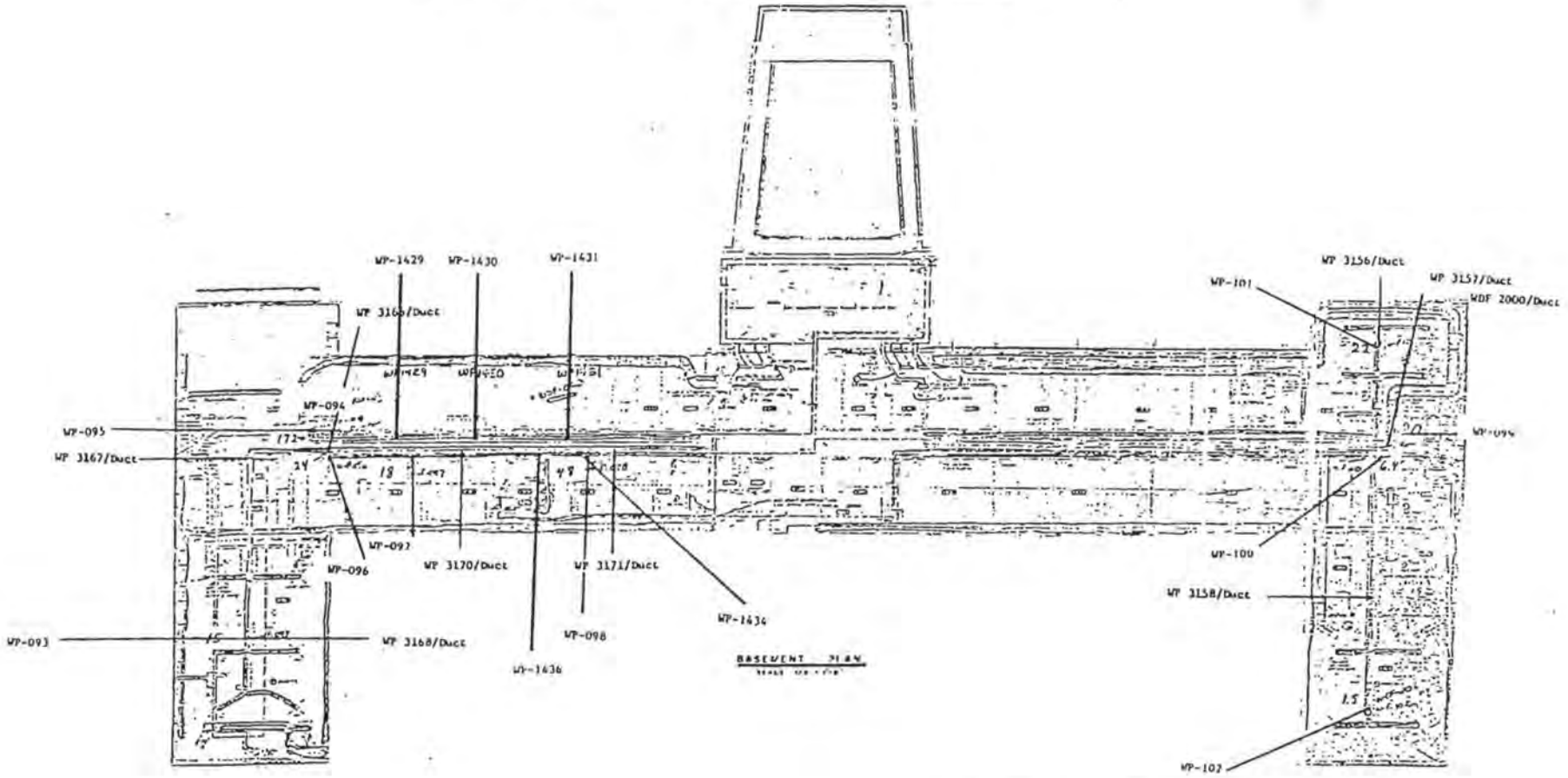

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FIGURE 25

LEGEND

October 4, 1985, Certification Sampling
Locations and Results
HVAC System, Basement

Sample Number	Location	Result
WP-093	Print Shop, Center	14.6
WP-094	Field Blank, Rm B5	ND<.6
WP-095	Hall, North 'C' Section	172.0
WP-096	Photo Copy Room Feed	23.6
WP-097	Dark Room Feed	17.6
WP-098	Rm. B1A	48.0
WP-099	Large Duct in A Sect Riser	10.4
WP-100	Hallway A Section to B22	6.4
WP-101	Cafeteria, Center	22.4
WP-102	B22 West	1.48

January 15, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Basement

Sample Number	Location	Result
WP-1429	Hallway-B	104.0
WP-1430	Hallway-B	72.0
WP-1431	Hallway-B	108.0

May 28, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Basement

Sample Number	Location	Result
WP-3156	Cafeteria	4.8
WP-3157	Hallway-B	5.2
WDF-2000	Hallway-Cafe	0.152 ng/m^2
WP-3158	Hallway-B	6.8
WP-3166	Rm. B3	10.4
WP-3167	Hallway-B	11.2
WP-3168	Print Shop	30.4
WP-3169	Field Blank-Print Rm	ND<.07
WP-3170	Enlarging Room	12.4
WP-3171	Rm. B1	176.0

July 11, 1986, Certification Re-Sampling
Locations And Results
HVAC System, Basement

Sample Number	Location	Result
WP-3277	Rm. B1A, Vent	104.0
WP-3278	Rm. B2, Vent	25.2

FIGURE 26

October 4, 1985, January 15, 1986, May 28, 1986, July 11, 1986
Certification Sampling and Certification Re-Sampling
Locations and Results, First Floor

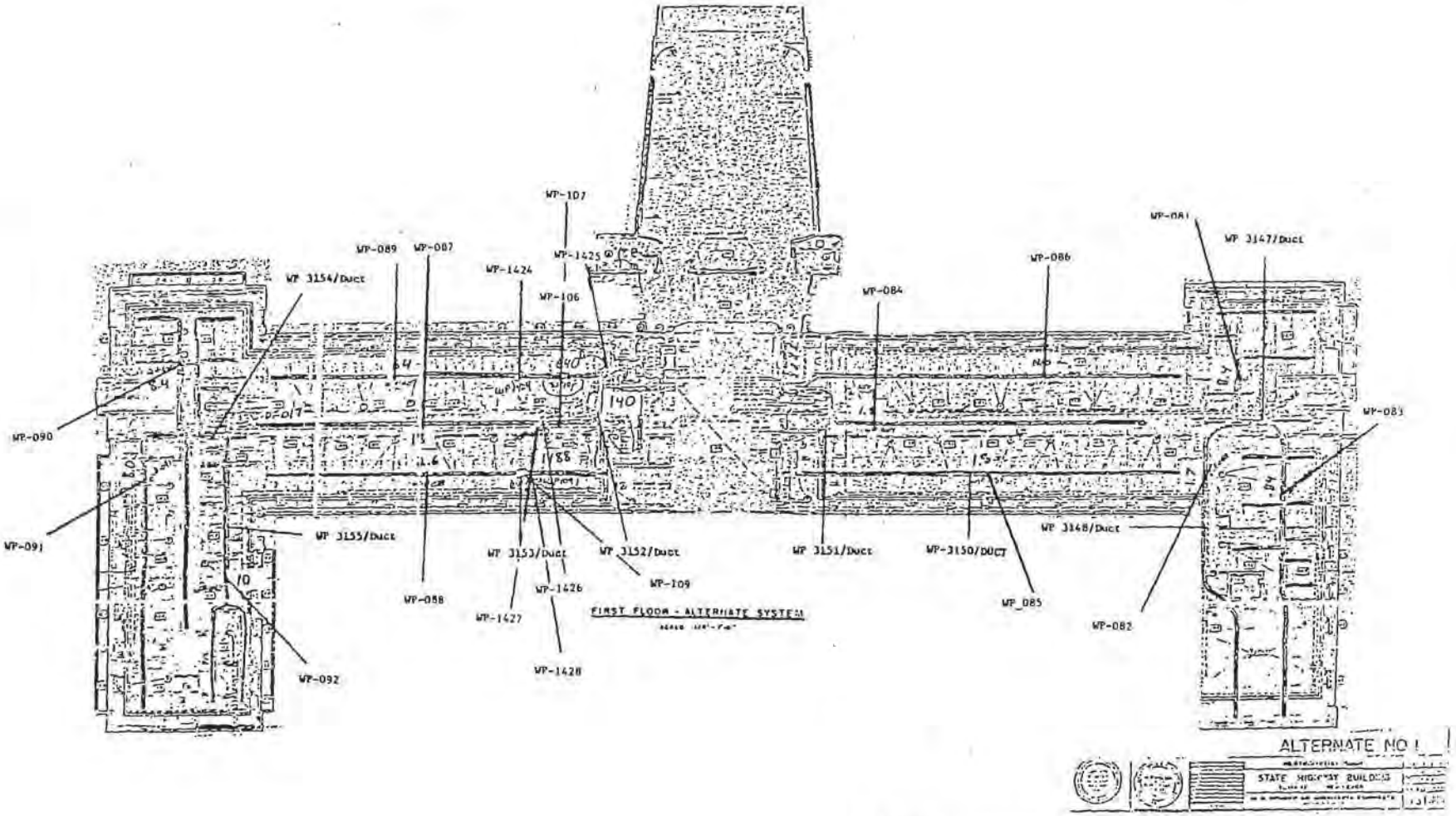

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FIGURE 26

Legend

October 4, 1985, Certification Sampling
Locations and Results
HVAC System, First Floor

Sample Number	Location	Result
WP-081	Rm. East of Rm. 131	8.4
WP-082	Hallway, East End Rm. 135	1.7
WP-083	Rm. 133	0.84
WP-084	Hallway B Sect, North	1.84
WP-085	Rm. 126 Center	1.8
WP-086	Rm. 129 North End	ND < 0.6
WP-087	Hallway, C Sect Center	18.0
WP-088	Rm. 105 Center	2.64
WP-089	Rm. 106 North	64.0
WP-090	Rm. 114 West Office	3.4
WP-091	Rm. 116 West	8.0
WP-092	Rm. 115 Center	10.4
WP-106	Hallway C Section	40.0
WP-107	Rm. 102 Center	640.0
WP-108	Field Blank	ND .6
WP-109	Rm. 101 North	188.0

January15, 1986, Certification Re-Sampling
Locations and Results
HVAC System, First Floor

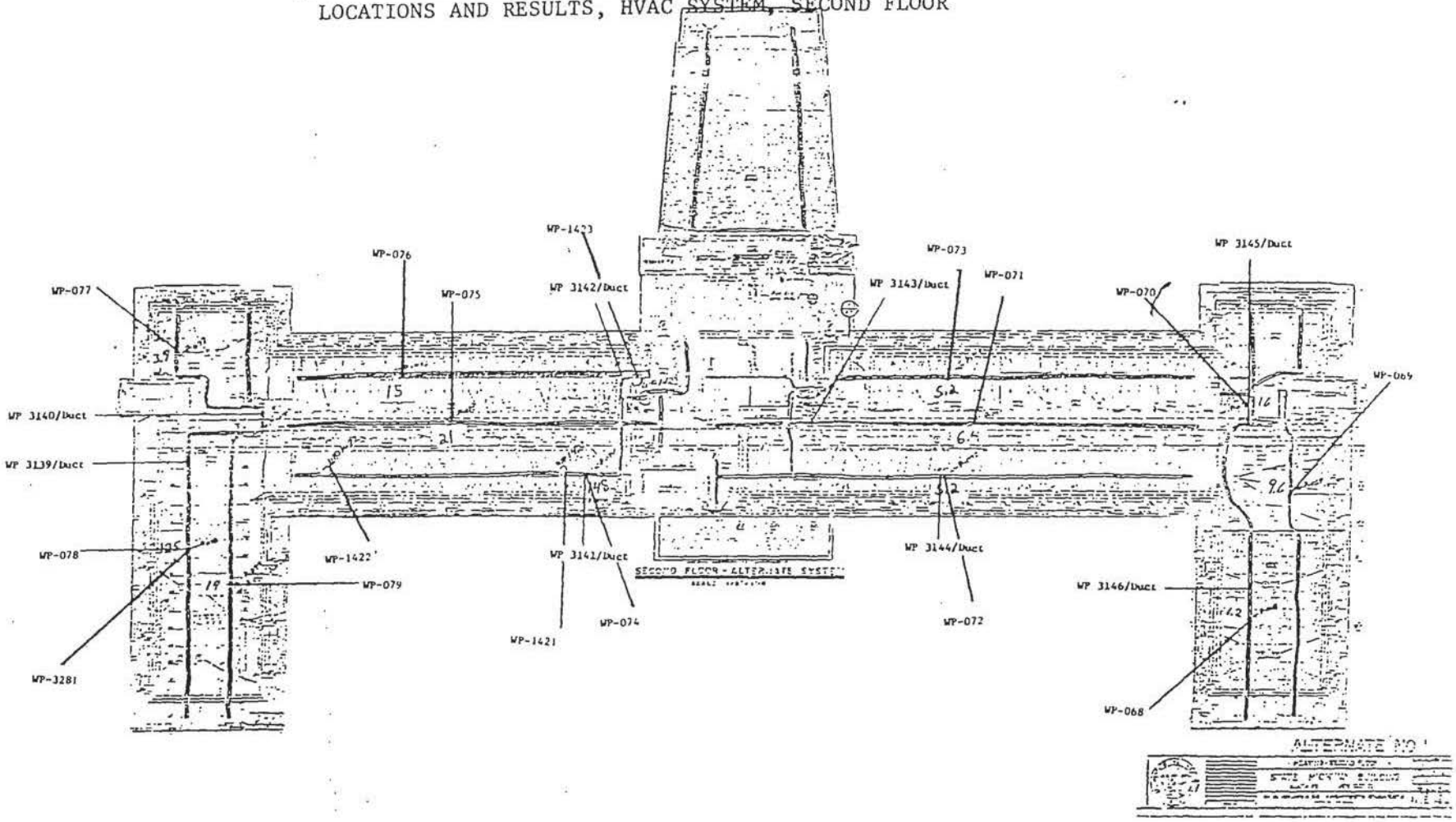
Sample Number	Location	Result
WP-1424	Rm. 104	80.0
WP-1425	Rm. 102 Riser	204.0
WP-1426	Field Blank-First Floor	ND < 0.3
WP-1427	Hallway C Section	23.6
WP-1428	Rm. 101	16.8

MAY 28, 1986, Certification Re-Sampling
Locations and Results
HVAC System, First Floor

Sample Number	Location	Result
WP-3147	Hallway-First Floor	5.6
WP-3148	Hallway-First Floor	4.4
WP-3149	Field Blank	ND < 68
WP-3150	Rm. 124	4.4
WP-3151	Hallway-First Floor	4.0
WP-3152	Hallway-First Floor	48.0
WP-3153	Rm. 101	10.0
WP-3154	Hallway-First Floor	8.8
WP-3155	Hallway-Administration	7.2

FIGURE 27

OCTOBER 4, 1985, JANUARY 15, 1986, MAY 28, 1986, JULY 11, 1986
CERTIFICATION SAMPLING AND CERTIFICATION RE-SAMPLING
LOCATIONS AND RESULTS, HVAC SYSTEM, SECOND FLOOR



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FIGURES 27

LEGEND

October 4, 1985 Certification Sampling
Locations and Results
HVAC System, Second Floor

Sample Number	Location	Result
WP-068	Rm. 216 North Run, Canter	1.24
WP-069	Rm. 215 South Run, Center	9.6
WP-070	Rm. 214 West Side	16.0
WP-071	Hallway Center of B Sect	6.4
WP-072	Rm. 210	5.2
WP-073	Rm. 209	5.2
WP-074	Rm. 201	148.0
WP-075	Hallway Center of C Sect	20.8
WP-076	Rm. 202 Center of Room	15.2
WP-077	Rm. 204A East End of Room	3.88
WP-078	Rm. 205 North Run, East End	25.2
WP-079	Rm. 205 South Run, Center	18.8
WP-080	Field Blank-Rm 205	ND 6

January 15, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Second Floor

Sample Number	Location	Result
WP-1421	Rm. 203	44.0
WP-1422	Rm. 200	56.0
WP-1423	Rm. 203	68.0

May 28, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Second Floor

Sample Number	Location	Result
WP-3139	Rm. 205	64.0
WP-3140	Hallway-Second Floor	2.32
WP-3141	Rm. 203	14.8
WP-3142	Rm. 200	8.8
WP-3143	Hallway-Second Floor	18.8
WP-3144	Rm. 210	44.0
WP-3145	Hallway-Second Floor	17.2
WP-3146	Rm. 216	23.6

July 11, 1986, Certification Re-Sampling
Locations and Results
HVAC System, Second Floor

Sample Number	Location	Result
WP-3281	Rm. 205 First Hole	11.6

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