



March 7, 2007
696/CAL-4064

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Subject: **Docket No. 70-734; SNM-696: Request to Release a Certain Portion of General Atomics' Facility to Unrestricted Use and Delete it from License SNM-696: Namely, GA's "Section B of the Building 2 Service Corridor"**

and

Dr. Ron Rogus (In Duplicate)
State of California
Department of Health Services
Radiologic Health Branch
Mail Stop 7610
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Subject: **Radioactive Materials License No. 0145-37: Request to Release a Certain Portion of General Atomics' Facility to Unrestricted Use and Delete it from License 0145-37: Namely, GA's "Section B of the Building 2 Service Corridor"**

Dear Mr. Baker and Dr. Rogus:

As you are aware, General Atomics (GA) is continuing its efforts directed at obtaining the release to unrestricted use of selected facilities and land areas at General Atomics. GA has recently completed the final radiological surveys of Section B of the Service Corridor of its Building 2 (Science Laboratories Building), located on GA's Main Site.

GA's Building 2 contains approximately 142 laboratories, plus offices, hallways, and a service corridor which houses the utilities, heating and A/C, etc. for the labs and offices. During the past ~ 50 years, the laboratories were used primarily for research and development activities involving the use of radioactive material.

All of the laboratories within Building 2 have been released to unrestricted use by the U.S. Nuclear Regulatory Commission (NRC) and all but a few have also been released by the State of California DHS Radiologic Health Branch (State). None of the laboratories in Building 2, or the projects occupying them, are authorized to use or store radioactive material in the service corridor, nor is such authorization anticipated in the future.

Building 2 is comprised of three arc-shaped sections which together form a "C"-shaped semi-circular building. The three sections are referred to as Sections A, B and C. Due to the large size and complexity of Building 2, the service corridor in each of the three sections is, or will be, the subject of a separate release request. By letter dated December 6, 2006, GA previously requested release of Section A (Reference). This release request addresses the service corridor in **Section B**. Section C will be the subject of GA's next release request.

The service corridor in Section B occupies a total of approximately 11,130 ft² (~1,031 m²), which includes three levels and a number of side rooms and ventilation rooms connected to, and accessible from, the service corridor. In the past, contaminated equipment and radioactive materials or waste were, on occasion, temporarily stored in portions of the service corridor, resulting in low levels of radioactive contamination in certain localized areas.

The results of analyses of characterization samples indicated Cs-137 was the primary contaminant. Appropriate decontamination activities were conducted in Section B until residual radiation levels were well below the approved release criteria specified in GA's NRC- and State-approved Site Decommissioning Plan.

The enclosed report documents the results of GA's comprehensive radiological measurements and surveys conducted within Section B of the Building 2 Service Corridor. The results of these surveys demonstrate that the service corridor in "Section B" meets the NRC- and State- approved criteria for release to unrestricted use.

Accordingly, GA hereby requests the NRC and the State to release the Service Corridor in Section B of GA's Building 2, as described in the enclosed report, to unrestricted use and to delete it from GA's NRC and State special nuclear material and radioactive material licenses, respectively.

Consistent with decisions made during joint NRC, State, and GA decommissioning coordination meetings, the NRC has the regulatory lead for the release of the Building 2 Service Corridor to unrestricted use. Moreover, in response to a request by GA, the NRC has already performed confirmatory surveys in Section B of the Building 2 Service Corridor on the basis of a "substantial" draft final survey report.

If you should have any questions regarding this request, or the enclosed report, please don't hesitate to contact Ms. Laura Q. Gonzales at (858) 455-2758 or laura.gonzales@gat.com, or me at (858) 455-2823 or keith.asmussen@gat.com.

Very truly yours,



Keith E. Asmussen, Ph.D., Director
Licensing, Safety and Nuclear Compliance

Enclosure: GA report titled "Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor," dated February 2007.

Reference: Asmussen, Keith E. letter no. 696/CAL-4044 to Mr. Merrit N. Baker and Dr. Ron Rogus, dated December 6, 2006. [Request to release "Section A of the Building 2 Service Corridor"]

cc: Dr. D. Blair Spitzberg, Chief, NMSS Branch 3, Region IV
Mr. Robert Evans, Fuel Cycle Inspector, NRC Region IV
Mr. Jeff Wong, State of CA, Berkeley, CA
Ms. Barbara Hamrick, State of CA, Brea, CA

GENERAL ATOMICS'
FINAL RADIOLOGICAL SURVEY REPORT
FOR SECTION B OF THE BUILDING 2
(SCIENCE LABORATORIES BUILDING)
SERVICE CORRIDOR

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February 2007



Table of Contents

INTRODUCTION	1
SITE DESCRIPTION	1
HISTORY OF USE	3
DECONTAMINATION EFFORTS AND CLASSIFICATION	4
Decontamination Efforts	4
Classification	5
CRITERIA FOR RELEASE TO UNRESTRICTED USE	5
As Low As Reasonably Achievable (ALARA)	5
Facilities and Equipment (and Asphalt or Concrete Surfaces)	5
Exposure Rate Guideline	6
INSTRUMENTATION & BACKGROUND MEASUREMENTS	6
Background Measurements for Instruments/Detectors	6
Minimum Detectable Activity (MDA) for Instruments/Detectors	6
Exposure Rate Background	7
FINAL SURVEYS PERFORMED	7
Objectives and Responsibilities	7
Survey Plans	8
SURVEY SUMMARY	8
Comparisons of Site Decommissioning Plan Requirements with Final Surveys Performed in Section B of the Building 2 Service Corridor	9
RESULTS OF THE FINAL SURVEYS	10
Non-Impacted Areas	10
Electrical Room	10
Elevator Machinery Room at Breezeway E	10
Elevator Machinery Room at Breezeway D	11
Mechanical Room	12
Service Corridor Overhead Crawl Space Outer Wall at Column B-46	13
Service Corridor Overhead Crawl Space Vent Louvers External Surfaces	13
Service Corridor Overhead Crawl Space	13
Ventilation Room above Breezeway D	14
Ventilation Room above Breezeway E	15
Non-Suspect Affected Area	15
Fixed Alpha Measurements	15
Fixed Beta Measurements	16
Removable Contamination (Wipe) Surveys	16
Alpha Scan Surveys	16
Beta Scan Surveys	16
Fixed Exposure Rate Measurements	16
Exposure Rate Scan Survey	17

Suspect Affected Area	17
Fixed Alpha Measurements	17
Fixed Beta Measurements	17
Removable Contamination (Wipe) Surveys	17
Alpha Scan Surveys	17
Beta Scan Survey	18
Fixed Exposure Rate Measurements	18
Exposure Rate Scan Survey	18
CONFIRMATORY SURVEY	18
CONCLUSION	18

List of Tables

Table 1: USNRC's Acceptable Surface Contamination Levels	T-1
Table 2: State of California's Acceptable Surface Contamination Levels	T-2
Table 3: List of Instruments	T-3
Table 4: Building 2 Service Corridor B Wipe Survey Results- Non-Suspect Affected Area	T-8
Table 5: Building 2 Service Corridor B Wipe Survey Results- Suspect Affected and Unaffected Areas	T-11

List of Figures (unpaged)

Figure 1: GA's Main and Sorrento Valley Site.
Figure 2A: Building 2.
Figure 2B: Section B of Building 2 (127-156 and 223-246)
Figure 2C: Section B of Building 2 (102-124 and 202-218)
Figure 3: Building 2, End View
Figure 4: Building 2 Service Corridor Section B Electrical Room Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations
Figure 5: Building 2 Service Corridor Section B Electrical Room Alpha and Beta Scan Measurement Locations and Results.
Figure 6: Building 2 Service Corridor Section B Electrical Room Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
Figure 7: Building 2 Service Corridor Section B Elevator Machinery Room Breezeway E Final Surveys.
Figure 8: Building 2 Service Corridor Section B Elevator Machinery Room Breezeway D Final Surveys.
Figure 9: Building 2 Service Corridor Section B Mechanical Room Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
Figure 10: Building 2 Service Corridor Section B Mechanical Room Alpha and Beta Scan Measurement Locations and Results.
Figure 11: Building 2 Service Corridor Section B Mechanical Room Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.

- Figure 12: Building 2 Service Corridor Section B Vent Room Above Breezeway D Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations
- Figure 13: Building 2 Service Corridor Section B Vent Room Above Breezeway D Alpha and Beta Scan Measurement Locations and Results.
- Figure 14: Building 2 Service Corridor Section B Vent Room Above Breezeway D Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 15: Building 2 Service Corridor Section B Vent Room Above Breezeway E Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations
- Figure 16: Building 2 Service Corridor Section B Vent Room Above Breezeway E Alpha and Beta Scan Measurement Locations and Results.
- Figure 17: Building 2 Service Corridor Section B Vent Room Above Breezeway E Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 18: Building 2 Service Corridor Section B Overhead Crawl Space Outer Wall at Column B-46 Beta Scan Measurement Locations and Results and Wipe Survey Locations.
- Figure 19: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface Beta Fixed Measurement and Scan Locations and Results.
- Figure 20: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface Alpha Fixed Measurement and Scan Locations and Results.
- Figure 21: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface Wipe Survey Locations.
- Figure 22: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface Exposure Rate Scan and Large Area Wipe Locations and Results.
- Figure 23: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Alpha Scan Survey Locations and Results.
- Figure 24: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Alpha Scan Survey Locations and Results.
- Figure 25: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Alpha Scan Survey Locations and Results.
- Figure 26: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Alpha Scan Survey Locations and Results.
- Figure 27: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-46 to C-51, Alpha Scan Survey Locations and Results.
- Figure 28: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Alpha Scan Survey Locations and Results.
- Figure 29: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Alpha Scan Survey Locations and Results.
- Figure 30: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Alpha Scan Survey Locations and Results.
- Figure 31: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Alpha Scan Survey Locations and Results.

Figure 32: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Beta Scan Survey Locations and Results.

1

Figure 33: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, BetaScan Survey Locations and Results.

Figure 34: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Beta Scan Survey Locations and Results.

Figure 35: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Beta Scan Survey Locations and Results.

Figure 36: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-46 to C-51, Beta Scan Survey Locations and Results.

Figure 37: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Beta Scan Survey Locations and Results.

Figure 38: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Beta Scan Survey Locations and Results.

Figure 39: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Beta Scan Survey Locations and Results.

Figure 40: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Beta Scan Survey Locations and Results.

Figure 41: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 42: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 43: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 44: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 45: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-46 to C-51, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 46: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 47: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

Figure 48: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-36 to B-41,

Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.

- Figure 49: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Fixed Alpha and Beta Measurement Locations and Results and Loose Surface Contamination (Wipe) Survey Locations.
- Figure 50: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 51: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 52: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 53: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 54: Building 2 Service Corridor, Level 1, Non-Suspect Affected Area, Column B-46 to C-51, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 55: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 56: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 57: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 58: Building 2 Service Corridor, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Exposure Rate fixed Measurement and Scan Survey Locations and Results.
- Figure 59: Building 2 Service Corridor First (Lowest) Level Floor Column B-43 to B-46 Alpha and Beta Scan Survey Locations and Results.
- Figure 60: Building 2 Service Corridor First (Lowest) Level Inner Wall Column B-43 to B-46 Alpha and Beta Scan Survey Locations and Results.
- Figure 61: Building 2 Service Corridor First (Lowest) Level Outer Wall Column B-43 to B-46 Alpha Scan Survey Locations and Results.
- Figure 62: Building 2 Service Corridor Second (Middle) Level Floor Column B-46 to B-49 Alpha Scan Survey Locations and Results.
- Figure 63: Building 2 Service Corridor Second (Middle) Level Inner Wall Column B-46 to B-49 Alpha Scan Survey Locations and Results.
- Figure 64: Building 2 Service Corridor Second (Middle) Level Outer Wall Column B-46 to B-49 and End Wall Alpha Scan Survey Locations and Results.
- Figure 65: Building 2 Service Corridor First (Lowest) Level Outer Wall Column B-43 to B-46 Beta Scan Survey Locations and Results.
- Figure 66: Building 2 Service Corridor Second (Middle) Level Floor Column B-46 to B-49 Beta Scan Survey Locations and Results.
- Figure 67: Building 2 Service Corridor Second (Middle) Level Inner Wall Column B-46 to B-49 Beta

Scan Survey Locations and Results.

- Figure 68: Building 2 Service Corridor Second (Middle) Level Outer Wall Column B-46 to B-49 and End Wall Beta Scan Survey Locations and Results.
- Figure 69: Building 2 Service Corridor First (Lowest) Level Floor Column B-43 to B-46 Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 70: Building 2 Service Corridor First (Lowest) Level Inner Wall Column B-43 to B-46 Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 71: Building 2 Service Corridor First (Lowest) Level Outer Wall Column B-43 to B-46 Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 72: Building 2 Service Corridor Second (Middle) Level Floor Column B-46 to B-49 Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 73: Building 2 Service Corridor Second (Middle) Level Inner Wall Column B-46 to B-49 Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 74: Building 2 Service Corridor Second (Middle) Level Outer Wall Column B-46 to B-49 and End Wall Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations.
- Figure 75: Building 2 Service Corridor First (Lowest) Level Floor Column B-43 to B-46 Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 76: Building 2 Service Corridor First (Lowest) Level Inner Wall Column B-43 to B-46 Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 77: Building 2 Service Corridor First (Lowest) Level Outer Wall Column B-43 to B-46 Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 78: Building 2 Service Corridor Second (Middle) Level Floor Column B-46 to B-49 Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 79: Building 2 Service Corridor Second (Middle) Level Inner Wall Column B-46 to B-49 Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 80: Building 2 Service Corridor Second (Middle) Level Outer Wall Column B-46 to B-49 and End Wall Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results.
- Figure 81: Building 2 Service Corridor Second (Middle) Level Floor Column B-46 to B-49 Post Decontamination Survey.
- Figure 82: Building 2 Service Corridor Section B Overhead Crawl Space Column B-29 to B-35 Exposure Rate Fixed Measurement and Large Area Wipe Locations and Results.
- Figure 83: Building 2 Service Corridor Section B Overhead Crawl Space Column B-35 to B-42 Exposure Rate Fixed Measurement and Large Area Wipe Locations and Results.
- Figure 84: Building 2 Service Corridor Section B Overhead Crawl Space Column B-42 to B-48 Exposure Rate Fixed Measurement and Large Area Wipe Locations and Results.

Appendices

- Appendix A: Final Survey Plans for Building 2 Service Corridor, Section B.
- Appendix B: Building 2 Service Corridor, Section B, Confirmatory Survey.



Introduction

General Atomics (GA) is continuing its efforts directed at decontaminating, as appropriate, and obtaining the release to unrestricted use of selected facilities and land areas at General Atomics.

GA has recently completed the Final Radiological Survey of Section B of the Service Corridor of GA's Building 2 (Science Laboratories Building), located on GA's Main Site.

GA's Building 2 is a semi-circular "C"-shaped building consisting of laboratories and offices with five breezeways. It is a three-level structure comprised of a lower-level, an upper-level and mezzanines. Building 2 was constructed in three phases with each being a partial arc of a semi-circular structure. These three portions of the building are referred to as Sections A, B and C. A service corridor runs through each of these sections and separates upper and lower levels in each section. (See Figure 2A).

The service corridor of Section B comprises ~ 1/3 of the total service corridor of Building 2, and is located between lower-level labs and offices 102-218 and upper-level labs and offices 128-243. The total floor space area to be released to unrestricted use is approximately 11,130 ft² (~ 1,031 m²), which includes all three (3) levels, side rooms, and ventilation rooms above breezeway D and breezeway E. (See Figures 2B and 2C).

GA is requesting both the Nuclear Regulatory Commission (NRC) and the State of California (DHS/RHB) to release Section B of the Building 2 (Science Laboratories Building) Service Corridor to unrestricted use.

This report documents the results of GA's radiological measurements completed within Section B of the Building 2 (Science Laboratories Building) Service Corridor. The results of these surveys demonstrate that the service corridor of Section B, herein referred to as "Section B", meets the NRC- and State- approved criteria for release to unrestricted use.

Site Description

Building 2, a.k.a. the Science Laboratories Building or "L" (for Laboratory) Building, is located on General Atomics' Main Site (see Figure 1). Building 2 contains approximately 142 laboratories, plus offices, hallways, and a service corridor which houses the utilities for the labs and offices (see Figure 2A). The laboratories were used during the past ~50 years primarily for research and development activities involving the use of radioactive material.



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

All 142 laboratories within Building 2 were subsequently released to unrestricted use by both the NRC and the State of California in various "groups" of labs. Subsequently, GA has amended its State DHS/RHB Radioactive Materials License to add 9 labs as authorized use locations. Of these, labs 517, 523, 530/532, 534, 560/562/564 were added to do work involving basic biological research carried out by GA's biosciences group, i.e., Diazyme, and lab 407 was added for work involving tritium diffusion studies. None of these laboratories are authorized to use or store radioactive materials in the service corridor of Building 2. The roof of Building 2 has been released to unrestricted use by the NRC. GA is awaiting the release of the roof by the State DHS/RHB.

The service corridor is approximately eight (8) feet wide and occupies the entire span of the semi-circular shaped Building 2 (see Figure 2A). There are three levels within the Service Corridor: (1) The easily accessible ground floor or Lower Level, also called Level 1 or the 1st Level; having a concrete floor, (2) The accessible middle level, also called Level 2 or the 2nd Level; which has metal grating as the floor, and (3) The top level, also called the Overhead Crawl Space, which has periodic metal grate landings and is difficult to access. The majority of the overhead crawl space is occupied by piping, ventilation ducts, and electrical cables. These levels are shown in Figure 3.

The service corridor contains all of the utilities, heating, and air conditioning needed by the laboratories. In addition, sewer drain lines which collect waste water from the laboratories and rest rooms are located beneath the first floor of the service corridor.

In 2000, the center three (3) feet of the concrete floor was removed and the sewer drain lines excavated throughout the entire length of the service corridor. A final radiological survey of the trench was performed in 2001. In April 2001, the report summarizing the results of this final radiological survey was submitted to the NRC and State of California, along with a request to release this trench to unrestricted use. The NRC released the trench to unrestricted use per license SNM-696 amendment #72 and the State DHS/RHB released the trench to unrestricted use per license 0145-37 amendment #158. New sewer drain lines were installed, the trench was backfilled and a new concrete floor was poured in the center ~3' of the first (lower) floor of the entire service corridor.

Due to the large size and complexity of the service corridor, it was sectioned off into three (3) survey sections: (1) Section A, (2) Section B and (3) Section C. This report only addresses **Section B** which is shown in greater detail in Figures 2B and 2C. Section B of the service corridor occupies ~ 1/3 of the total service corridor and is located between lower labs and offices 102-218 and between upper labs and offices 128-243. The I-beam numbers (or columns) in relation to the laboratories in Section B are also shown in Figures 2B and 2C.

GENERAL ATOMICS Final Radiological Survey Report for Section B of the Building 2
(Science Laboratories Building) Service Corridor

In addition, there are a number of "side" rooms connected to, and accessible from the first floor of the service corridor. These "side" rooms are: (1) An electrical room that contains electrical transformers and switch gear, (2) a mechanical room, which is essentially a maintenance workshop, and (3) two elevator machinery rooms. There are also two large ventilation rooms; one above Breezeway D and one above Breezeway E.

Section B is approximately 315 feet long. The lower level is approximately 9'7" high, the second level is approximately 8'10" high, and the crawl space is approximately 7'10" high. The first (lower) level has a concrete floor (the center 3' is a new concrete floor), the second level floor is mostly steel grating, and the crawl space only has sporadic metal grating landings over $\sim\frac{1}{4}$ of the total floor surface area (the remaining area is filled with piping, ducts, and electrical conduit/wires). The service corridor can be accessed through doorways in some of the laboratories and at the breezeways which separate groups of laboratories, and from both ends of the semi-circular Building 2. Figure 3 shows the various levels (end view) of Building 2.

The total floor space of Section B is approximately 11,130 ft² ($\sim 1,031$ m²); which is comprised of the following areas/locations:

<u>Location/Area</u>	<u>Area (ft²)</u>
First Level (lower level)	2,520
Second Level (upper level)	2,520
Crawl Space (grated floor area)	630
Mechanical Room	1,624
Electrical Room	840
Ventilation room at Breezeway D	1,394
Ventilation room at Breezeway E	1,530
Elevator Machinery Room #1	36
Elevator Machinery Room #2	36
	<u>11,130</u>

History of Use

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. On occasion, contaminated equipment and 55 gallon drums containing low levels of liquid radioactive waste were temporarily stored in the service corridor. These activities resulted in low levels of radioactive contamination in certain localized areas.



Decontamination Efforts and Classification

Decontamination Efforts

In 1994, a few ventilation ducts in the service corridor were identified as being contaminated with trace levels of radioactivity. In February 1994, all of the contaminated ducts, fans and motors that were found to be contaminated were removed and disposed of as low level radioactive waste at an authorized low-level radioactive waste disposal site. In May 1994, a survey of all of the ventilation systems remaining was completed and all additional contaminated equipment found was either removed and disposed of as low-level radioactive waste or decontaminated. Additional surveying was performed during this Final Survey.

Characterization surveys of the entire Service Corridor (i.e., Sections A, B and C) began in 1998. Samples of concrete surfaces found to be contaminated were collected and analyzed by gamma spectroscopy. The following areas within the Section B service corridor were identified as having elevated radioactivity:

1. First (lower) level between columns B-43 to B-46 (excluding the center 3 feet of the floor because it is new).
2. The second (upper) level between column B-46 and B-49.

On the basis of gamma spectroscopy analyses of concrete samples, Cs-137 contamination was identified near I-beams B44 and B45 in the first (lower) level and between I-beams B46 and B49 on the second (upper) level. The highest Cs-137 concentration detected was ~26 pCi/g. Most of the areas were small (i.e., $< 1 \text{ m}^2$) and each area was decontaminated at that time (circa 1998). Trace concentrations of Co-60 ($< 0.2 \text{ pCi/g}$) were also detected in several concrete samples. No uranium or thorium contamination was detected within Section B of the service corridor.

Additional decontamination prior to the Final Survey was performed in order to decontaminate each area to as close to normal background levels as reasonably achievable.

In 2001, all of the contaminated drain lines were excavated and disposed of as low level radioactive waste at an authorized low-level radioactive waste disposal site. GA submitted a Final Radiological Survey Report to the NRC and State DHS/RHB for the resultant trench in April 2001 summarizing residual radiation levels and the results of gamma scan analyses of soil samples taken in the trench. The NRC subsequently performed a confirmatory survey and released the trench to unrestricted use (license amendment #72 to GA's SNM-696 license). In July 2004, the State DHS/RHB also released the trench to unrestricted use (license amendment #158). The trench, in the middle of the service corridor, was subsequently filled in with clean soil and covered with new concrete.

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2. The second (upper) level between column B-46 and B-49.

On the basis of gamma spectroscopy analyses of concrete samples, Cs-137 contamination was identified near I-beams B44 and B45 in the first (lower) level and between I-beams B46 and B49 on the second (upper) level. The highest Cs-137 concentration detected was ~26 pCi/g. Most of the areas were small (i.e., $< 1 \text{ m}^2$) and each area was decontaminated at that time (circa 1998). Trace concentrations of Co-60 ($< 0.2 \text{ pCi/g}$) were also detected in several concrete samples. No uranium or thorium contamination was detected within Section B of the service corridor.

Additional decontamination prior to the Final Survey was performed in order to decontaminate each area to as close to normal background levels as reasonably achievable.

In 2001, all of the contaminated drain lines were excavated and disposed of as low level radioactive waste at an authorized low-level radioactive waste disposal site. GA submitted a Final Radiological Survey Report to the NRC and State DHS/RHB for the resultant trench in April 2001 summarizing residual radiation levels and the results of gamma scan analyses of soil samples taken in the trench. The NRC subsequently performed a confirmatory survey and released the trench to unrestricted use (license amendment #72 to GA's SNM-696 license). In July 2004, the State DHS/RHB also released the trench to unrestricted use (license amendment #158). The trench, in the middle of the service corridor, was subsequently filled in with clean soil and covered with new concrete.



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

The original concrete that was broken/cut during the excavation of the contaminated drain lines was surveyed and the results confirmed radiation levels were well below release criteria. This concrete was placed in the former Soil Staging Area (SSA Bin T-31) and subsequently surveyed and released to unrestricted use by the NRC.

In January 2002, a Final Survey Plan for the Service Corridor was issued. The Plan was revised and supplements to the plan were later issued in 2003 and 2004. The plan and supplements are provided in Appendix A.

Elevated areas of radioactivity identified on surfaces in the crawl space were decontaminated by scabbling the concrete surfaces with powered hand tools. Contaminated grating was decontaminated, piping insulation was removed and piping was decontaminated, and an ~7' section of contaminated louver panels were replaced near I-beam 46. All removed items were disposed of as low level radioactive waste at an authorized low level radioactive waste disposal facility.

Classification

The entire service corridor was initially classified as a **Non-Suspect Affected Area** for final survey purposes.

Following the discovery of elevated areas, the following areas were re-classified as **Suspect Affected Areas**:

1. First (lower) level between columns B-43 to B-46 (excluding the center 3 feet of the floor because it is new).
2. The second (upper) level between column B-46 and B-49.

The side rooms and ventilation rooms above the breezeways were classified as **Unaffected Areas** because they had no history of radioactive material use, storage, or contamination.

Criteria for Release to Unrestricted Use

As Low As Reasonably Achievable (ALARA)

During its decommissioning efforts, GA always attempts to decontaminate to levels as close to natural background levels, and as far below the NRC- and State- approved release criteria, as is reasonably achievable.

Facilities and Equipment (and Asphalt or Concrete Surfaces)

Cs-137 was the predominate contaminate found within Section B. The NRC's and the State of



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

California's DHS/RHB criteria for release of facilities and equipment to unrestricted use are provided in Tables 1 and 2, respectively. The applicable guidelines for beta/gamma emitters (including Cs-137) are as follows:

5,000 dpm/100 cm², averaged over a 1 m² area
15,000 dpm/100 cm², maximum in a 100 cm² area if the average over 1 m² is met
1,000 dpm/100 cm², removable activity

Exposure Rate Guideline

Pursuant to the NRC and State of California approved release criteria, exposure rates measured at 1 m above the surface are not to exceed 10 µR/hr above natural background levels.

Instrumentation and Background Measurements

A list of instruments used during the radiological surveys is shown in Table 3. The table includes: (1) a description of the instrument, model number and its serial number, (2) a description of the detector (if applicable) and its serial number, (3) instrument ranges, (4) calibration due dates, (5) typical background readings and (6) calibration efficiencies (if applicable). All of the instruments used were calibrated semiannually and after repair, except for exposure rate meters which were calibrated quarterly.

Background Measurements for Instruments/Detectors

Building 13 on GA's main site was used for conducting background measurements with instruments used for the final survey because: (1) there is no history involving the use or storage of radioactive materials in Building 13, and (2) the various surfaces and construction materials found inside the Building 2 service corridor could also be found within and outside of Building 13. Background information, where appropriate, is included in Table 3.

Minimum Detectable Activity (MDA)

Minimum detectable activities (MDA's) for instruments used for fixed measurements, for each type of surface (see Table 3), were calculated using equation (5-2) from the NUREG/CR-5849 as shown below:

Equation (5-2)

$$MDA = \frac{2.71 + 4.65\sqrt{B_R \times t}}{t \times E \times \frac{A}{100}} (dpm/100cm^2)$$



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

Where:

B_R = background rate (cpm)

t = count time (min)

E = efficiency

A = area of the detector (cm^2)

The MDA for scan surveys using the 434 cm^2 gas flow proportional detector (floor monitor) was calculated using equation 5-3 from the draft NUREG/CR-5849 (modified in accordance with the discussion on page 5.8 of the draft NUREG/CR-5849), as follows:

Equation (5-3):

$$MDA = \frac{X \times B_R}{E \times \frac{A}{100}} (\text{dpm}/100\text{cm}^2)$$

Where:

X = the multiple/portion of the background rate that can be discernable as an increase in instrument response by the surveyor (dependent on the type of instrument used).

B_R = background rate in (cpm)

E = efficiency (counts per disintegration)

A = area of the detector (cm^2)

Exposure Rate Background

The typical exposure rate background for GA's site using a Ludlum Model 19 micro R meter is 12-18 $\mu\text{R/hr}$ measured at 1 m from the surface of soil. This range of exposure rates can be measured south of Building 15 (an office building on the eastern portion of the GA site). Furthermore, measurements taken offsite in ten (10) different locations (nine (9) offsite and one (1) onsite at a non-impacted area near Building 15) over a period of 15 months also averaged $\sim 15 \mu\text{R/hr}$ (measured at 1 m from the surface). The range of 12-18 $\mu\text{R/hr}$ is typical at the GA site for the external dose rates measured at 1 meter from the surface. Background exposure rates in non-impacted areas, measured with the specific instruments used for this final survey, are identified in Table 3.

Final Surveys Performed

Objectives and Responsibilities

The objectives of the final survey plans were: (1) to demonstrate that the average surface residual contamination levels for each survey unit were below the approved release criteria, (2) to show that the maximum residual activity did not exceed three times the approved release criteria for average



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

surface contamination value in an area up to 100 cm², and, (3) that the exposure rate measurements taken in these areas, measured at 1 meter above the surface, were less than 10 μ R/hr above background.

Survey Plans

A Final Survey Plan was developed based on the previous history of use, results of periodic surveys performed in the Building 2 Service Corridor, the radionuclides of concern, the potential for contamination, the various types of surfaces encountered and the classification of the various areas. A revision to this survey plan, which increased the amount of surveying, was issued in February, 2002. Two other supplements to this plan were issued on 3/17/03 to perform isotopic sampling of residual contamination and to perform surveys in the "side rooms" and crawl space. (Note: Some of the plans refer to other sections of the service corridor other than Section B). A fourth supplement to this plan was issued following the re-classification of areas with elevated activity levels found on previous surveys; the areas with elevated levels of radioactivity were subsequently decontaminated. The survey Plan and supplements are provided in Appendix A.

Surveys were taken in accordance with approved survey plan(s) by qualified Health Physics Technicians having a minimum of three years health physics experience.

Every survey taken was documented on a daily basis to a worksheet/drawing showing the approximate locations surveyed/sampled. The documentation included the results of the measurements (including units), the technician's signature, date, instrument(s) used (including the model and serial number of both the ratemeter and detector), calibration due date, % efficiency, background readings (if applicable) and any other pertinent information.

Survey Summary

Comparisons of the Site Decommissioning Plan requirements with the actual Final Surveys performed in relation to the percentage of surface area scanned, number of measurements (i.e., number of fixed radiation measurements), and exposure rate measurements (μ R/hr) are provided below:



**Final Radiological Survey Report for Section B of the Building 2
(Science Laboratories Building) Service Corridor**

Comparisons of Site Decommissioning Plan Requirements with Final Surveys Performed in Section B of the Building 2 Service Corridor					
Survey Area⁽¹⁾	Gridding Required ?	# of Direct Measurements α or β or Wipes	Surface Scans α, β,	# of Exposure Rate Fixed Measurements (μR/hr)	Exposure Rate Scan Measurements (μR/hr)
D-Plan ⁽²⁾ Unaffected Area(required) →	Not Required	Total = 12 1 per 50 m ² or 1 every ~7 m Based on ~573 m ²	10% accessible floors & walls below 2 m.	Total = 57 1 per 10 m ² or 1 every ~3 m Based on ~573 m ²	10% accessible floors and walls below. 2m.
Final Surveys Unaffected Area (performed) →	No	Total = 315 101 α 102 β , & 112 wipes	10%- floors & walls < 2 m	Total = 155	10% of floors & walls < 2 m; 100% of external vent louvers
D-Plan ⁽²⁾ Non-Suspect Affected Area (required) →	Not Required	Total = 42 1 per 20 m ² or 1 every 4.5 m	10% accessible floors and walls < 2 m	Total = 47 1 per 10 m ² or 1 every ~3 m.	10% accessible floors & walls < 2 m
Final Surveys Non-Suspect Affected Area (performed) →	No	Total = 522 130 fixed α , 275 fixed β , & 117 wipe samples	100% accessible floor & walls < 2 m & 10% of walls > 2 m	Total = 48 fixed measurements	1 st level- 100% accessible floor & walls < 2 m & 10% of walls > 2m 2 nd level -100%
D-Plan ⁽²⁾ Suspect Affected Area (required) →	Yes, if feasible	Total = 83 1 per 4 m ² or 1 every 2 m	100% accessible floors & walls < 2 m	Total = 27 1 per 4 m ² or 1 every 2 m	100% accessible floors & walls below 2m.
Final Surveys Suspect Affected Area (performed) →	Yes, Where possible	Total = 121 35 α , 53 β , and 33 wipe samples	100% accessible floor & walls < 2m; 10% of walls > 2m	Total = 76	100% of accessible floor & walls < 2m & 10% of walls > 2m

- (1) The total surface (Survey Required) area to be released:
 Unaffected Area= approximately 6,162 ft² (~ 573 m²), Floor Space Only.
 Non-Suspect Affected Area= approximately 9,076.2 ft² (~ 844 m²), Old Floor Space and walls up to 2m.
 Suspect Affected Area= approximately 3,546 ft² (~ 330 m²), Old Floor Space and walls up to 2m.
- (2) D-Plan = GA's NRC- and State- Approved Site Decommissioning Plan.

Results of the Final Surveys

The final radiological survey results for Section B of the Service Corridor of Building 2 are provided in figures and tables as noted below:

Non-Impacted Areas

Electrical Room

See Figures 4, 5, and 6 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha Fixed Activity: Two (2) measurements taken, all results were at natural background activity levels.

Beta Fixed Activity: Two (2) measurements taken, the highest result was 1,009 cp2m, which is equivalent to 300 dpm/100 cm²; far less than the NRC- and State- approved limits (5,000 and 15,000 dpm/100 cm² average and maximum, respectively) for release to unrestricted use.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 10 to 40 cpm, which is at natural background activity levels.

Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 1600 to 2100 cpm, which is not discernible from natural background levels.

Removable Surface Activity: Two (2) wipe samples were taken and analyzed for α and β activity. Both results were not discernible from natural background activity levels.

Exposure Rate Measurements: Twenty-eight (28) exposure rate measurements were taken at 1 meter from the floor surfaces. The highest measurement was 28 μ R/hr, which is less than the approved release criteria of 10 μ R/hr above background (14 to 22 μ R/hr).

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (Tl) detector held within 1" of the surface. The range was 20 to 26 μ R/hr, which is also below the approved release criteria.

Elevator Machinery Room at Breezeway E

See Figure 7 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

Alpha Fixed Activity: One (1) measurement was taken, the result was at natural background activity levels.

Beta Fixed Activity: Two (2) measurements taken, the highest result was 1,029 cp2m, which is equivalent to 332 dpm/100 cm²; far less than the NRC- and State- approved release criteria.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 10 to 40 cpm, which is at natural background levels.

Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 1,400 to 1,600 cpm, which is at natural background levels.

Removable Surface Activity: Two (2) wipe samples were taken and analyzed for α and β activity. The results were not discernible from natural background activity levels.

Fixed Exposure Rate Measurements: One (1) exposure rate measurements were taken at 1 meter from the floor surfaces. The highest measurement was 16 μ R/hr, which is at natural background levels.

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 18 to 20 μ R/hr, which is not discernable from natural background levels.

Elevator Machinery Room at Breezeway D

See Figure 8 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha Fixed Activity: One (1) measurements taken, the result was at natural background activity levels.

Beta Fixed Activity: Two (2) measurements taken, the highest result was 1,041 cp2m, which is equivalent to 351 dpm/100 cm², which is far below the NRC-and State- approved release limit.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 0 to 40 cpm, which is at natural background levels.



Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 1,500 to 1,600 cpm, which is at natural background levels.

Removable Surface Activity: Two (2) wipe samples were taken and analyzed for α and β activity. The results were not discernible from natural background activity levels.

Exposure Rate Measurements: One (1) exposure rate measurement was taken at 1 meter from the floor surfaces. The measurement was 15 μ R/hr, which is not discernable from natural background levels.

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 18 to 22 μ R/hr, which is not discernable from natural background levels.

Mechanical Room

See Figures 9, 10, and 11 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha Fixed Activity: Four (4) measurements taken, all results were at natural background activity levels.

Beta Fixed Activity: Four (4) measurements taken, the highest result was 1,012 cp2m, which is equivalent to 304 dpm/100 cm² which is less than the NRC-and State- approved release criteria.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 0 to 50 cpm, which is which is not discernable from natural background levels.

Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm² gas flow proportional detector. The results ranged from 1600 to 2000 cpm, which is which is not discernable from natural background levels.

Removable Surface Activity: Four (4) wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels.

Exposure Rate Measurements: Thirty-seven (37) exposure rate measurements were taken at 1 meter from the floor surfaces. The highest measurement was 25 μ R/hr, which is far less than



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

the approved release criteria of 10 $\mu\text{R/hr}$ above background (14 to 22 $\mu\text{R/hr}$).

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 18 to 28 $\mu\text{R/hr}$, which is below the release criteria.

Service Corridor Overhead Crawl Space Outer Wall at Column B-46

See Figure 18 for measurement locations and results, and Table 5 for wipe analysis results. After an ~7' section of contaminated louvers were removed the surrounding area was surveyed prior to the installation of new louvers. A summary of the survey results is as follows:

Beta scan activity: Thirteen (13) fixed measurements using a 15 cm^2 GM probe were taken. The results were not discernable from normal background levels.

Removable Activity: A total of ten (10) wipes were collected. All of the results were < 20 cpm/100 cm^2 .

Service Corridor Overhead Crawl Space Vent Louvers External Surfaces

See Figures 19, 20, 21, and 22 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha fixed activity: Eighty-two (82) fixed alpha measurements were taken, all results were at natural background activity levels.

Beta Fixed Activity: Eighty-two (82) measurements taken, all measurements were at normal background levels.

Removable Activity: Eighty-two (82) wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels. In addition, twenty-one (21) Large Area Wipe samples were taken and analyzed in the field with hand held instruments for alpha and beta activity. All wipe results were at natural background levels.

Exposure Rate Surface Scans: 100% of all accessible surfaces were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 5 to 9 $\mu\text{R/hr}$, which is at natural background levels.

Service Corridor Overhead Crawl Space

See Figures 82, 83, and 84 for measurement locations and results. A summary of the survey results is as follows:



Final Radiological Survey Report for Section B of the Building 2
(Science Laboratories Building) Service Corridor

Removable Surface Activity: Forty-eight (48) large area wipes were taken and analyzed in the field for α and β activity, all results were at natural background levels.

Exposure Rate Measurements: Sixty-three (63) exposure rate measurement were taken at 1 meter from the floor surfaces. The highest measurement was 11 $\mu\text{R/hr}$, which is which is not discernable from natural background levels.

Exposure Rate Surface Scans: 10% of all accessible surfaces were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 6 to 12 $\mu\text{R/hr}$, which is which is not discernable from natural background levels.

Ventilation Room above Breezeway "D"

See Figures 12, 13, and 14 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha Fixed Activity: Five (5) measurements taken, all results were at natural background activity levels.

Beta Fixed Activity: Five (5) measurements taken, the highest result was 987 cp2m, which is equivalent to 264 dpm/100 cm^2 ; far less than the NRC- and State- approved limits for release to unrestricted use.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm^2 gas flow proportional detector. The results ranged from 10 to 40 cpm, which is at natural background activity levels.

Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm^2 gas flow proportional detector. The results ranged from 600 to 1600 cpm, which is not discernible from natural background levels.

Removable Surface Activity: Five (5) wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels.

Exposure Rate Measurements: Six (6) exposure rate measurements were taken at 1 meter from the floor surfaces. The highest measurement was 11 $\mu\text{R/hr}$, which is less at natural background levels.



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 7 to 16 $\mu\text{R/hr}$, which is not discernable from natural background levels.

Ventilation Room above Breezeway "E"

See Figures 15, 16, and 17 for measurement locations and results, and Table 5 for wipe analysis results. A summary of the survey results is as follows:

Alpha Fixed Activity: Six (6) measurements taken, all results were at natural background activity levels.

Beta Fixed Activity: Five (5) measurements taken, the highest result was 760 cp2m, which is at natural background activity levels.

Alpha Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm^2 gas flow proportional detector. The results ranged from 0 to 50 cpm, which is not discernible from natural background activity levels.

Beta Scan Survey: 10% of floor surfaces and walls below 2 m were scanned with a 434 cm^2 gas flow proportional detector. The results ranged from 600 to 1600 cpm, which is not discernible from natural background levels.

Removable Surface Activity: Five (5) wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels.

Exposure Rate Measurements: Nineteen (19) exposure rate measurements were taken at 1 meter from the floor surfaces. The highest measurement was 13 $\mu\text{R/hr}$, which is less at natural background levels.

Exposure Rate Surface Scans: 10% of floor surfaces and walls below 2 m were scanned with a 2" x 2" NaI (TI) detector held within 1" of the surface. The range was 7 to 14 $\mu\text{R/hr}$, which is not discernable from natural background levels.

Non-Suspect Affected Area

Fixed Alpha Measurements:

A total of 130 α measurements were taken with the detector probe held within $\frac{1}{2}$ " for 30 seconds to 1 minute. All measurements were at the natural background level for the surfaces measured (0-20



cpm). See Figures 41, 42, 43, 44, and 45 for the 1st (lowest) level survey measurement locations and results, and, Figures 46, 47, 48, and 49 for the 2nd level survey locations and results.

Fixed Beta Measurements:

A total of 275 β measurements were taken with the detector probe held within 1/2" for 2 minutes. The highest measurement was 522 dpm/100 cm² on the outside walls at column B-36 to B-41 on the 1st level (see figure 43). This result is far less than the NRC- and State- approved release criteria. See Figures 41, 42, 43, 44, and 45 for the 1st (lower) level survey measurement locations and results, and, Figures 46, 47, 48, and 49 for the 2nd (upper) level survey measurement locations and results.

Removable Contamination (Wipe) Surveys:

A total of 115 wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels. Figures 41, 42, 43, 44, and 45 for the 1st (lower) level survey locations and results, and, Figures 46, 47, 48, and 49 for the 2nd (upper) level survey locations and results, and, Table 4 for results.

Alpha Scan Surveys:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for α activity. All results were at the natural background activity levels. See Figures 23, 24, 25, 26, and 27 for the 1st (lower) level survey locations and results, and, Figures 28, 29, 30, and 31 for the 2nd (upper) level survey measurement locations and results.

Beta Scan Surveys:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for β activity. The highest activity level found was 2900 cpm found on the 2nd (upper) level between columns B-41 and B-46 (see Figure 35). This activity level is equivalent to 689 dpm/100 cm², which is far below the NRC- and State- approved release criteria identified in the GA Site Decommissioning Plan. See Figures 32, 33, 34, 35, and 36 for the 1st (lower) level survey locations and results, and, Figures 37, 38, 39, and 40 for the 2nd (upper) level survey locations and results.

Fixed Exposure Rate Measurements:

Forty-eight (48) exposure Rate measurements were taken in the center of the service corridor, on the 1st and 2nd (upper) level, at one (1) meter from the floor surface and approximately one (1) meter from both the inside and outside walls (simultaneously). All results were not discernible from natural background levels. See Figures 50, 51, 52, 53, and 54 for the 1st (lower) level survey locations and results, and, Figures 55, 56, 57, and 58 for the 2nd (upper) level survey measurement locations and results.



Exposure Rate Scan Survey:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for α activity. All results were not discernible from natural background activity levels. See Figures 50, 51, 52, 53, and 54 for the 1st (lower) level survey locations and results, and, Figures 55, 56, 57, and 58 for the 2nd (upper) level survey locations and results.

Suspect Affected Area

Fixed Alpha Measurements:

A total of thirty-five (35) α measurements were taken with the detector probe held within 1/2" for 30 seconds to 1 minute. All measurements were at the natural background level for the surfaces measured (0-20 cpm). See Figures 69, 70, 71, 72, 73, and 74 for survey measurement locations and results.

Fixed Beta Measurements:

A total of Fifty-three (53) β measurements were taken with the detector probe held within 1/2" for 2 minutes. The highest measurement was 1489 cp2m on the second (upper) level floor at column B-46 to B-49 (see Figure 81). This result corresponds to 1,444 dpm/100 cm² which far below the NRC- and State- approved release criteria. See Figures 69, 70, 71, 72, 73, 74, and 81 for survey measurement locations and results.

Removable Contamination (Wipe) Surveys:

A total of thirty-three (33), 100 cm² wipe samples were taken and analyzed for α and β activity. All results were not discernible from natural background activity levels. In addition, six (6) large area wipes were taken on piping, cables, etc, in the overhead in crawl spaces between A-11 and A-13. These were analyzed in the field for α and β activity. All results were at background levels. See Figures 69, 70, 71, 72, 73, 74, and 81 for survey locations, and, Table 5 for results. In addition, 100% of the crawl Space (upper level) was surveyed with Large Area Wipes that were analyzed for α and β activity in the field using portable instruments. No activity above natural background levels was detected.

Alpha Scan Surveys:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for α activity. The highest measurement was 340 cpm at column A-11 to A-13, in the crawl space (see Figure 69). This measurement corresponds to 351 dpm/100 cm², which is far below the NRC- and State- approved release criteria. See Figures 59, 60, 61, 62, 63, and, 64 for survey locations and results.



Final Radiological Survey Report for Section B of the Building 2 (Science Laboratories Building) Service Corridor

Beta Scan Surveys:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for β activity. The highest activity level found was 2000 cpm on the 1st (lower) level, outer wall, between columns B-43 and B-46 (see Figure 65). This activity level is equivalent to 455 dpm/100 cm², which is far below the NRC- and State- approved release criteria identified in GA's Site Decommissioning Plan. See Figures 65, 66, 67, 68 and 81 for survey locations and results.

Fixed Exposure Rate Measurements:

Seventy-six (76) exposure Rate measurements were taken in the center of the service corridor, on the 1st and 2nd (upper) level, at one (1) meter from the floor surface and approximately one (1) meter from both the inside and outside walls (simultaneously). All results were not discernible from natural background levels. See Figures 75, 76, 77, 78, 79, and 80 for survey measurement locations and results.

Exposure Rate Scan Survey:

100% of the accessible floor and wall surfaces below 2 m, with the exception of the middle three (3) feet of new floor material, and, 10% of the accessible walls above 2 m, was scanned for α activity. All results were not discernible from natural background activity levels. See Figures 76, 77, 78, 79, and 80 for survey locations and results.

Confirmatory Survey

A Confirmatory Survey was performed by GA Health Physics technicians who were not routinely assigned to the performance of the Final Survey. This survey was conducted during October and November 2004, in accordance with a survey plan. The results of this survey supports the results of the Final survey; all residual activity is far below the NRC- and State approved release criteria as defined in the GA Site Decommissioning Plan. See Appendix B for the confirmatory survey plan, a survey summary, and the survey maps showing the locations and results of all surveys performed.

Conclusion

Final residual contamination and radiation surveys, as well as the results of analyses of soil samples, as documented in this report, demonstrate that Section B of GA's Building 2 Service Corridor meets the NRC- and State- approved criteria for release to unrestricted use.

Table 1: USNRC'S ACCEPTABLE SURFACE CONTAMINATION LEVELS ¹

Nuclides	Average ^{b,c,f} (dpm/100cm ²)	Maximum ^{b,d,f} (dpm/100 cm ²)	Removable ^{b,e,f} (dpm/100cm ²)
U-nat, ²³⁵ U, ²³⁸ U, & associated decay products	5,000 α	15,000 α	1,000 α
Transuranics, ²²⁶ Ra, ²²⁸ Ra, ²³⁰ Th, ²²⁸ Th, ²³¹ Pa, ²²⁷ Ac, ¹²⁵ I, ¹²⁹ I	100	300	20
Th-nat, ²³² Th, ⁹⁰ Sr, ²²³ Ra, ²²⁴ Ra, ²³² U, ¹²⁶ I, ¹³³ I, ¹³¹ I	1,000	3,000	200
Beta/gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except ⁹⁰ Sr and other noted above.	5,000	15,000	1,000

- a Where surface contamination by both alpha- and beta/gamma-emitting nuclides exists, the limits established for alpha- and beta/gamma-emitting nuclides should apply independently.
- b As used in this table dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.
- d The maximum contamination level applies to an area of not more than 100 cm².
- e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, then pertinent levels should be reduced proportionally and the entire surface should be wiped.
- f The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mRad/hr at 1 cm² and 1.0 mRad/hr at 1 cm², respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Table 2: STATE OF CA ACCEPTABLE SURFACE CONTAMINATION LEVELS ¹

Nuclides ^a	Average ^{b,c,f} (dpm/100cm ²)	Maximum ^{b,d,f} (dpm/100cm ²)	Removable ^{b,e,f} (dpm/100cm ²)
U-nat, ²³⁵ U, ²³⁸ U, & associated decay products	5,000	15,000	1,000
Transuranics, ²²⁶ Ra, ²²⁸ Ra, ²³⁰ Th, ²²⁸ Th, ²³¹ Pa, ²²⁷ Ac, ¹²⁵ I, ¹²⁹ I	100	300	20
Th-nat, ²³² Th, ⁹⁰ Sr, ²²³ Ra, ²²⁴ Ra, ²³² U, ¹²⁶ I, ¹³³ I, ¹³¹ I	1,000	3,000	200
Beta/gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except ⁹⁰ Sr and other noted above	5,000	15,000	1,000
<p>a Where surface contamination by both alpha- and beta/gamma-emitting nuclides exists, the limits established for alpha- and beta/gamma-emitting nuclides should apply independently.</p> <p>b As used in this table dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, an geometric factors associated with the instrumentation.</p> <p>c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.</p> <p>d The maximum contamination level applies to an area of not more than 100 cm².</p> <p>e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, then pertinent levels should be reduced proportionally and the entire surface should be wiped.</p> <p>f The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm² and 1.0 mrad/hr at 1 cm², respectively, measured through not more than 7 milligrams per square centimeter of total absorber.</p>			

¹ Guidelines For Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses For byproduct, Source, or Special Nuclear Material, also known as "Decon-1" incorporated into GA's State of CA Radioactive Materials License.

Table 3: Building 2 Service Corridor Section B List Of Instruments

Instrument	Detector	Range (cpm)	Calibration Due Date	Efficiency	Background	Description
Non-Suspect Affected Area Survey						
Ludlum Model 2221 S/N 84459	Ludlum Model 43-37 434 cm ² gas flow proportional Beta detector S/N 086215	Four Linear Ranges 0-500,000 & one Log 50-500,000	07-24-02 09-27-02 11-12-02	31.08%	1840-2100 cpm on concrete, 1640 - 1850 cpm on cement block 1730-1800cpm, metal grating Scan MDA = 438 dpm/100 cm ² (concrete), 388 dpm/100 cm ² (cement block), 393 dpm/100 cm ² , grating	Active Probe Area = 434 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector from the floor for optimum performance.
Ludlum Model 2221 S/N 154202	Ludlum Model 43-37 434 cm ² gas flow proportional Beta detector S/N 149017	Four Linear Ranges 0-500,000 & one Log 50-500,000	07-06-04	30.39%	1300-2000 cpm on concrete, 1300-1500 cpm on cement block, 700-1300 cpm on metal. Scan MDA= 375 dpm/100 cm ² (concrete), 318 dpm/100 cm ² (cement block), 227 dpm/100 cm ² (metal)	Active Probe Area = 434 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector from the floor for optimum performance.
Ludlum Model 2221 S/N 148425	Ludlum Model 43-37 434 cm ² gas flow proportional Alpha detector S/N 086236	Four Linear Ranges 0-500,000 & one Log 50-500,000	06-02-02 07-31-02	21.29%	10-40 cpm on concrete Scan MDA= 108 dpm/100 cm ²	Active Probe Area = 434 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector from the floor for optimum performance.
Ludlum Model 3 S/N 151348	Ludlum Model 44-10 NaI (TI) Scintillator Gamma detector S/N 163169	Five Ranges 0-500 µR/hr	03-24-02, 05-22-02, 07-24-02	N/A	22-28 µR/hr @ contact 20-25 µR/hr @ 1m (in concrete room)	2 inch x 2 inch NaI (TI) scintillator. Used for measuring external dose rates at the surface and at 1 meter.
Ludlum Model 3 S/N 153551	Ludlum Model 44-10 NaI (TI) Scintillator Gamma detector S/N 155109	Five Ranges 0-500 µR/hr	07-09-02	N/A	22-28 µR/hr @ contact 20-25 µR/hr @ 1m (in concrete room)	2 inch x 2 inch NaI (TI) scintillator. Used for measuring external dose rates at the surface and at 1 meter.

Table 3: Building 2 Service Corridor Section B List Of Instruments

Instrument	Detector	Range (cpm)	Calibration Due Date	Efficiency	Background	Description
Ludlum Model 3 S/N 153590	Ludlum Model 44-10 NaI (TI) Scintillator Gamma detector S/N 155190	Five Ranges 0-500 μ R/hr	02-12-04	N/A	22-28 μ R/hr @ contact 20-25 μ R/hr @ 1m (in concrete room)	2 inch x 2 inch NaI (TI) scintillator. Used for measuring external dose rates at the surface and at 1 meter.
Ludlum Model 3 S/N 143349	Ludlum Model 44-9 15 cm ² Beta/Gamma Detector S/N 145867	Four Ranges 0-600,000 cpm	08-12-02	24.16%	80-120 cpm MDA = 2759 dpm/100cm ² , Concrete	The instrument is used for beta/gamma surveying in places that a 434 cm ² probe will not fit. The detector has an active probe area of 15 cm ² .
Ludlum Model 2221 S/N 84423	Ludlum Model 43-68 100 cm ² gas flow proportional Beta detector S/N 119444	Four Linear Ranges 0-500,000 & one Log 50-500,000	06-10-02 08-05-02	34.39% 36.47%	1042 cp2m on concrete MDA = 222 dpm/100 cm ² MDA = 210 dpm/100 cm ² @ 36.47%	Active Probe Area = 100 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector.
Ludlum Model 12 S/N 91103	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 92192	Four Ranges 0-500,000	03-18-02	22.14%	0-20 cpm MDA = 312 dpm/100 cm ²	Active Probe Area = 50 cm ² . Used for Alpha surveying and fixed measurements.
Ludlum Model 12 S/N 138801	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 145696	Four Ranges 0-500,000	05-11-02	22.52%	0-20 cpm (all) MDA = 309 dpm/100 cm ²	Active Probe Area = 50 cm ² . Used for Alpha surveying and fixed measurements.
Canberra Low Level α/β Counter Model 2404	Gas Flow Proportional Detector	N/A	As needed	~26-30%	Varies with Sample	Canberra Model 2404 Low Level α/β gas proportional counting system used to count wipes for removable contamination. Results are usually reported as dpm/100 cm ² .

Table 3: Building 2 Service Corridor Section B List Of Instruments

Instrument	Detector	Range (cpm)	Calibration Due Date	Efficiency	Background	Description
Canberra Gamma Spectroscopy System	High Purity Germanium Detector	N/A	As needed	Varies with Sample	Varies with Sample	Gamma Spectroscopy MCA system using a high purity Germanium detector.

Suspect Affected Area and Unaffected Area Survey

Ludlum Model 2221 S/N 84459	Ludlum Model 43-37 434 cm ² gas flow proportional Alpha detector S/N 086215	Four Linear Ranges 0-500,000 & one Log 50-500,000	02-02-04	21.58%	10-60 cpm on concrete 10-30 cpm on cement block 0-40 cpm on metal 0-40 cpm on grating 0-40 cpm on wood	Active Probe Area = 434 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector from the floor for optimum performance.
Ludlum Model 2221 S/N 154202	Ludlum Model 43-37 434 cm ² gas flow proportional Beta detector S/N 149017	Four Linear Ranges 0-500,000 & one Log 50-500,000	03-24-04 06-11-04	30.39% 30.39%	1300-2000 cpm on concrete 1300-1500 cpm on cement block 700-1300 on metal 1000-1400 cpm on grating 900-1400 cpm on wood	Active Probe Area = 434 cm ² . The detector and rate meter are combined and mounted on a roll around cart. The instrument features a static-flow system, quick disconnects, a portable gas bottle and a means to adjust the height of the detector from the floor for optimum performance.
Ludlum Model 2221 S/N 86302	Ludlum Model 43-68 100 cm ² gas flow proportional Beta detector S/N142547	Four Linear Ranges 0-500,000 & one Log 50-500,000	01-14-04 04-06-04 05-04-04	31.20% 31.20% 31.20%	822 ± 344 cp2m on concrete MDA 218 dpm/100 cm ² scan 320-420 cpm 671 ± 126 cp2m on cement block MDA 197 dpm/100 cm ² scan 220-340 cpm	Active Probe Area = 100 cm ² . The detector and rate meter are combined on a roll around cart. The instrument features a static-flow system, quick disconnects and a portable gas bottle.

Table 3: Building 2 Service Corridor Section B List Of Instruments

Instrument	Detector	Range (cpm)	Calibration Due Date	Efficiency	Background	Description
					435 ± 170 cp2m on metal MDA 160 dpm/100 cm ² scan 180-280 cpm 588±141 cp2m on metal grating MDA 185 dpm/100 cm ² 637±109 cp2m on wood MDA 192 dpm/100 cm ²	
Ludlum Model 3 S/N 138880	Ludlum Model 44-9 15 cm ² Beta/Gamma Detector S/N 117851	Four Ranges 0-600,000 cpm	03-11-04 05-10-04 01-28-05	26.14% 26.14% 26.14%	60-80 cpm on concrete 50-80 cpm on cement block 40-70 cpm on metal 50-80 cpm on insulation	The instrument is used for beta/gamma surveying. The detector has an active probe area of 15 cm ² .
Ludlum Model 3 S/N 143349	Ludlum Model 44-9 15 cm ² Beta/Gamma Detector S/N 145967	Four Ranges 0-600,000 cpm	02-03-04	29.18%	40-60 cpm on metal	The instrument is used for beta/gamma surveying. The detector has an active probe area of 15 cm ² .
Ludlum Model 3 S/N 153590	Ludlum Model 44-10 NaI (TI) Scintillator Gamma detector S/N 155190	Five Ranges 0-500 µR/hr	11-17-03 02-12-04	N/A	<u>concrete</u> 15-24 µR/hr contact 14-22 µR/hr @ 1 meter <u>cement block</u> 13-20 µR/hr contact 13-20 µR/hr @ 1 meter <u>Metal</u> 9-17 µR/hr contact 13-19 µR/hr @ 1 meter	2 inch x 2 inch NaI (TI) scintillator. Used for measuring external dose rates at the surface and at 1 meter.
Ludlum Model 3 S/N 153551	Ludlum Model 44-10 NaI (TI) Scintillator Gamma detector S/N 155109	Five Ranges 0-500 µR/hr	11-17-03 01-06-05 04-08-05 07-05-05	N/A	<u>concrete</u> 15-21 µR/hr contact 15-21 µR/hr @ 1 meter <u>cement block</u> 14-19 µR/hr contact 14-18 µR/hr @ 1 meter <u>Metal</u>	2 inch x 2 inch NaI (TI) scintillator. Used for measuring external dose rates at the surface and at 1 meter.

Table 3: Building 2 Service Corridor Section B List Of Instruments

Instrument	Detector	Range (cpm)	Calibration Due Date	Efficiency	Background	Description
					9-13 $\mu\text{R/hr}$ contact 10-13 $\mu\text{R/hr}$ @ 1 meter	
Ludlum Model 12 S/N 138801	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 145696	Four Ranges 0-500,000 cpm	03-11-04	22.52%	<20 cpm all surfaces MDA 209 dpm/100 cm^2	Active Probe Area = 50 cm^2 . Used for Alpha surveying and fixed measurements.
Ludlum Model 12 S/N 138738	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 073360	Four Ranges 0-500,000 cpm	05-17-04	21.02%	<20 cpm all surfaces MDA 224 dpm/100 cm^2	Active Probe Area = 50 cm^2 . Used for Alpha surveying and fixed measurements.
Ludlum Model 12 S/N 72676	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 89928	Four Ranges 0-500,000 cpm	12-09-03	22.14%	<20 cpm all surfaces MDA 212 dpm/100 cm^2	Active Probe Area = 50 cm^2 . Used for Alpha surveying and fixed measurements.
Ludlum Model 12 S/N 91051	Ludlum Model 43-65 Alpha Scintillator ZnS(Ag) Alpha detector S/N 094053	Four Ranges 0-500,000 cpm	04-15-03 10-14-03	21.77% 21.77%	<20 cpm all surfaces MDA 216 dpm/100 cm^2	Active Probe Area = 50 cm^2 . Used for Alpha surveying and fixed measurements.
Canberra Low Level α/β Counter Model 2404	Gas Flow Proportional Detector	N/A	as needed	~26-30%	Varies with Sample	Canberra Model 2404 Low Level α/β gas proportional counting system used to count wipes for removable contamination. Results are usually reported as dpm/100 cm^2 .
Canberra Gamma Spectroscopy System	High Purity Germanium Detector	N/A	as needed	Varies with Sample	Varies with Sample	Gamma Spectroscopy MCA system using a high purity Germanium detector.

Table 4: Building 2 Service Corridor, Wipe Sample Analysis Results					
Non-Suspect Affected Area					
(Note: breaks in sample numbering sequence occurs due to re-classification)					
Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²	Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²
111	<20	<20	314	<20	<20
112	<20	<20	315	<20	<20
113	<20	<20	316	<20	<20
114	<20	<20	317	<20	<20
115	<20	<20	318	<20	<20
116	<20	<20	319	<20	<20
117	<20	<20	320	<20	<20
151	<20	<20	321	<20	<20
152	<20	<20	322	<20	<20
153	<20	<20	323	<20	<20
154	<20	<20	324	<20	<20
155	<20	<20	325	<20	<20
156	<20	<20	326	<20	<20
157	<20	<20	327	<20	<20
158	<20	<20	328	<20	<20
159	<20	<20	329	<20	<20
160	<20	<20	330	<20	<20
161	<20	<20	331	<20	<20
162	<20	<20	332	<20	<20
163	<20	<20	333	<20	<20
164	<20	<20	334	<20	<20
165	<20	<20	335	<20	<20
175	<20	<20	336	<20	<20
176	<20	<20	337	<20	<20
177	<20	<20	338	<20	<20

Table 4: Building 2 Service Corridor, Wipe Sample Analysis Results					
Non-Suspect Affected Area					
(Note: breaks in sample numbering sequence occurs due to re-classification)					
Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²	Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²
178	<20	<20	339	<20	<20
179	<20	<20	340	<20	<20
180	<20	<20	341	<20	<20
181	<20	<20	342	<20	<20
182	<20	<20	440	<20	<20
183	<20	<20	441	<20	<20
184	<20	<20	442	<20	<20
185	<20	<20	443	<20	<20
186	<20	<20	444	<20	<20
187	<20	<20	445	<20	<20
188	<20	<20	446	<20	<20
189	<20	<20	447	<20	<20
190	<20	<20	448	<20	<20
191	<20	<20	449	<20	<20
192	<20	<20	450	<20	<20
193	<20	<20	451	<20	<20
194	<20	<20	452	<20	<20
195	<20	<20	453	<20	<20
196	<20	<20	454	<20	<20
197	<20	<20	455	<20	<20
198	<20	<20	456	<20	<20
199	<20	<20	457	<20	<20
200	<20	<20	458	<20	<20
201	<20	<20	459	<20	<20
202	<20	<20	460	<20	<20

Table 4: Building 2 Service Corridor, Wipe Sample Analysis Results					
Non-Suspect Affected Area (Note: breaks in sample numbering sequence occurs due to re-classification)					
Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²	Sample Number	α in dpm/100 cm ²	β in dpm/100 cm ²
203	<20	<20	461	<20	<20
204	<20	<20	462	<20	<20
205	<20	<20	463	<20	<20
206	<20	<20	464	<20	<20
207	<20	<20	465	<20	<20
208	<20	<20	466	<20	<20
209	<20	<20	467	<20	<20
210	<20	<20	468	<20	<20
			469	<20	<20

Table 5: Building 2 Service Corridor Section B Wipe Results Suspect Affected and Unaffected Areas
(Wipe results in dpm/100cm²)

Lower Level B43 - B46			
Wipe #	α	β	Figure #
1	<20	<20	70
2	<20	<20	70
3	<20	<20	70
4	<20	<20	70
5	<20	<20	70
6	<20	<20	69
7	<20	<20	69
8	<20	<20	69
9	<20	<20	71
10	<20	<20	71
11	<20	<20	71
12	<20	<20	71
13	<20	<20	71
14	<20	<20	70
15	<20	<20	70
16	<20	<20	70
17	<20	<20	69
18	<20	<20	69
19	<20	<20	71
20	<20	<20	71
Middle Level B46-B49			
Wipe #	α	β	Figure #
1	<20	<20	73
2	<20	<20	73

3	<20	<20	73
4	<20	<20	73
5	<20	<20	73
6	<20	<20	74
7	<20	<20	74
8	<20	<20	74
9	<20	<20	74
10	<20	<20	74
11	<20	<20	72
12	<20	<20	72
13	<20	<20	72
14	<20	<20	72
Electrical Room B			
Wipe #	α	β	Figure #
1	<20	<20	4
2	<20	<20	4
Mechanical Room B			
Wipe #	α	β	Figure #
3	<20	<20	9
4	<20	<20	9
5	<20	<20	9
6	<20	<20	9
Elevator Machinery Room D @ B. 50			
Wipe #	α	β	Figure #
9	<20	<20	8
10	<20	<20	8

Table 5: Building 2 Service Corridor Section B Wipe Results Suspect Affected and Unaffected Areas
(Wipe results in dpm/100cm²)

Elevator Machinery Room E @ B38			
Wipe #	α	β	Figure #
7	<20	<20	7
8	<20	<20	7
Ventilation Room Above Breezeway D			
Wipe #	α	β	Figure #
1	<20	36	12
2	<20	<20	12
3	<20	<20	12
4	<20	<20	12
5	<20	<20	12
Ventilation Room Above Breezeway E			
Wipe #	α	β	Figure #
1	<20	<20	15
2	<20	<20	15
3	<20	<20	15
4	<20	<20	15
5	<20	<20	15
Louvers External Surface			
Wipe #	α	β	Figure #
1	<20	<20	21
2	<20	<20	21
3	<20	<20	21
4	<20	<20	21
5	<20	<20	21
6	<20	<20	21

7	<20	<20	21
8	<20	<20	21
9	<20	<20	21
10	<20	<20	21
11	<20	<20	21
12	<20	<20	21
13	<20	<20	21
14	<20	<20	21
15	<20	<20	21
16	<20	<20	21
17	<20	<20	21
18	<20	<20	21
19	<20	<20	21
20	<20	<20	21
21	<20	<20	21
22	<20	<20	21
23	<20	<20	21
24	<20	<20	21
25	<20	<20	21
26	<20	<20	21
27	<20	<20	21
28	<20	<20	21
29	<20	<20	21
30	<20	<20	21
31	<20	32	21
32	<20	<20	21

Table 5: Building 2 Service Corridor Section B Wipe Results Suspect Affected and Unaffected Areas
(Wipe results in dpm/100cm²)

Wipe #	α	β	Figure #
33	<20	<20	21
34	<20	<20	21
35	<20	<20	21
36	<20	<20	21
37	<20	<20	21
38	<20	<20	21
39	<20	<20	21
40	<20	<20	21
41	<20	<20	21
42	<20	<20	21
43	<20	<20	21
44	<20	<20	21
45	<20	<20	21
46	<20	<20	21
47	<20	<20	21
48	<20	<20	21
49	<20	<20	21
50	<20	<20	21
51	<20	<20	21
52	<20	<20	21
53	<20	<20	21
54	<20	<20	21
55	<20	<20	21
56	<20	<20	21
57	<20	<20	21
58	<20	<20	21

59	<20	<20	21
60	<20	<20	21
61	<20	<20	21
62	<20	<20	21
63	<20	<20	21
64	<20	<20	21
65	<20	<20	21
66	<20	<20	21
67	<20	22	Louvers replaced 12/2004
68	<20	25	
69	<20	<20	21
70	<20	<20	21
71	<20	<20	21
72	<20	<20	21
73	<20	<20	21
74	<20	<20	21
75	<20	<20	21
76	<20	<20	21
77	<20	<20	21
78	<20	<20	21
79	<20	<20	21
80	<20	<20	21
81	<20	<20	21
82	<20	<20	21
83	<20	<20	21
72	<20	<20	21

Table 5: Building 2 Service Corridor Section B Wipe Results Suspect Affected and Unaffected Areas
(Wipe results in dpm/100cm²)

Upper Level Crawl Space @ B46			
Wipe #	α	β	Figure #
1	<20	<20	18
2	<20	<20	18
3	<20	<20	18
4	<20	<20	18
5	<20	<20	18
6	<20	<20	18
7	<20	<20	18
8	<20	<20	18
9	<20	<20	18
10	<20	<20	18

Figure 1: GA's Main Site and Sorrento Valley Site

Building Numbers Names

Building 1	Administration
Building 2	Science Laboratories A, B, C
Building 7	Cafeteria
Building 9	Office/Lab Building
Building 10	Office Building/Health Physics
Building 13	Technical Office Building
Building 14	Technical Office East
Building 15	Technical Office East
Building 19	Swimming Pool Building
Building 21	TRIGA Building
Building 22	Inertial Fusion Development Building
Building 23	Former Hot Cell Site
Building 25	Former Liquid Waste Processing Building
Building 27	Space Power Building
Building 29	Office Building
Building 29-2	Landscaper's Building
Building 30	Office/Lab Building (Former LINAC Complex)
Building 31	Storage/Nuclear Calibration
Building 31-2	Lab Building
Building 33	ICF Lab Building
Building 33-1	ICF Office Building
Building 33-5	Painters Building
Building 34	Fusion DIII-D Building
Building 34-1	Fusion DIII-D Capacitor Building
Building 34-2	Fusion DIII-D Lab Building
Building 34-3	Fusion DIII-D Storage Building
Building 35	Test Tower Building
Building 35-1	Facilities (& Shipping & Receiving)
Building 36	Experimental Building
Building 37	Sorrento Valley Building A
Building 39-1	Storage Building
Building 42	Laboratory Building (QA)
Building 45	Machine Shop
Building 63	3550 Dunhill St.
Building 64	11030 Roselle St.
Building 65	11040 Roselle St.
Building 66	3520 Dunhill St.
Building 66	3510 Dunhill St.

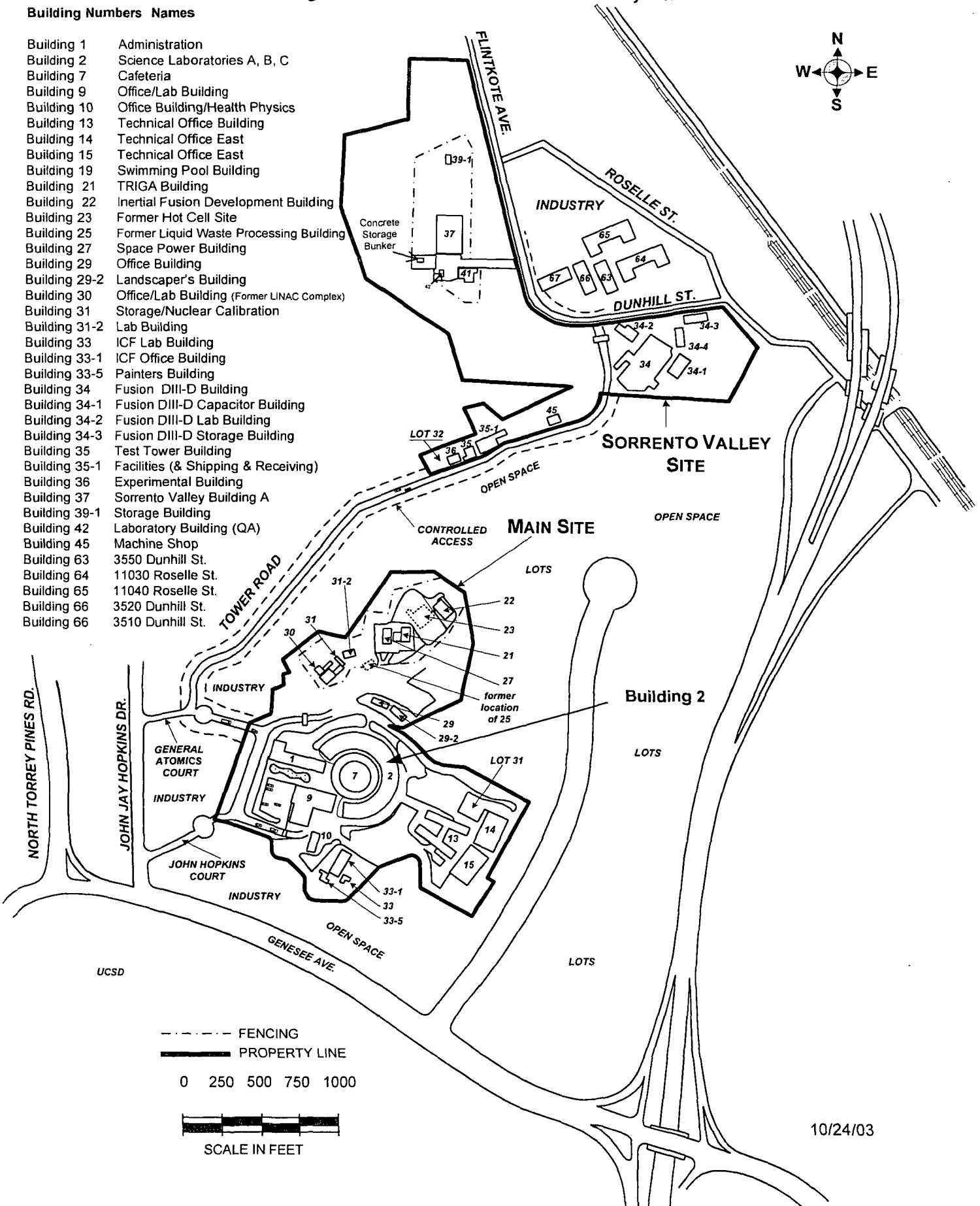
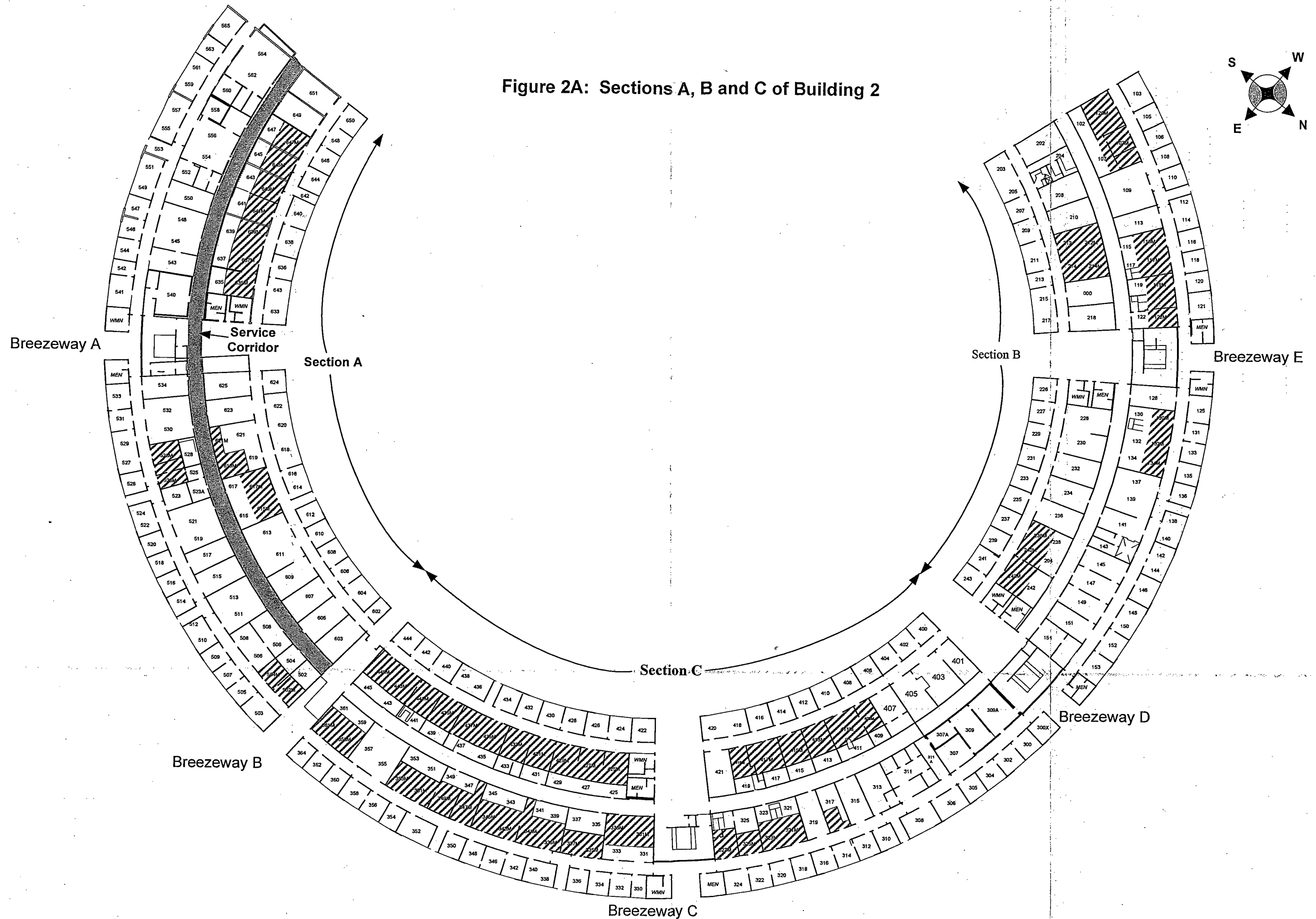


Figure 2A: Sections A, B and C of Building 2



VACANT

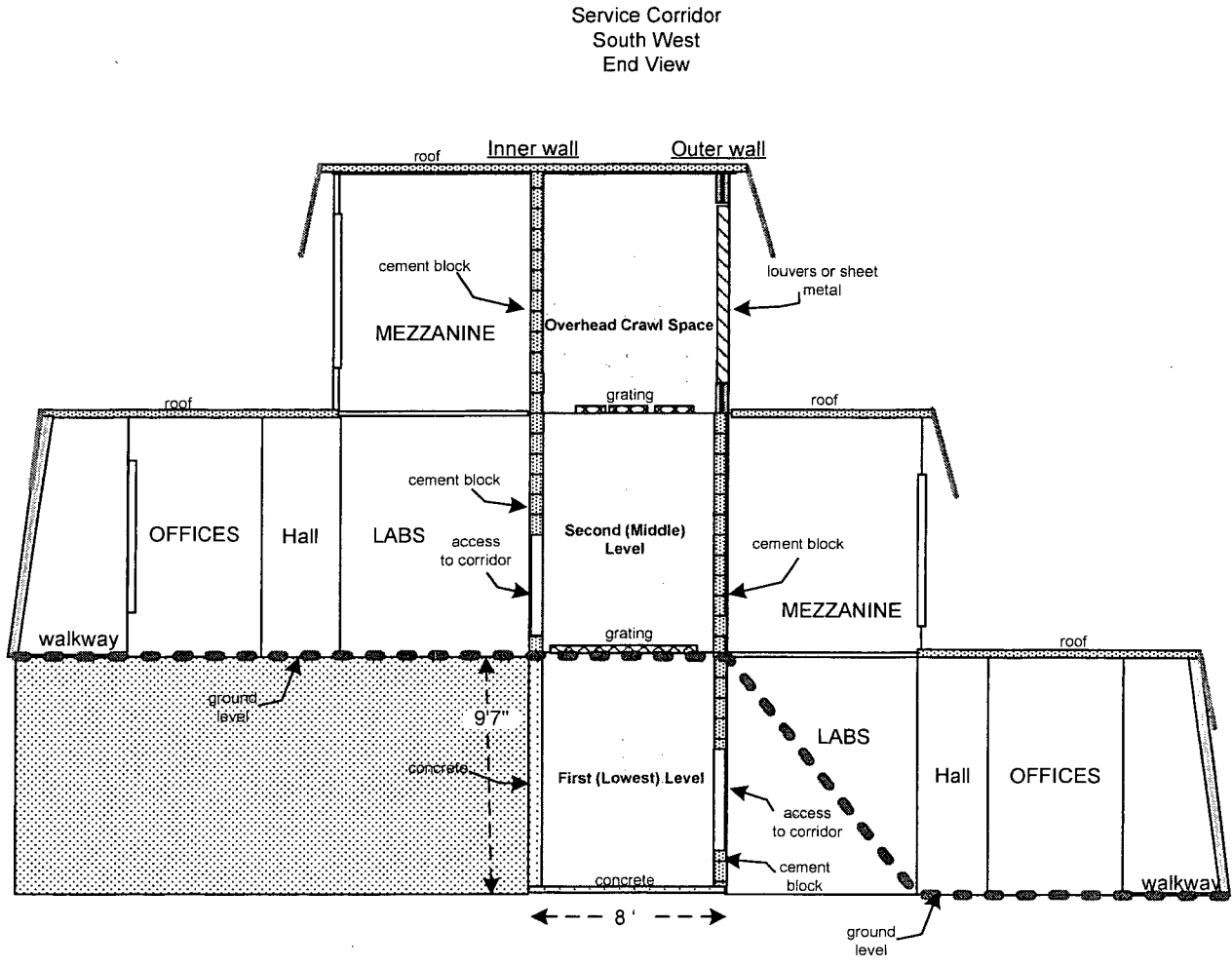
PROPRIETARY INFORMATION
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GENERAL ATOMICS

FAC. ENG. NO.	SHEET NO.	DATE	BUILDING: BUILDING 2
000-02	02	03/06/03	FLOOR: ROOMS 127 - 156 & 223 - 246
			DESCRIPTION: OCCUPANCY

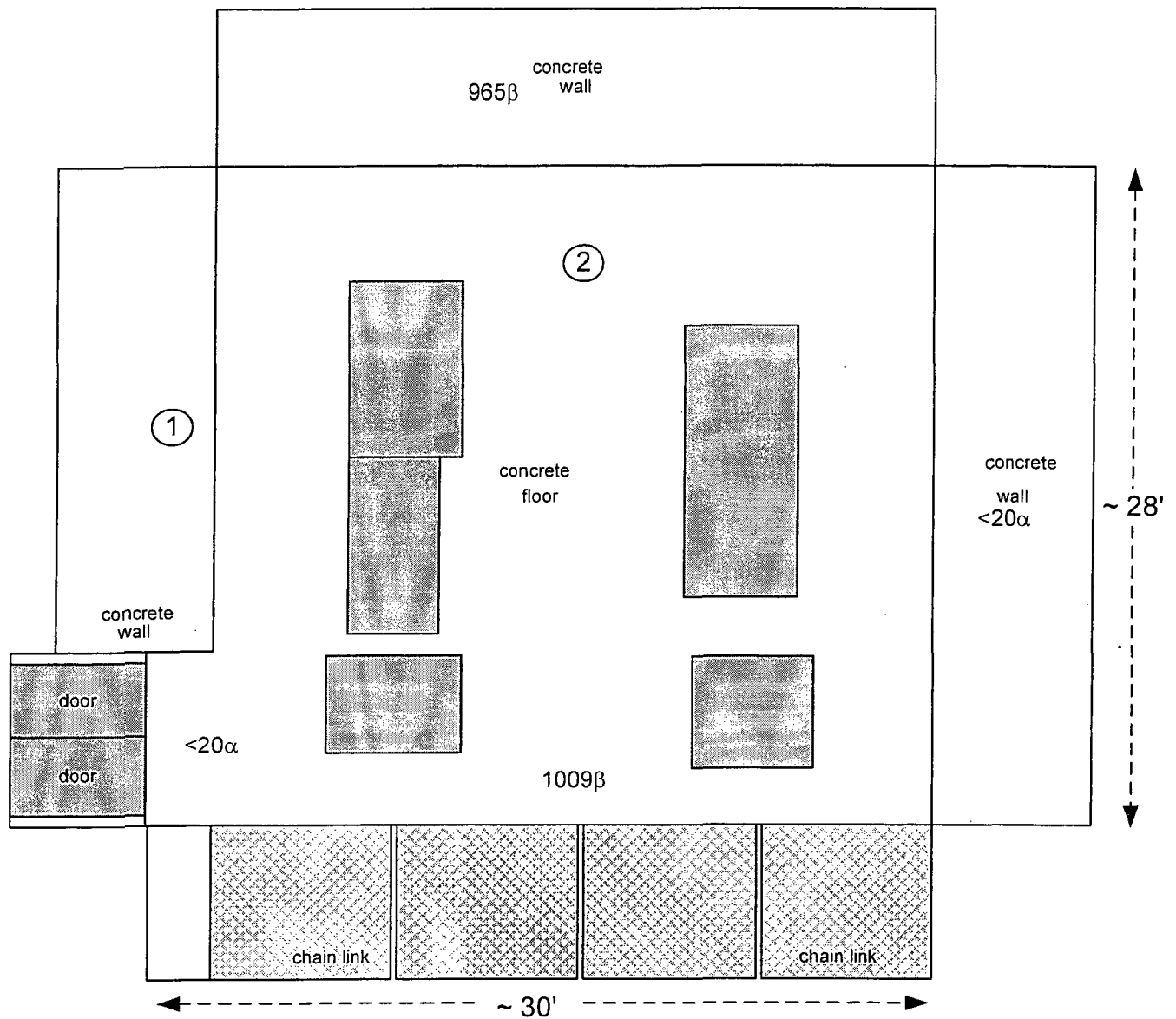
VACANT

Figure 3: Building 2 End View



Drawing NOT to Scale

Figure 4: Building 2 Service Corridor Section B Electrical Room
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



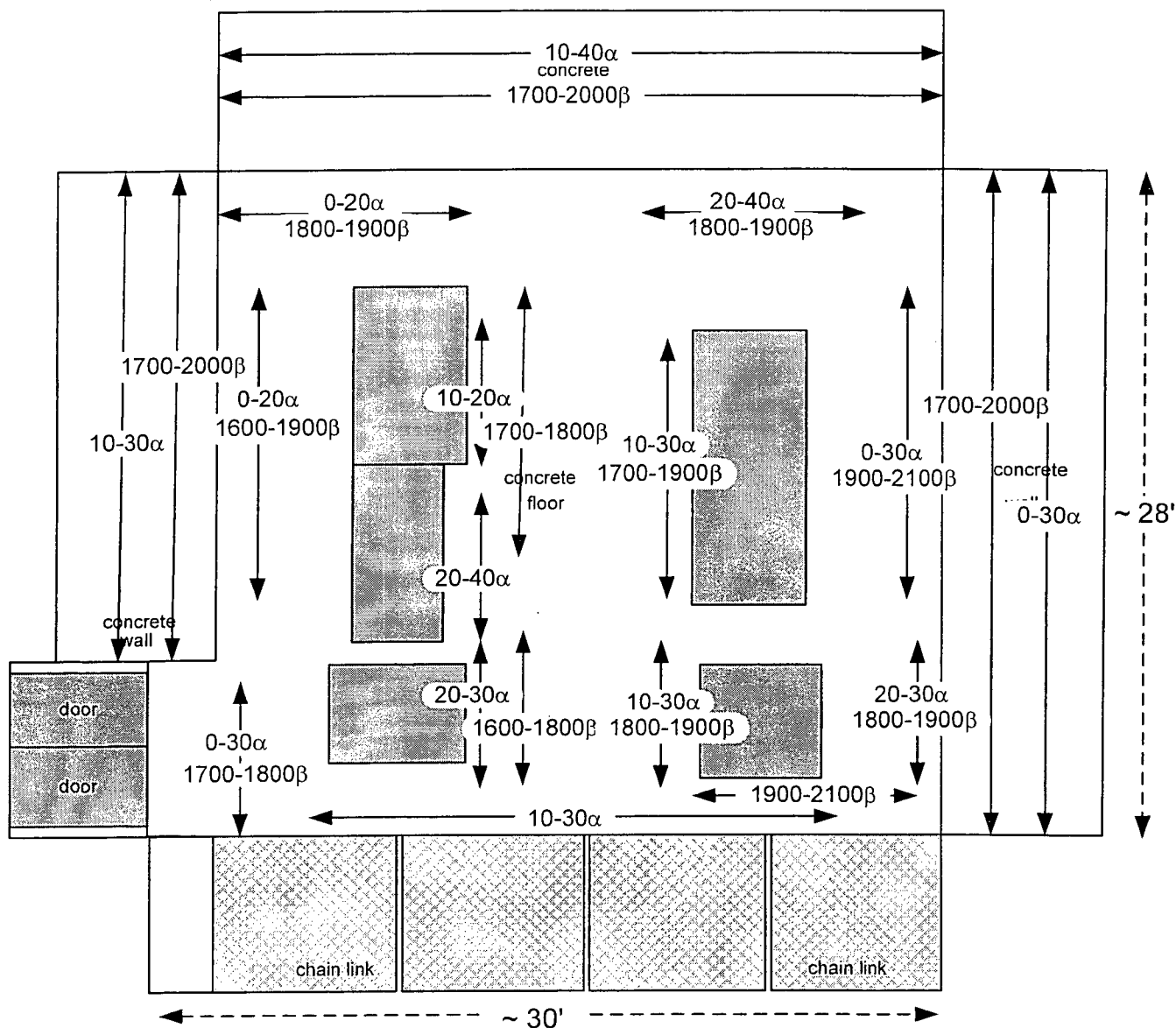
Notes:

1. ##α Denotes alpha fixed measurement in cpm.
2. ###β Denotes beta fixed measurement in cp2m.
3. (#) Denotes wipe location, wipe results are provided in Table 5.

Instruments		
Model	Ludlum 12	Ludlum 2221
Serial Number	138801	86302
Probe	50 cm ² α	100 cm ² β
Probe Serial #	145696	142547
Cal Due Date	03-11-04	04-06-04
Efficiency	22.52 %	31.20%
Background	<20 cpm	822+/-344 cp2m
MDA	209 dpm/100 cm ²	218 dpm/100cm ²

Survey conducted by: G. Sayer & D. Koelker
Date: 10-14-03

Figure 5: Building 2 Service Corridor Section B Electrical Room
Alpha and Beta Scan Measurement Locations and Results



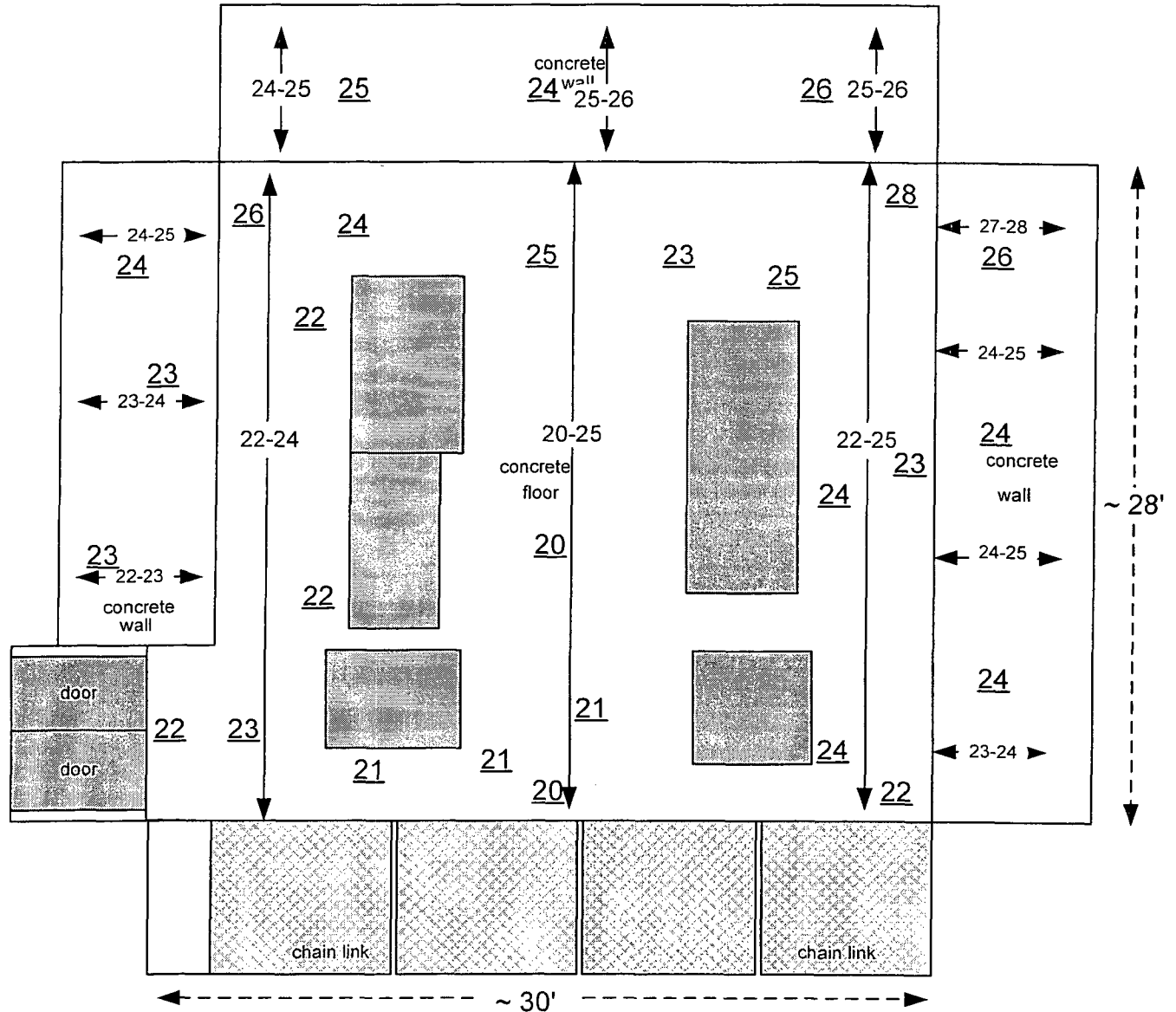
Notes:

1. 10% of surface floor and walls 2 meters and below scanned.
2. $\leftarrow \#\#\alpha \rightarrow$ Denotes alpha scan in cpm.
3. $\leftarrow \#\#\beta \rightarrow$ Denotes beta scan in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial Number	84459	154202
Probe	434 cm ² α	434 cm ² β
Probe Serial #	086215	149017
Cal Due Date	02-02-04	03-24-04
Efficiency	21.58 %	30.39 %
Background	10-60 cpm	1300-2000
Scan MDA	112 dpm/100 cm ²	375 dpm/100 cm ²

Survey conducted by: D. Koelker
Date: 10-13-03

Figure 6: Building 2 Service Corridor Section B Electrical Room
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



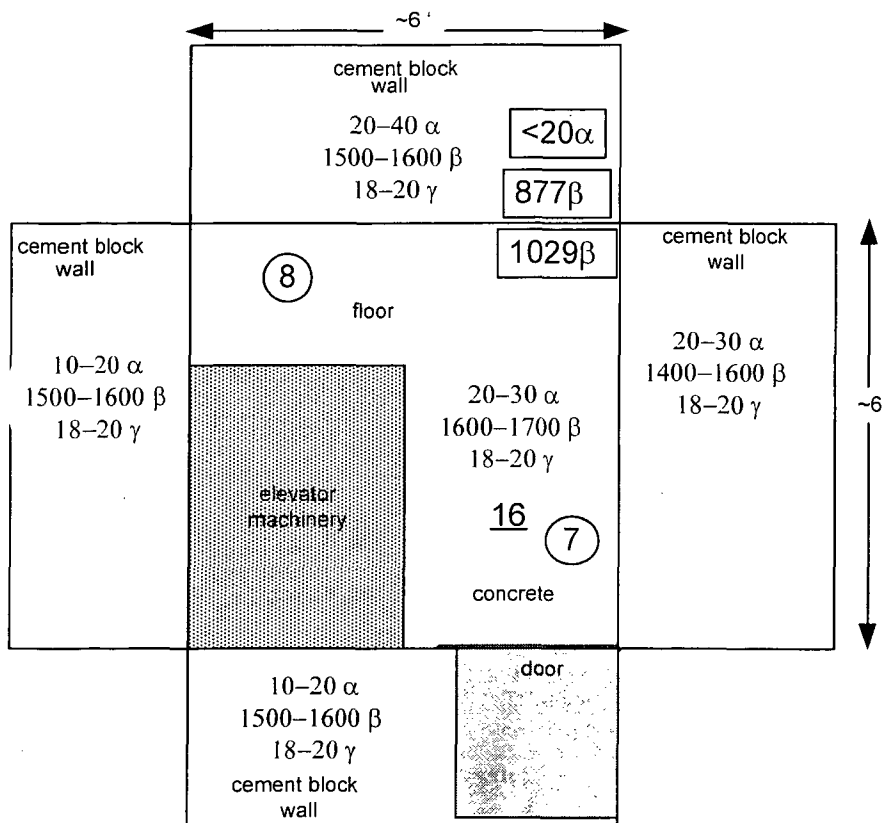
Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. **← ## →** Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 10% of floor and walls 2 meters and below were scanned.

Instrument	
Model	Ludlum 3
Serial Number	153590
Probe	2" X 2" NaI γ
Probe Serial #	155190
Cal Due Date	11-17-03
Bkgd contact	15-24 $\mu\text{R/hr}$
Bkgd @1 meter	14-22 $\mu\text{R/hr}$

Survey conducted by: G. Sayer
Date: 10-13-03

Figure 7: Building 2 Service Corridor Section B Elevator Machinery Room Breezeway E
Final Surveys



Instrument	
Model	Ludlum 3
Serial Number	153551
Probe	2" X 2" NaI γ
Probe Serial #	155109
Cal Due Date	07-05-05
Bkgd concrete	15-21 μR/hr

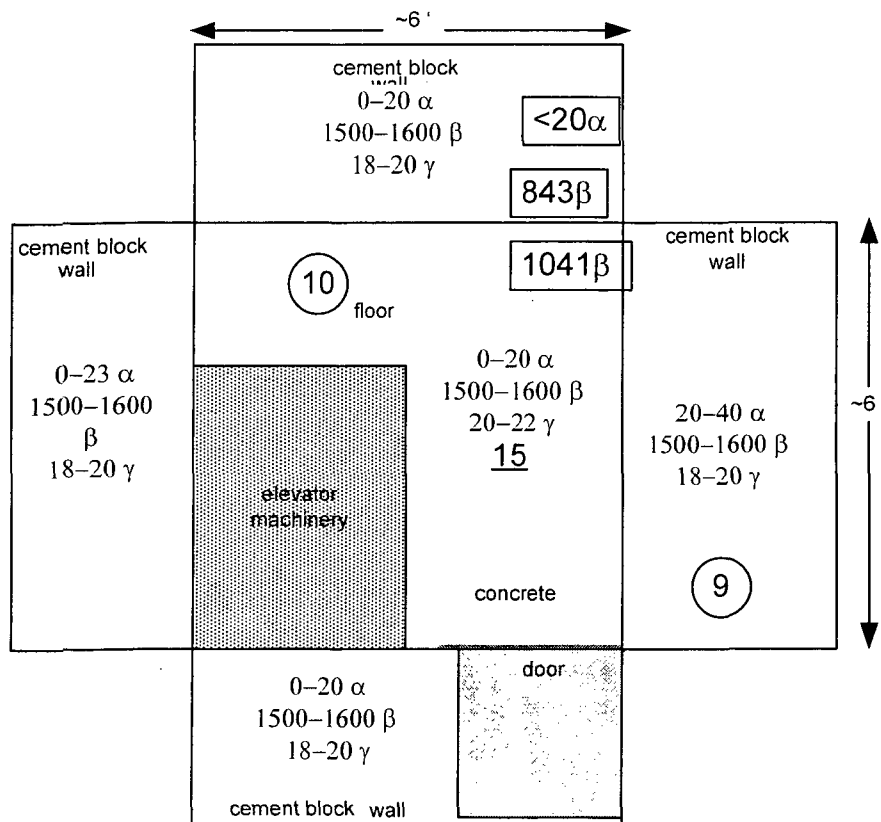
Instruments					
Model	Ludlum 12	Ludlum 2221	Ludlum 2221	Ludlum 2221	Ludlum 3
Serial Number	138801	86302	84459	154202	153590
Probe	50 cm ² α	100 cm ² β	434 cm ² α	434 cm ² β	2" X 2" NaI γ
Probe Serial #	145696	142547	086215	149017	155190
Cal Due Date	03-11-04	01-14-04	02-02-04	03-24-04	11-17-03
Efficiency %	22.52	31.20	21.58	30.39	N/A
Bkgd. concrete	<20 cpm	822+/-344 cp2m	10-60 cpm	1200-2000 cpm	cont. 15-24 μR/hr
MDA concrete	209 dpm/100 cm ²	218 dpm/100 cm ²	112 dpm/100 cm ²	364 dpm/100 cm ²	@1m 14-22 μR/hr
Bkgd cement blk	<20 cpm	671+/-126 cp2m	10-30 cpm	1300-1500 cpm	cont. 13-20 μR/hr
MDA cement blk	209 dpm/100 cm ²	197 dpm/100 cm ²	64 dpm/100 cm ²	318 dpm/100 cm ²	@1m 13-20 μR/hr

Notes:

- Alpha, beta and exposure rate scans of 10% of the floor and walls 2 meters and below. ## α-alpha scan in cpm, ## β-beta scan in cpm and ## γ-exposure rate scan in μR/hr.
- ##α Denotes alpha fixed measurement in cpm.
- ###β Denotes beta fixed measurement in cp2m.
- # Denotes wipe location. Wipe results are provided in Table 5.
- ## Denotes fixed exposure rate measurement, in μR/hr, taken @ ~ 1 meter from the surface.

Surveys conducted by: W. Schuck, D. Koelker, G. Sayer & R. Stowell
Dates: 09-24-03, 10-14-03 & 4-27-05.

Figure 8: Building 2 Service Corridor Section B Elevator Machinery Room Breezeway D
Final Suveys



Instrument	
Model	Ludlum 3
Serial Number	153551
Probe	2" X 2" NaI γ
Probe Serial #	155109
Cal Due Date	07-05-05
Background	15-21 μR/hr

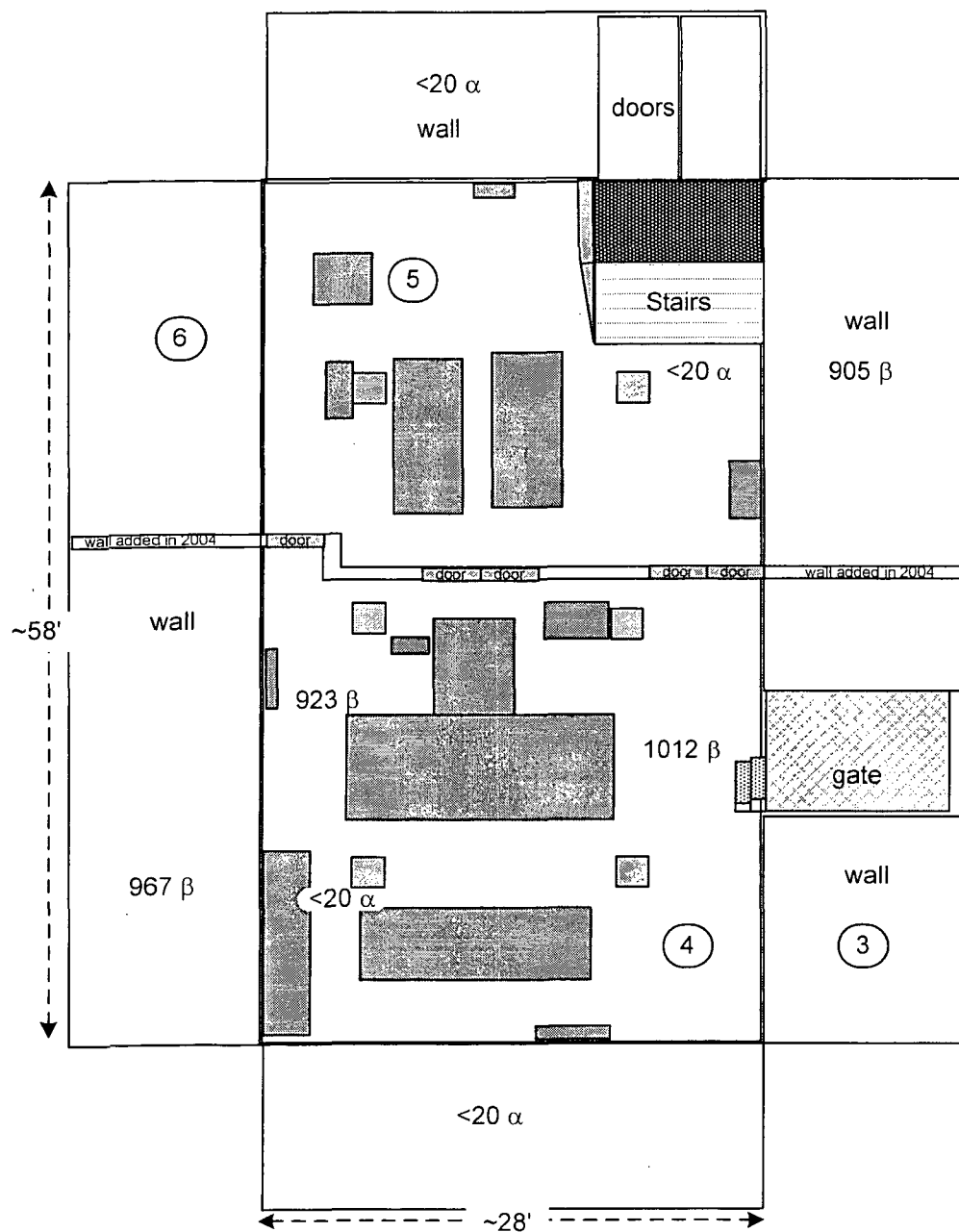
Instruments					
Model	Ludlum 12	Ludlum 2221	Ludlum 2221	Ludlum 2221	Ludlum 3
Serial Number	138801	86302	84459	154202	153590
Probe	50 cm ² α	100 cm ² β	434 cm ² α	434 cm ² β	2" X 2" NaI γ
Probe Serial #	145696	142547	086215	149017	155190
Cal Due Date	03-11-04	01-14-04	02-02-04	03-24-04	11-17-03
Efficiency %	22.52	31.20	21.58	30.39	N/A
Bkgd. concrete	<20 cpm	822+/-344 cp2m	10-60 cpm	1200-2000 cpm	cont. 15-24 μR/hr
MDA concrete	209 dpm/100 cm ²	218 dpm/100 cm ²	112 dpm/100 cm ²	364 dpm/100 cm ²	@1m 14-22 μR/hr
Bkgd cement blk	<20 cpm	671+/-126 cp2m	10-30 cpm	1300-1500 cpm	cont. 13-20 μR/hr
MDA cement blk	209 dpm/100 cm ²	197 dpm/100 cm ²	64 dpm/100 cm ²	318 dpm/100 cm ²	@1m 13-20 μR/hr

Notes:

- Alpha, beta and exposure rate scans of 10% of the floor and walls 2 meters and below. ##α-alpha scan in cpm, #-#β-beta scan in cpm and #-#γ-exposure rate scan in μR/hr.
- ## Denotes exposure rate fixed measurement in μR/hr at 1 meter.
- ##α Denotes alpha fixed measurement in cpm.
- ###β Denotes beta fixed measurement in cp2m.
- # Denotes wipe location. Wipe results are provided in Table 5.
- ## Denotes exposure rate fixed measurement, in μR/hr, taken at 1 meter from the surface.

Surveys conducted by: W. Schuck, G. Sayer, D. Koelker & R Stowell
Dates: 09-24-03, 10-14-03 & 04-27-05

Figure 9: Building 2 Service Corridor Section B Mechanical Room
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



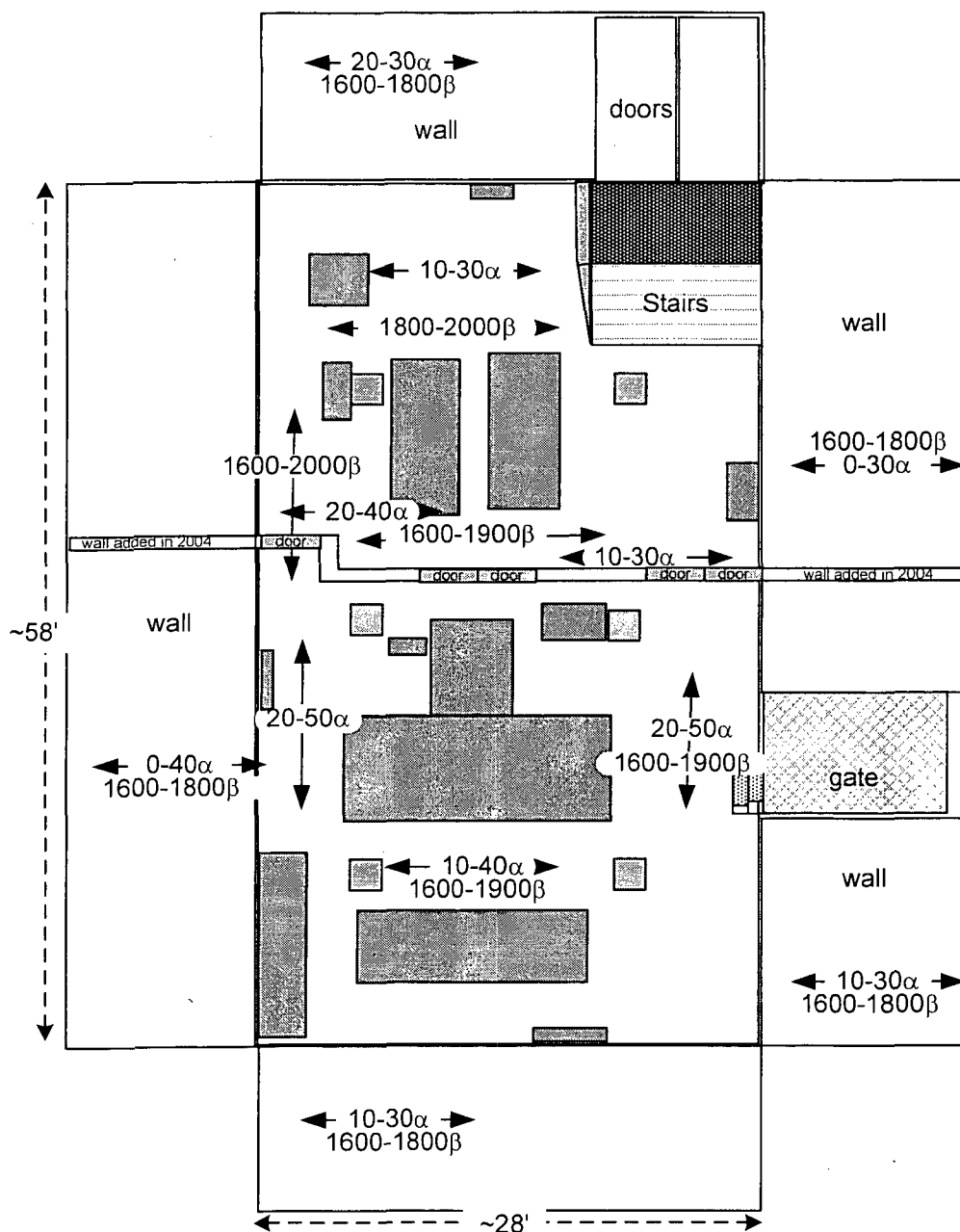
Notes:

1. ## α Denotes fixed alpha measurement in cpm.
2. ### β Denotes fixed beta measurement in cp2m.
3. (#) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 12	Ludlum 2221
Serial Number	138801	86302
Probe	50 cm ² α	100 cm ² β
Probe Serial #	145696	142547
Cal Due Date	03-11-04	01-14-04
Efficiency	22.52%	31.20%
Bkgd. concrete	<20 cpm	822+/-344 cp2m
MDA concrete	209 dpm/100 cm ²	218 dpm/100 cm ²

Surveys conducted by: D. Koelker & G. Sayer
Dates: 10-14-03

Figure 10: Building 2 Service Corridor Section B Mechanical Room
Alpha and Beta Scan Measurement Locations and Results



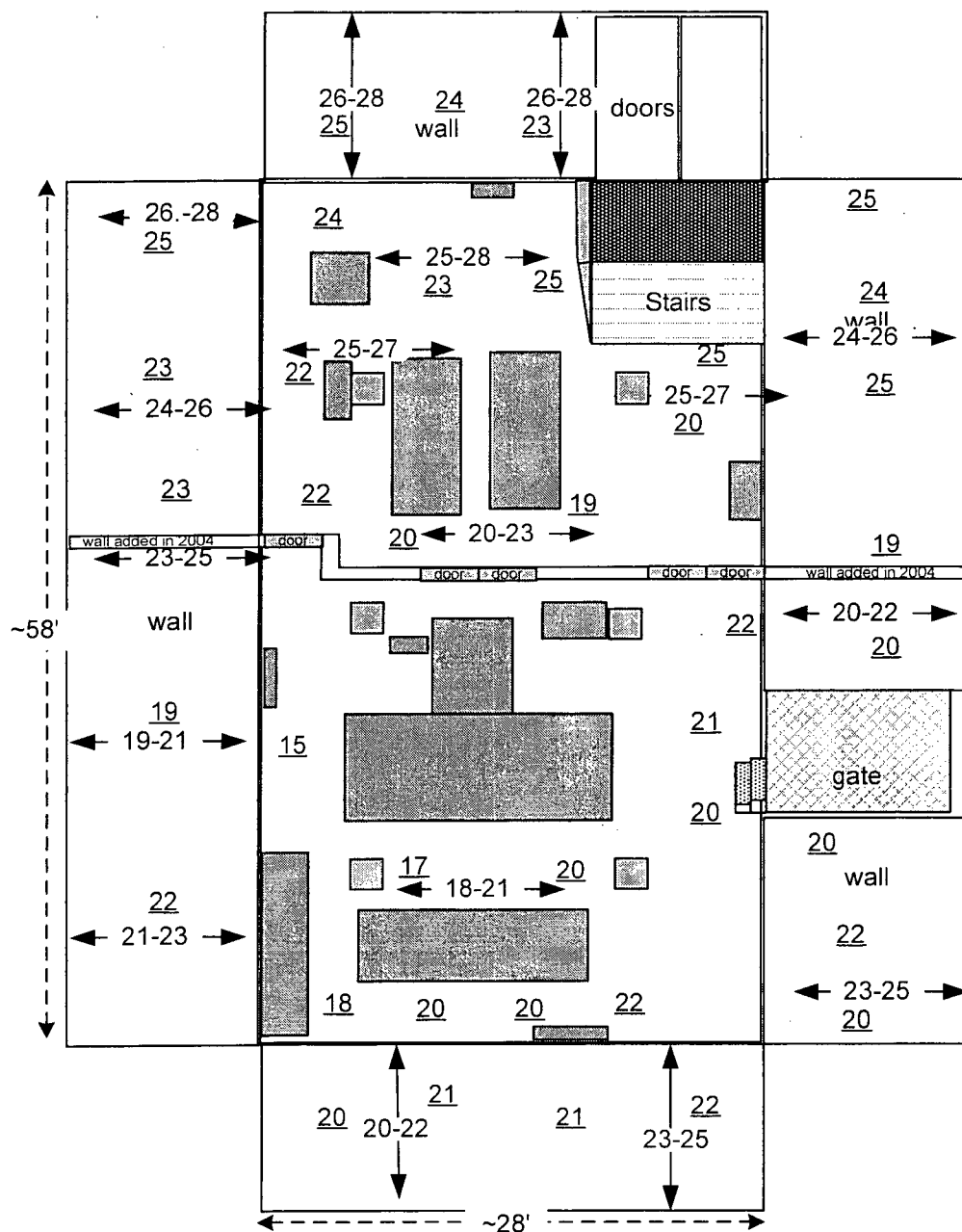
Notes:

1. 10% of surface scanned for alpha and beta.
2. ← ##-##α → Denotes alpha scan in cpm.
3. ← ##-##β → Denotes beta scan in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial Number	84459	154202
Probe	434 cm ² α	434 cm ² β
Probe Serial #	086215	149017
Cal Due Date	02-02-04	03-24-04
Efficiency	21.58%	30.39%
Bkgd. concrete	10-60 cpm	1300-2000 cpm
Scan MDA	112 dpm/100 cm ²	375 dpm/100 cm ²

Surveys conducted by: W. Schuck
Date: 09-24-03

Figure 11: Building 2 Service Corridor Section B Mechanical Room
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



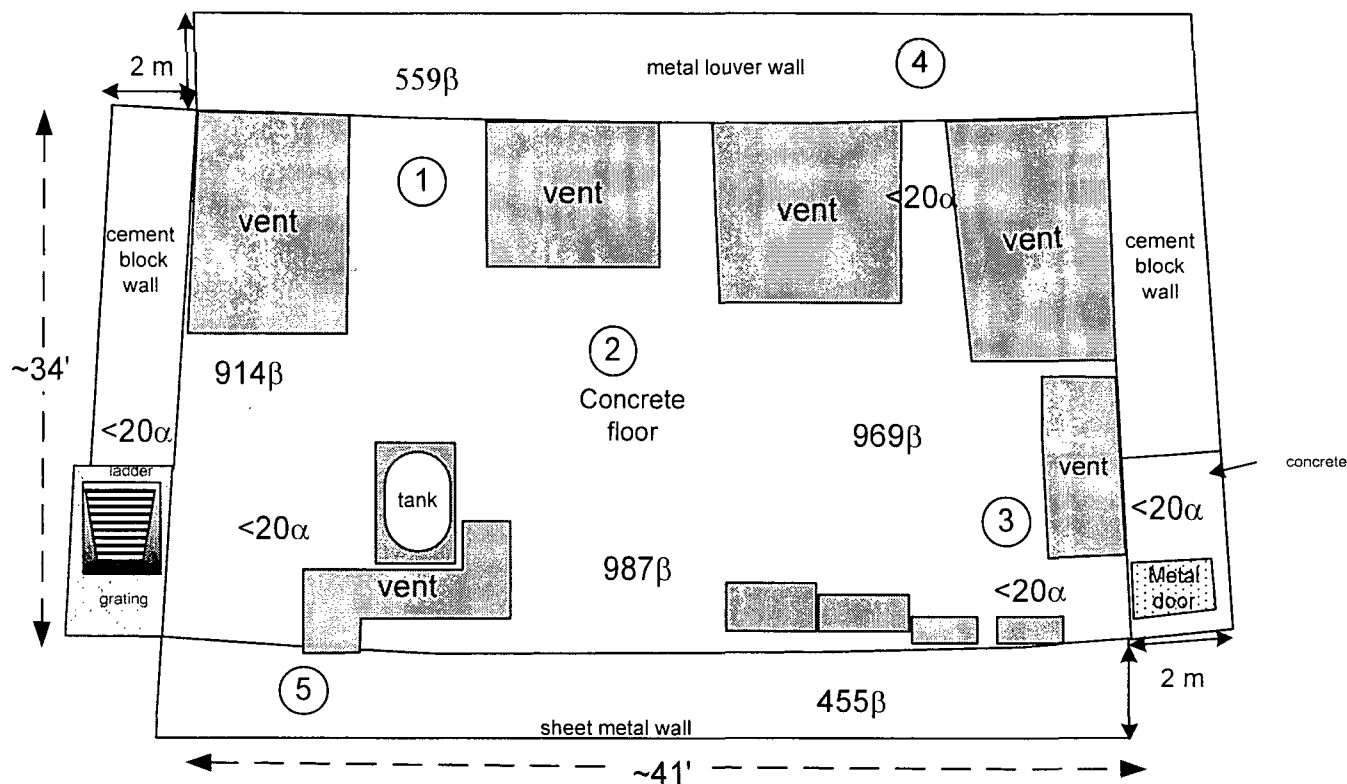
Notes:

1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~1 meter from the surface.
2. $\leftarrow \text{##} \text{##} \rightarrow$ Denotes exposure rate scan measurement in $\mu\text{R/hr}$. 10% of floor and walls 2 meters and below scanned.

Instrument	
Model	Ludlum 3
Serial Number	153590
Probe	2" X 2" NaI γ
Probe Serial #	155190
Cal Due Date	11-17-03
Bkgd. contact	15-24 $\mu\text{R/hr}$
Bkgd. @ 1 m	14-22 $\mu\text{R/hr}$

Surveys conducted by: W. Schuck
Date: 09-24-03

Figure 12: Building 2 Service Corridor Section B Vent Room Above Breezeway D
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



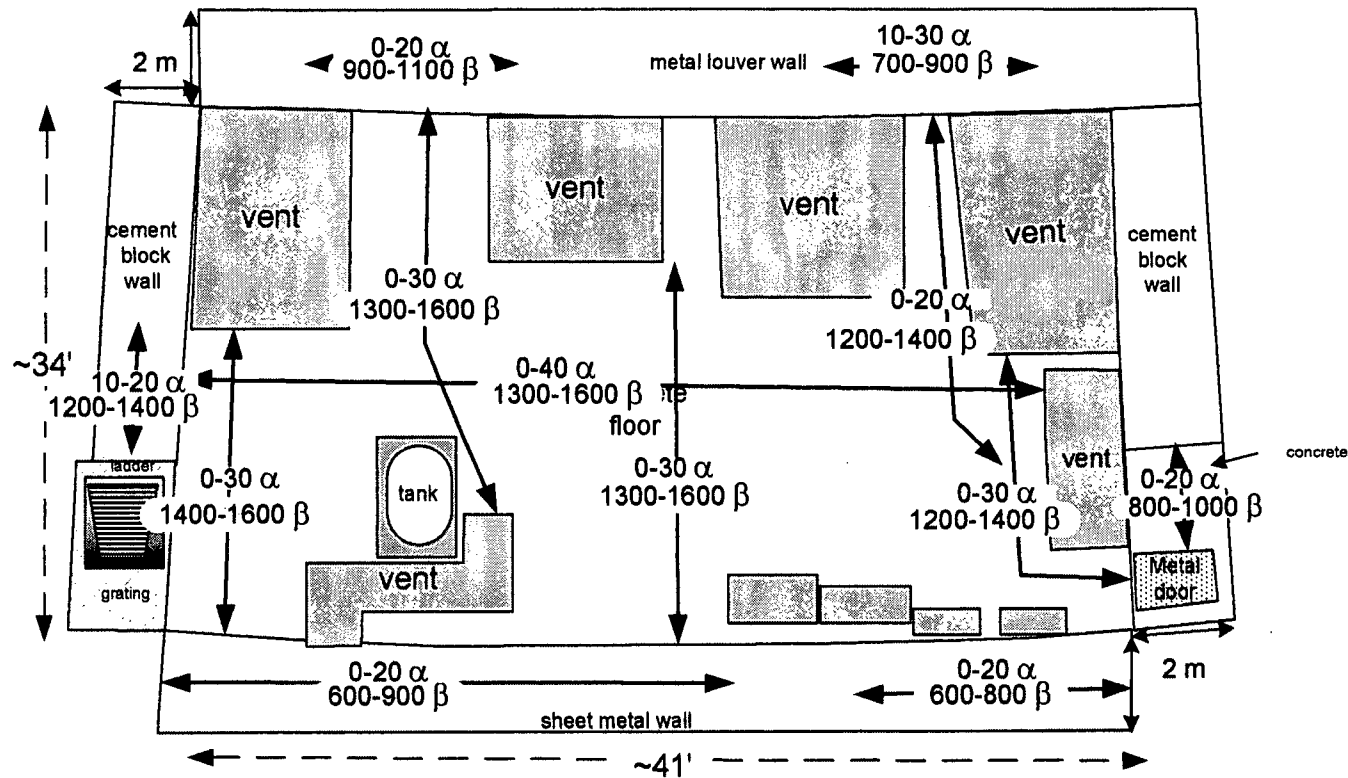
Notes:

1. $\#\alpha$ Denotes fixed alpha measurement in cpm.
2. $\#\beta$ Denotes fixed beta measurement in cp2m.
3. $\#$ Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial Number	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	05-04-04	03-11-04
Efficiency %	31.20	22.52
Bkgd. concrete	822+/- 344 cp2m	<20 cpm
Bkgd. cem. block	671+/-126 cp2m	<20 cpm
Bkgd. metal	435+/-170 cp2m	<20 cpm

Survey conducted by R. Stowell & G. Sayer
Date: 01-13-04

Figure 13: Building 2 Service Corridor Section B Vent Room Above Breezeway D
Alpha and Beta Scan Measurement Locations and Results



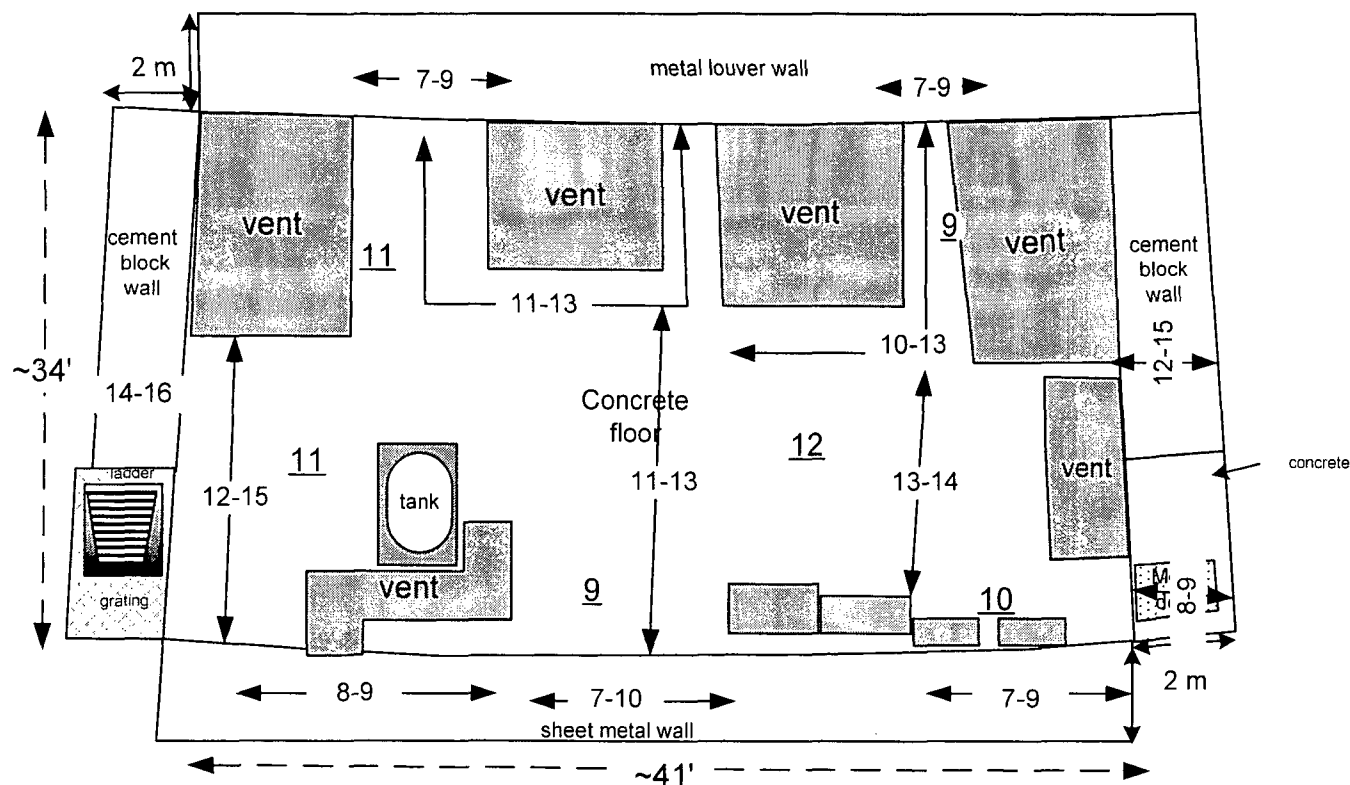
Notes:

- 10% of floor and walls 2 meters and below were scanned for alpha and beta
- ### α Denotes alpha scan in cpm.
- ####-#### β Denotes beta scan in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial Number	84459	154202
Probe	434 cm ² α	434 cm ² β
Probe Serial #	086215	149017
Cal Due Date	02-02-04	06-11-04
Efficiency %	21.58	30.39
Bkgd. Concrete	10-60 cpm	1300-2000 cpm
Bkgd. Cement block	10-30 cpm	1300-1500 cpm
Bkgd. Metal	0-40 cpm	700-1300 cpm

Surveys conducted by: R. Stowell & G. Sayer
Date: 01-13-04

Figure 14: Building 2 Service Corridor Section B Vent Room Above Breezeway D
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



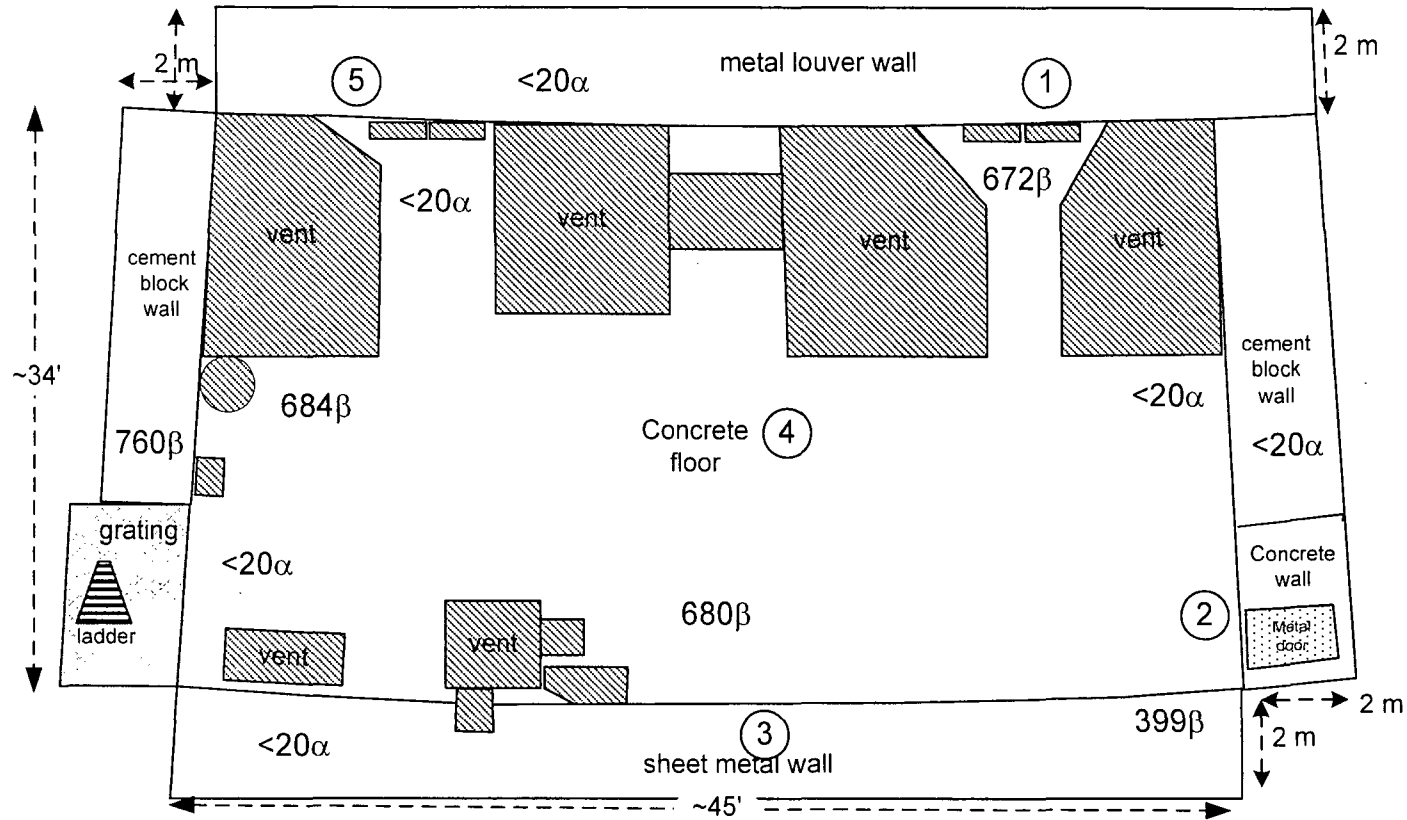
Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. **← ##-## →** Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 10% of floor and walls 2 meters and below were scanned.

Instrument		
Model	Ludlum 3	
Serial Number	153590	
Probe	2" X 2" NaI γ	
Probe Serial #	155190	
Cal Due Date	02-12-04	
Background	Contact	@1 meter
Concrete	15-24 $\mu\text{R/hr}$	14-22 $\mu\text{R/hr}$
Cement Block	13-20 $\mu\text{R/hr}$	13-20 $\mu\text{R/hr}$
Metal	9-17 $\mu\text{R/hr}$	13-19 $\mu\text{R/hr}$

Survey conducted by: G. Sayer
Date: 12-15-03

Figure 15: Building 2 Service Corridor Section B Vent Room Above Breezeway E
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



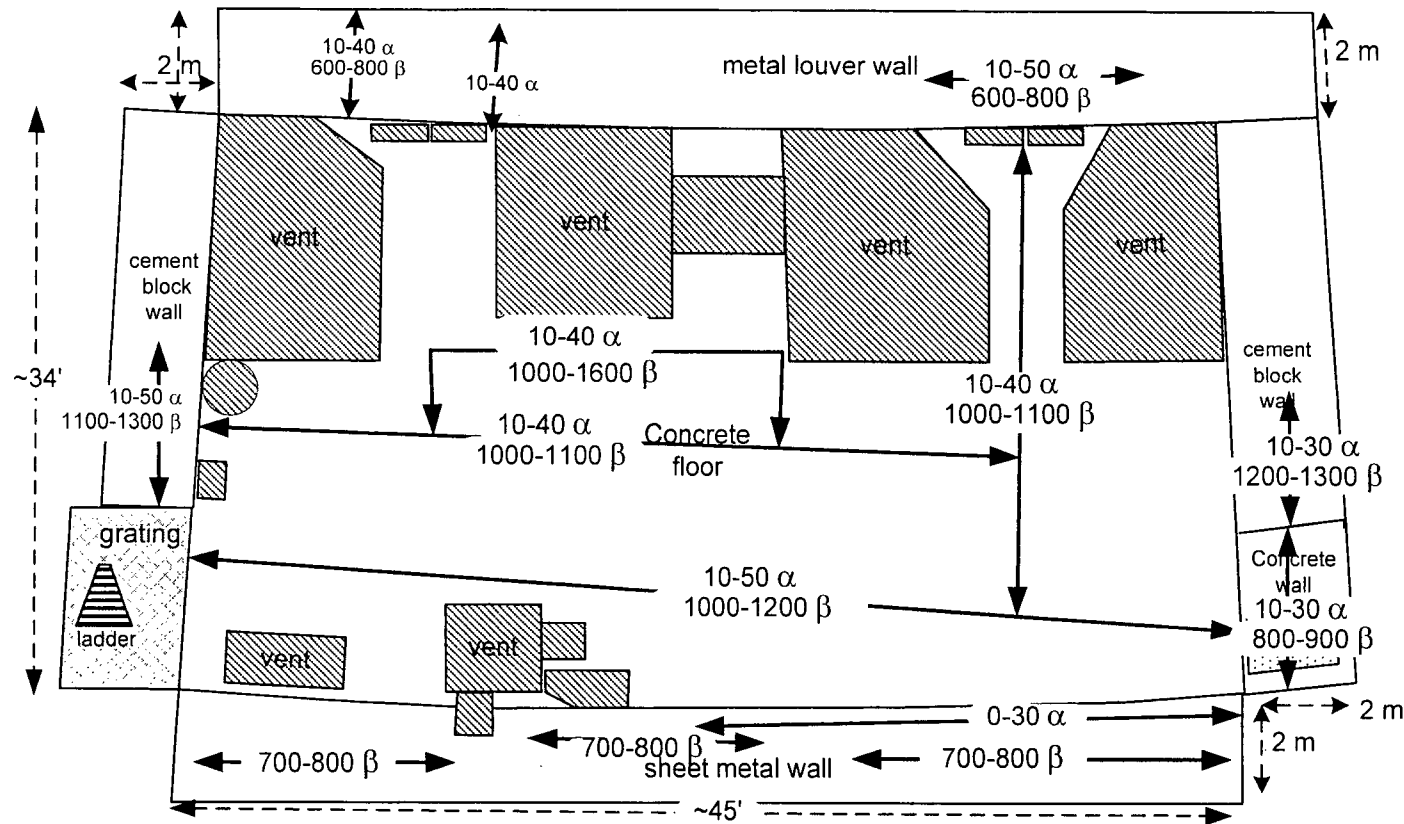
Notes:

1. $##\alpha$ Denotes fixed alpha measurement in cpm.
2. $###\beta$ Denotes fixed beta measurement in cp2m.
3. $\textcircled{\#}$ Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial Number	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	05-04-04	03-11-04
Efficiency %	31.20	22.52
Bkgd. concrete	822+/- 344 cp2m	<20 cpm
Bkgd. cem. block	671+/- 126 cp2m	<20 cpm
Bkgd. metal	435+/- 170 cp2m	<20 cpm

Survey conducted by R. Stowell & G. Sayer
Date: 12-15-03

Figure 16: Building 2 Service Corridor Section B Vent Room Above Breezeway E
Alpha and Beta Scan Measurement Locations and Results



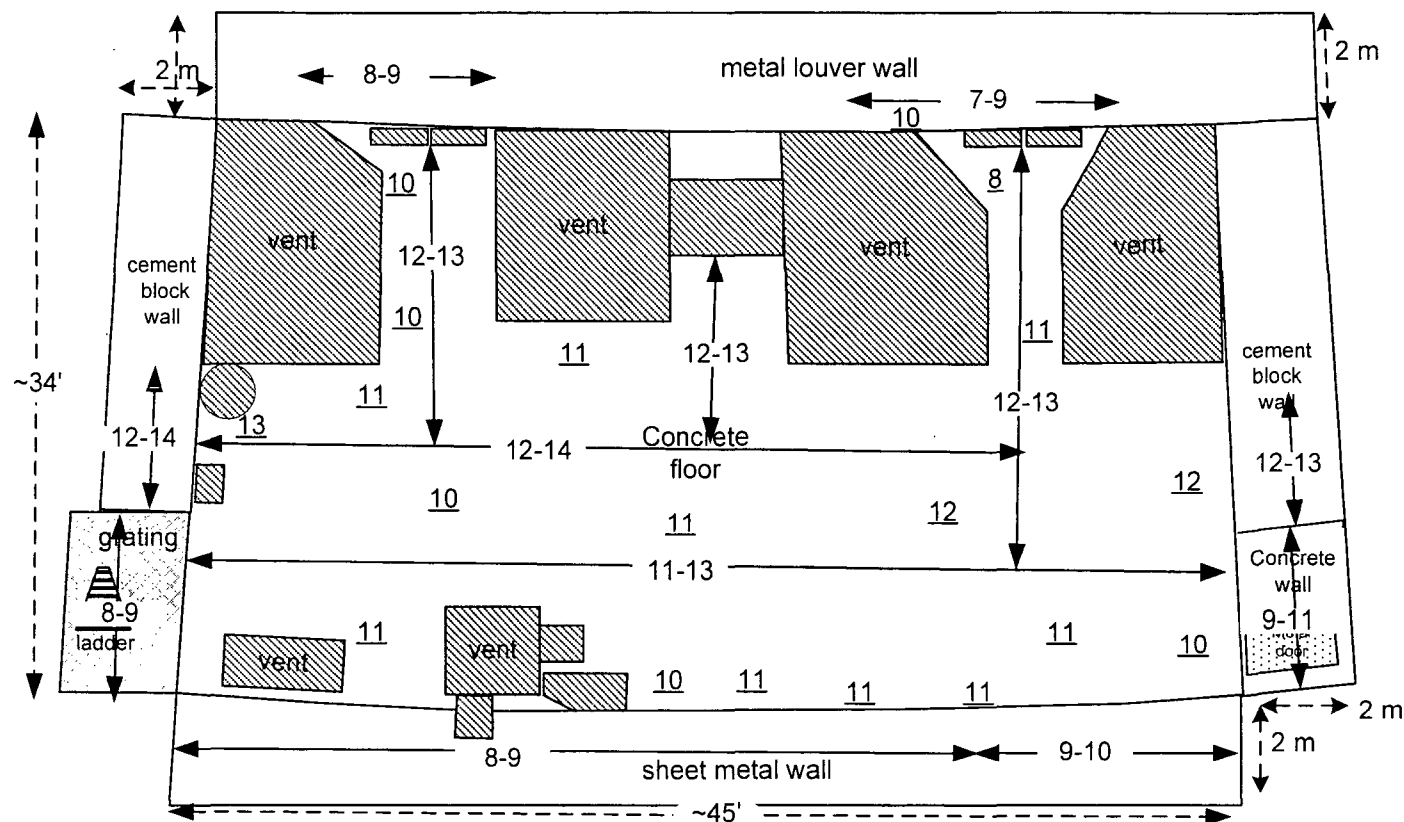
Notes:

1. 10% of floor area and walls 2 meters and below were scanned for alpha and beta
2. $\leftarrow \#\#\#\alpha \rightarrow$ Denotes alpha scan in cpm.
3. $\leftarrow \#\#\#\#\#\beta \rightarrow$ Denotes beta scan in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial Number	84459	154202
Probe	434 cm ² α	434 cm ² β
Probe Serial #	086215	149017
Cal Due Date	02-02-04	06-11-04
Efficiency %	21.58	31.39
Bkgd. Concrete	10-60 cpm	1300-2000 cpm
Bkgd. Cement block	10-30 cpm	1300-1500 cpm
Bkgd. Metal	0-40 cpm	700-1300 cpm

Survey conducted by: R. Stowell & G. Sayer
Date: 12-15-03

Figure 17: Building 2 Service Corridor Section B Vent Room Above Breezeway E
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



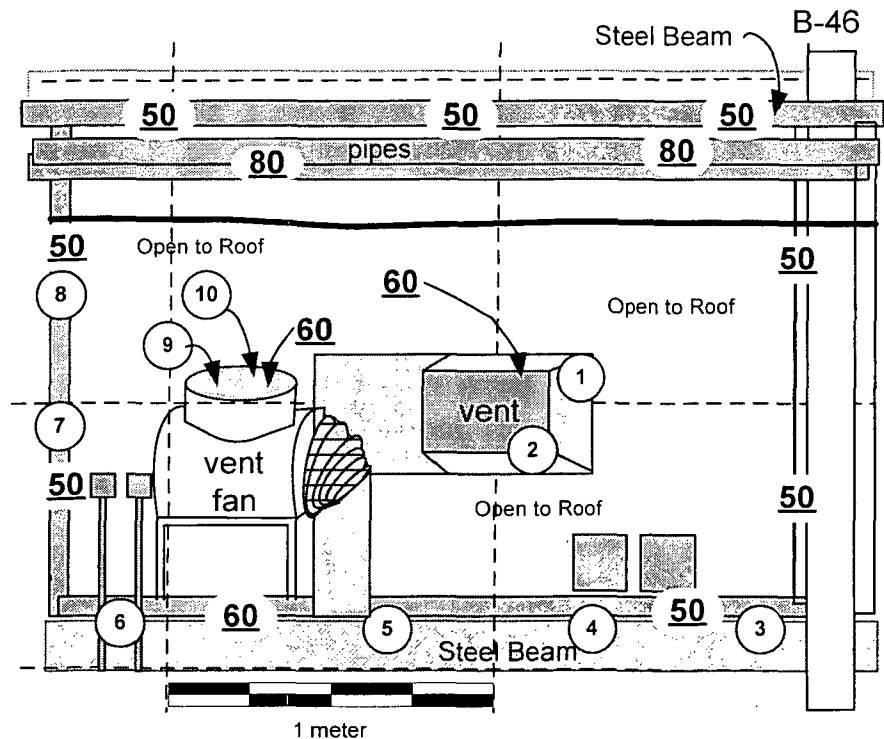
Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. **← ##-## →** Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 10% of floor and walls 2 meters and below were scanned.

Instrument		
Model	Ludlum 3	
Serial Number	153590	
Probe	2" X 2" NaI γ	
Probe Serial #	155190	
Cal Due Date	02-12-04	
Background	Contact	@1 meter
Concrete	15-24 $\mu\text{R/hr}$	14-22 $\mu\text{R/hr}$
Cement Block	13-20 $\mu\text{R/hr}$	13-20 $\mu\text{R/hr}$
Metal	9-17 $\mu\text{R/hr}$	13-19 $\mu\text{R/hr}$

Survey conducted by: G. Sayer
Date: 12-15-03

Figure 18: Building 2 Service Core Section B Overhead Crawl Space Outer Wall at Column B-46
Beta Scan Locations and Results and Wipe Survey Locations



- Notes:
1. An ~7 foot long contaminated section of the louvered wall was removed at column B46. The surrounding area was surveyed prior to installing the new louvered wall section.
 2. **##** Denotes scan results using the 15 cm² probe.
 3. **#** Denotes wipe location. Wipe results are provided in Table 5.

Instrument	
Model	Ludlum 3
Serial Number	138880
Probe	15 cm ² β-γ
Probe Serial #	117851
Cal Due Date	01-28-05
Efficiency	26.14%
Background	40-70 cpm

Surveys Conducted by: B. Belcher & S. Cowan
Date: 12-11-04

Beta Fixed Measurement and Scan Locations and Results

B 50 B 49 B 48 B 47 B 46 B 45 B 44 B 43 B 42

B 42 B 41 B 40 B 39 B 38 B 37 B 36 B 35

B 34 B 33 B 32 B 31 B 30 B 29

Suspect Affected Area

Louvers replaced December 2004

ladder

refrigeration unit

Instrument	
Model	Ludium 3
Serial Number	138880
Probe	15 cm ² β-γ
Probe Serial #	117851

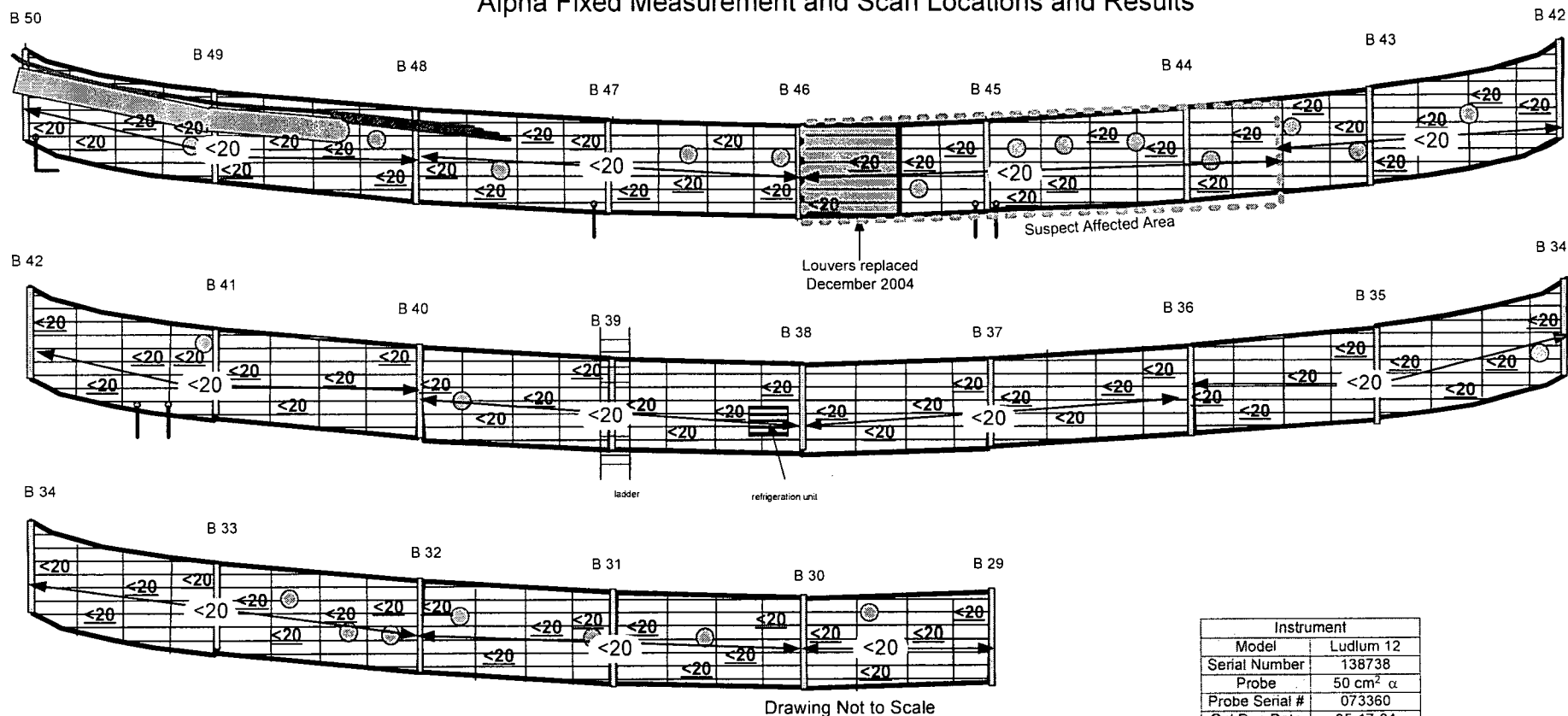
Drawing Not to Scale

1. **##** Denotes fixed beta measurement in cpm.
2. **← ## →** Denotes beta scan in cpm.
3. 100% of accessible surface scanned in Suspect Affected Area, Column B43.5 to B 46.
4. 10% of surface scanned in Unaffected Area (remainder of the louvers).
5. A section of contaminated louvers (fixed beta measurement of up to 800 cpm) was replaced in December 2004.

Instrument	
Model	Ludlum 3
Serial Number	138880
Probe	15 cm ² β-γ
Probe Serial #	117851
Cal Due Date	05-10-04
Efficiency	26.14%
Background	40-70 cpm

Survey Conducted by: G. Sayer
Dates: 11-18-03 to 11-20-03

Figure 20: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface
Alpha Fixed Measurement and Scan Locations and Results



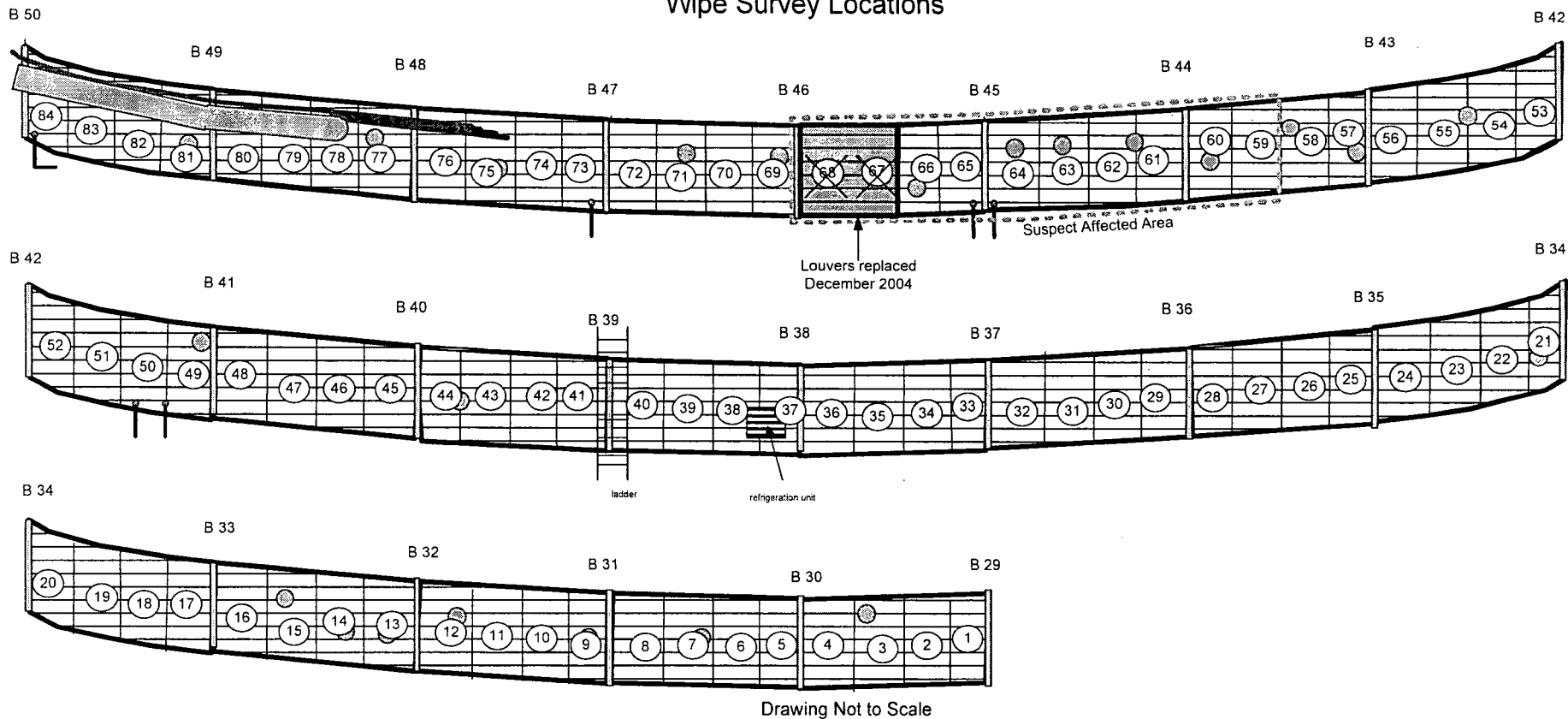
Instrument	
Model	Ludlum 12
Serial Number	138738
Probe	50 cm ² α
Probe Serial #	073360
Cal Due Date	05-17-04
Efficiency	21.02%
Background	<20 cpm

Notes:

1. **##** Denotes fixed alpha measurement in cpm.
2. **← ## →** Denotes alpha scan in cpm.
3. 100% of accessible surface scanned in Suspect Affected Area, Column B 43.5 to B 46.
4. 10% of surface scanned in Unaffected Area (remainder of the louvers).
5. A section of the louvers was replaced in December 2004.

Survey Conducted by: R. Stowell
Dates: 11-18-03 to 11-19-03

Figure 21: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface
Wipe Survey Locations

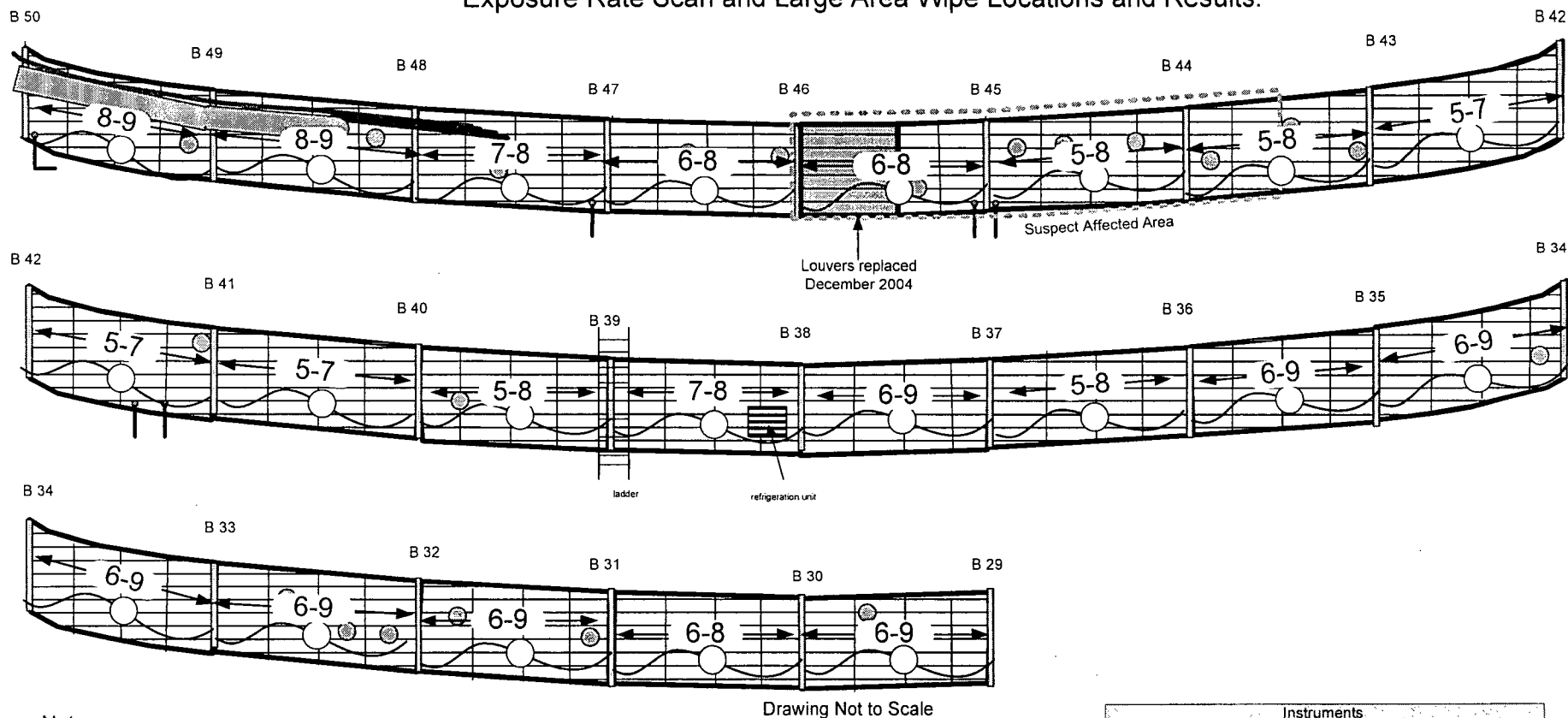


Notes:

1. (##) Denotes wipe location.
2. Wipe results are provide in Table 5.
3. Wipes 67 and 68 taken on louvers prior to replacement in December 2004.

Survey Conducted by: G. Sayer
Date: 11-03-03

Figure 22: Building 2 Service Corridor Section B Overhead Crawl Space Vent Louvers External Surface Exposure Rate Scan and Large Area Wipe Locations and Results.



Notes:

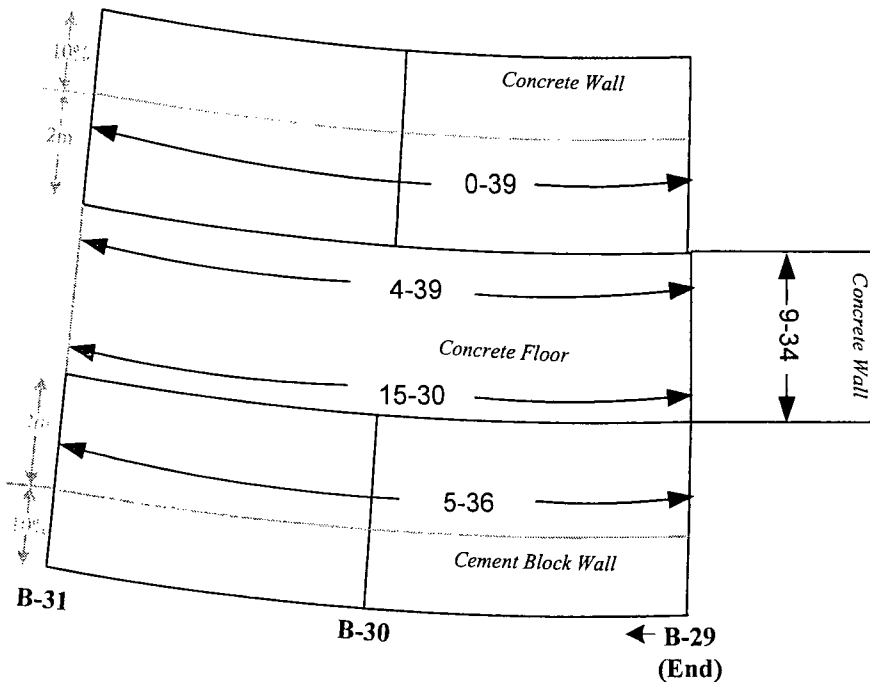
1. $\leftarrow \# \# \rightarrow$ Denotes exposure rate surface scans in $\mu\text{R/hr}$. 100% of accessible surface scanned.
2. Denotes large area wipe. 100% of accessible surface wiped.
3. No alpha or beta activity above background detected on large area (Masslinn) wipes.

Drawing Not to Scale

Instruments			
Model	Ludlum	Ludlum 12	Ludlum 3
Serial Number	153551	138801	138880
Probe	2" X 2" Na-I γ	50 cm^2 α	cm^2 β - γ
Probe Serial #	155109	145969	117851
Cal Due Date	11-17-03	03-11-04	03-11-04
Efficiency	NA	22.52%	26.14%
Background	9-13 $\mu\text{R/hr}$	<20 cpm	20-60 cpm

Surveys Conducted by: G. Sayer & D. Koelker
Date: 10-30-03

Figure 23: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-29 to B-31 Alpha Scan Survey Locations and Results.



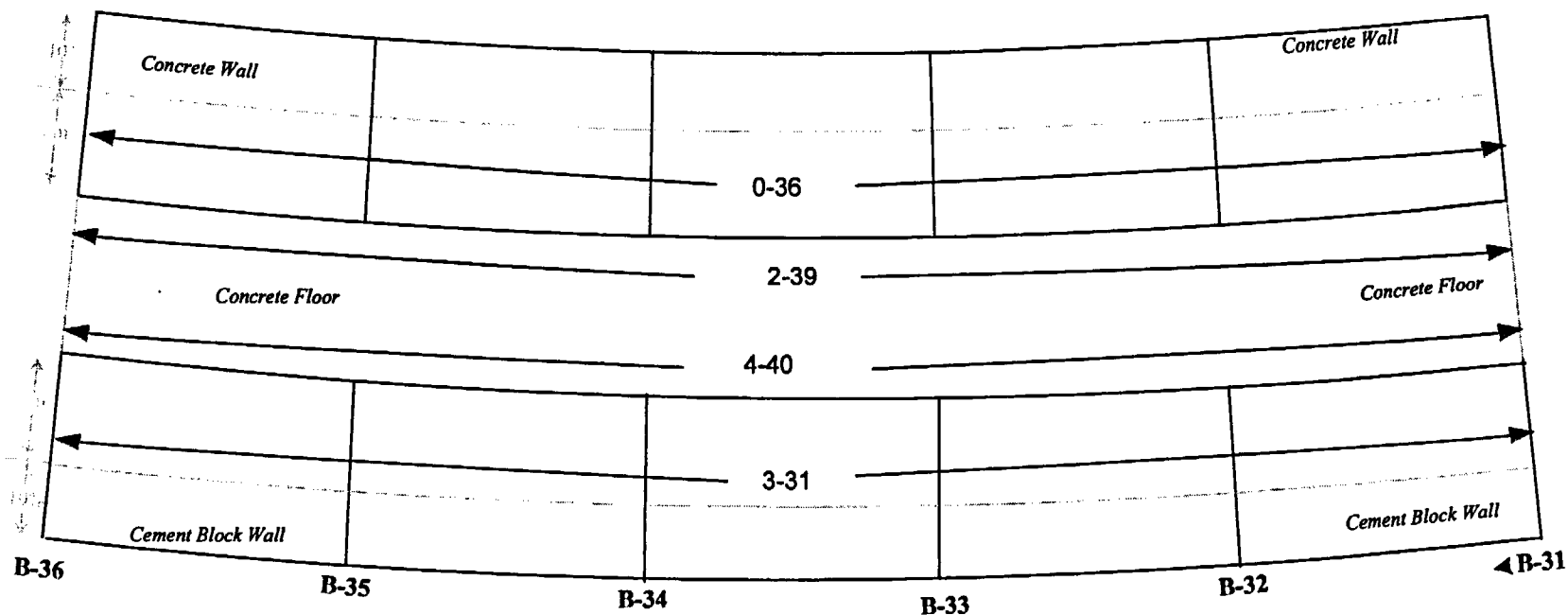
- # = α Range in cpm

100% of Original floor and walls up to 2m surfaces scanned, 10% of walls above 2m

The Highest α Result (39 cpm) = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	06/02/02
Efficiency	21.29%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	108
Surveyors: J. Sullivan	Date: 02/11/02

Figure 24: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Alpha Scan Survey Locations and Results.



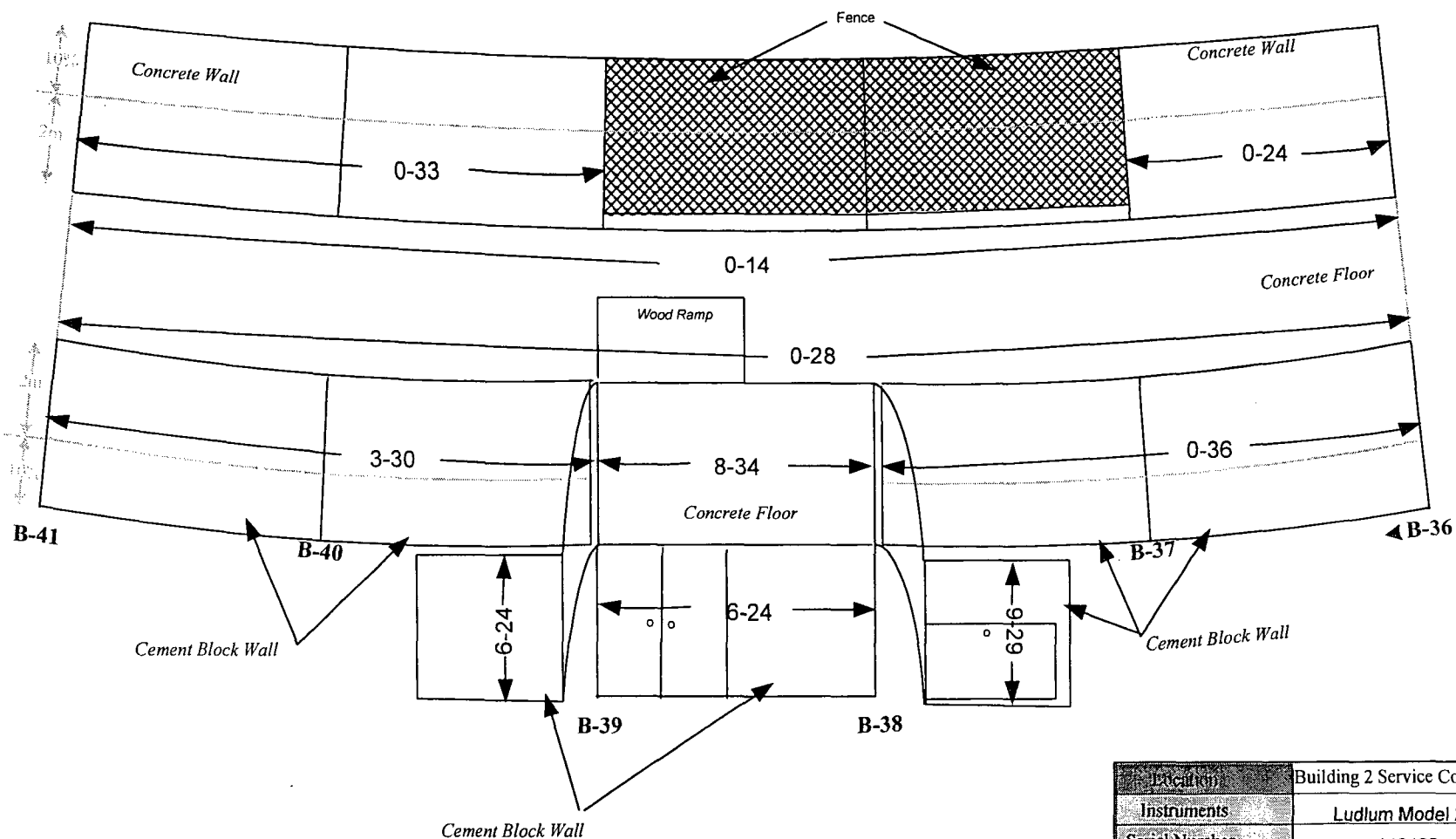
- # = α Range in cpm

100% of Original floor and walls up to 2m surfaces scanned, 10% of walls above 2m

The Highest α Result (40 cpm) = Natural Background

Building 2 Service Corridor	
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	06/02/02
Efficiency	21.29%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	108
Surveyors: J. Sullivan	Date: 02/11/02

Figure 25: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Alpha Scan Survey Locations and Results.



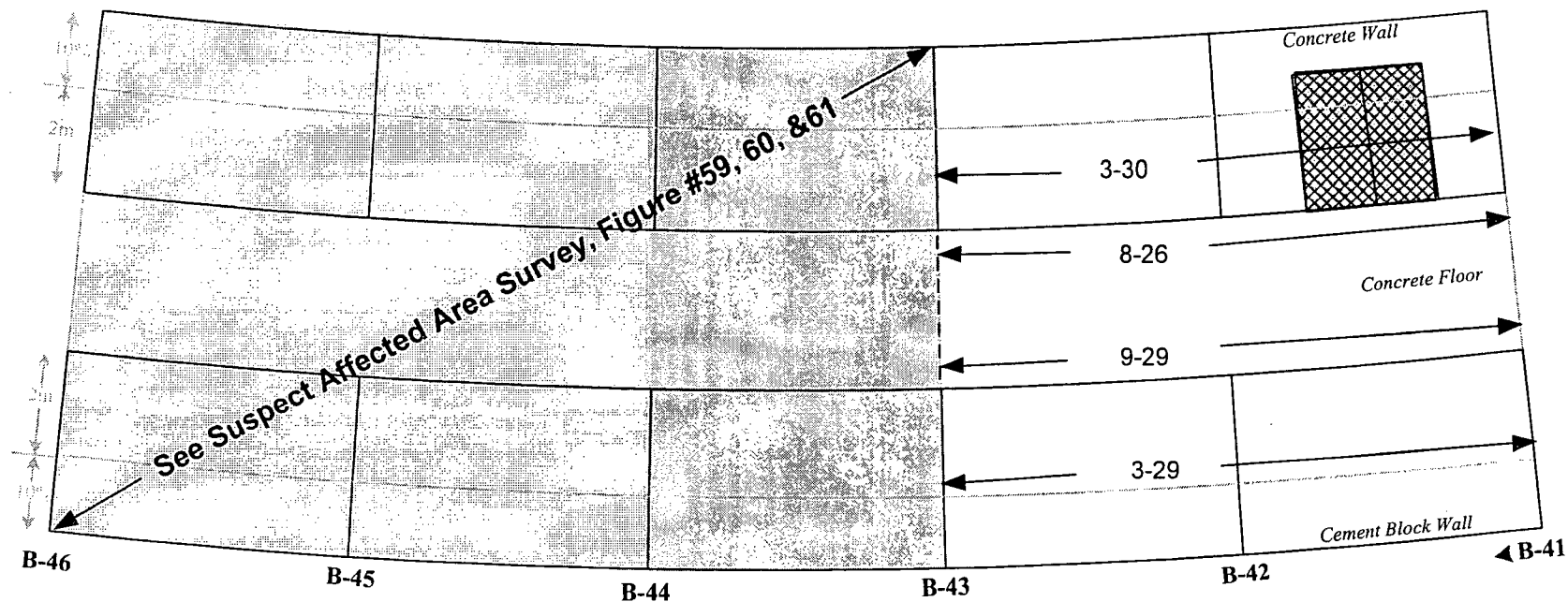
- # = α Range in cpm

100% of Original floor and walls up to 2m surfaces scanned, 10% of walls above 2m

The Highest α Result (36 cpm) = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	06/02/02
Efficiency	21.29%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	108
Surveyors: J. Sullivan	Date: 02/08/02

Figure 26: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Alpha Scan Survey Locations and Results.



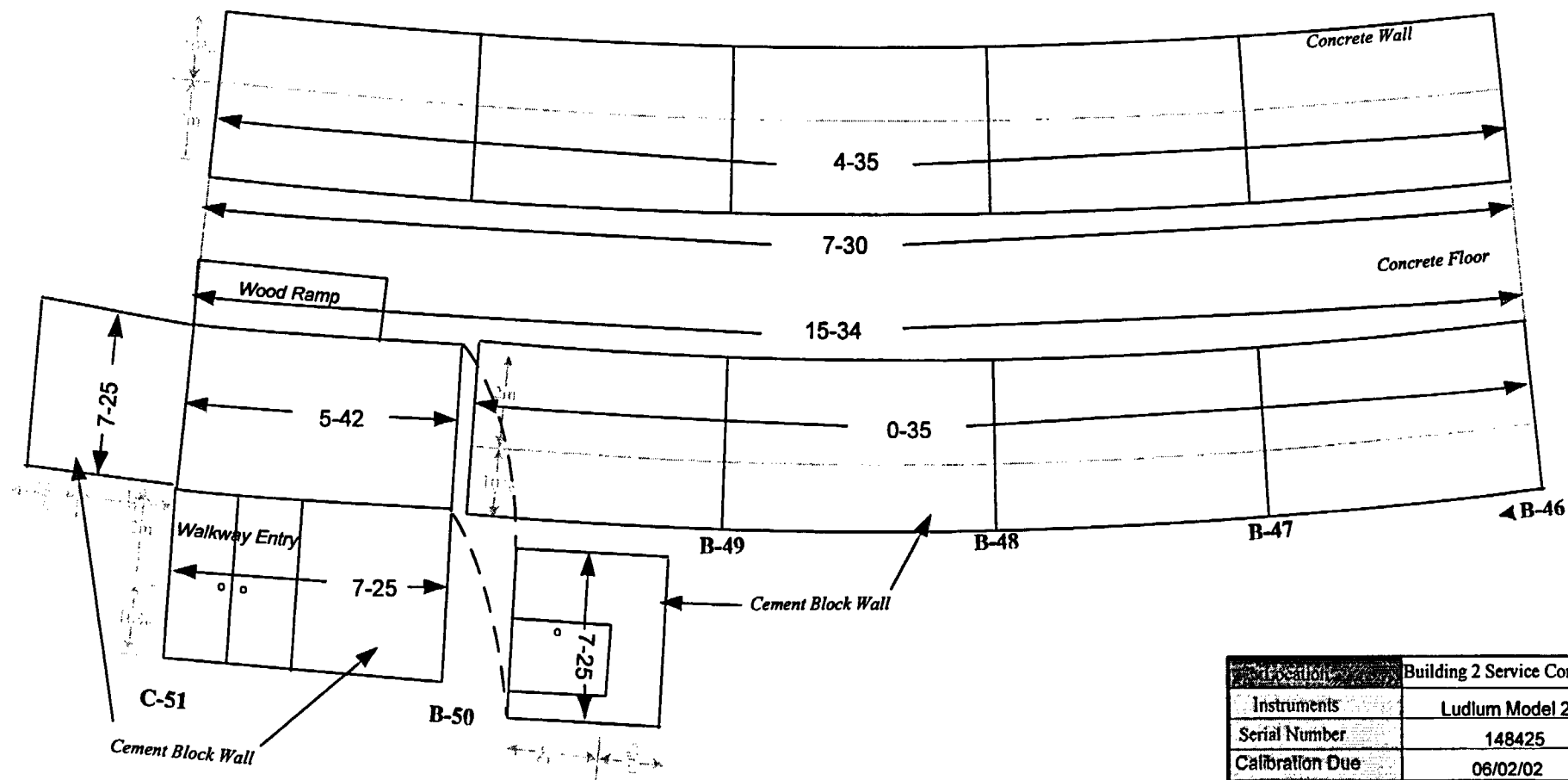
Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	06/02/02
Efficiency	21.29%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	108
Surveyors: J. Sullivan	Date: 02/07/02

- # = α Range in cpm

100% of Original floor and walls up to 2m surfaces scanned, 10% of walls above 2m

The Highest α Result (30 cpm) = Natural Background

Figure 27: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-46 to C51, Alpha Scan Survey Locations and Results.



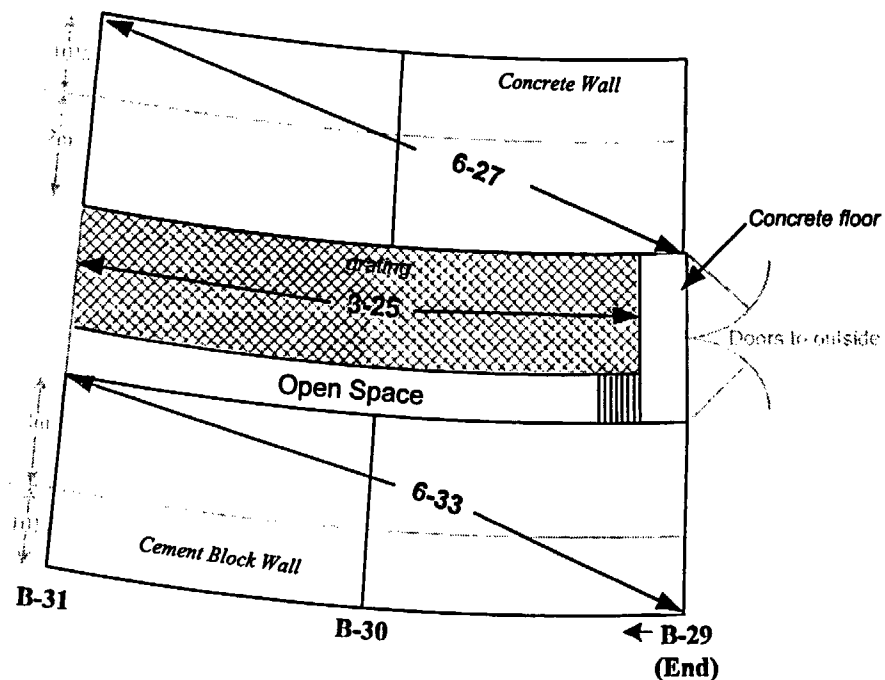
- # = α Range in cpm

100% of Original floor and walls up to 2m surfaces scanned, 10% of walls above 2m

The Highest α Result (42 cpm) = < MDA

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	06/02/02
Efficiency	21.29%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	108
Surveyors: J. Sullivan	Date: 02/07/02

Figure 28: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Alpha Scan Survey Locations and Results.



- # = α Range in cpm

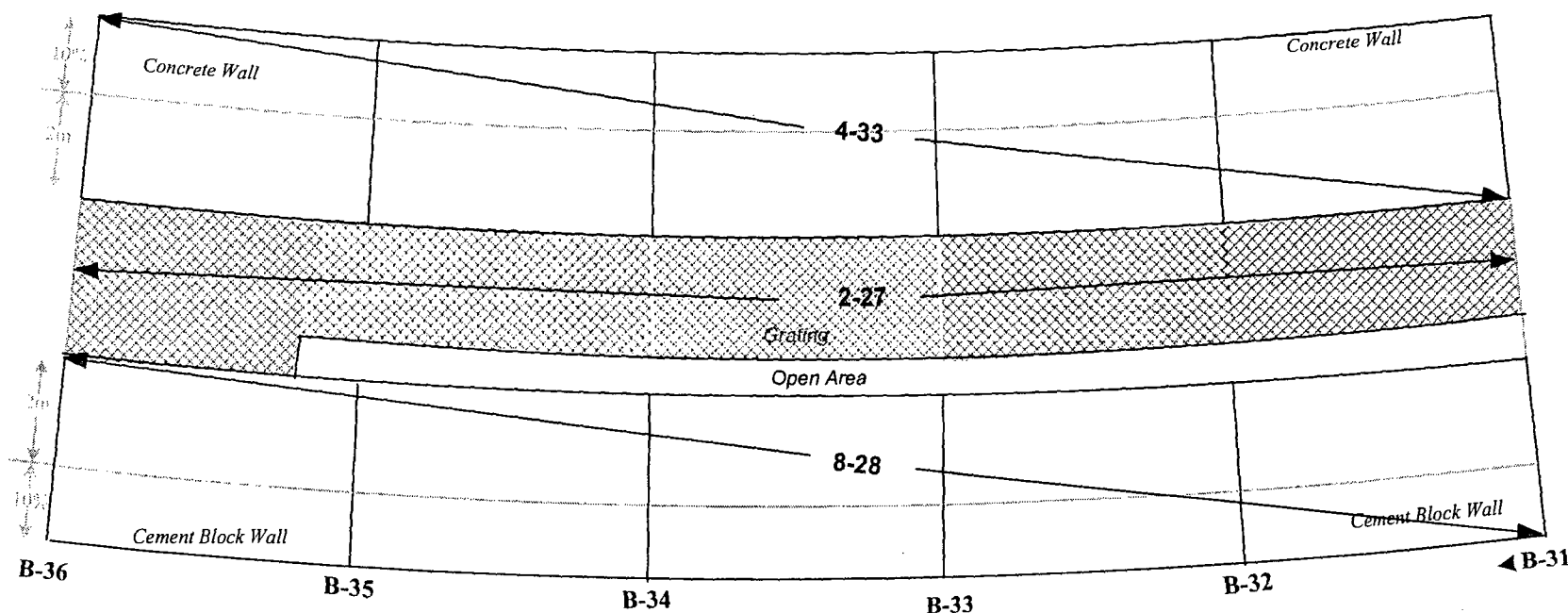
100% of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest α Result (33 cpm) = Natural Background

B# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	07/31/02
Efficiency	21.09%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	109
Surveyors: B. Hunter, S. Finchum Date: 05/03-06/02	

Figure 29: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Alpha Scan Survey Locations and Results.



- # = α Range in cpm

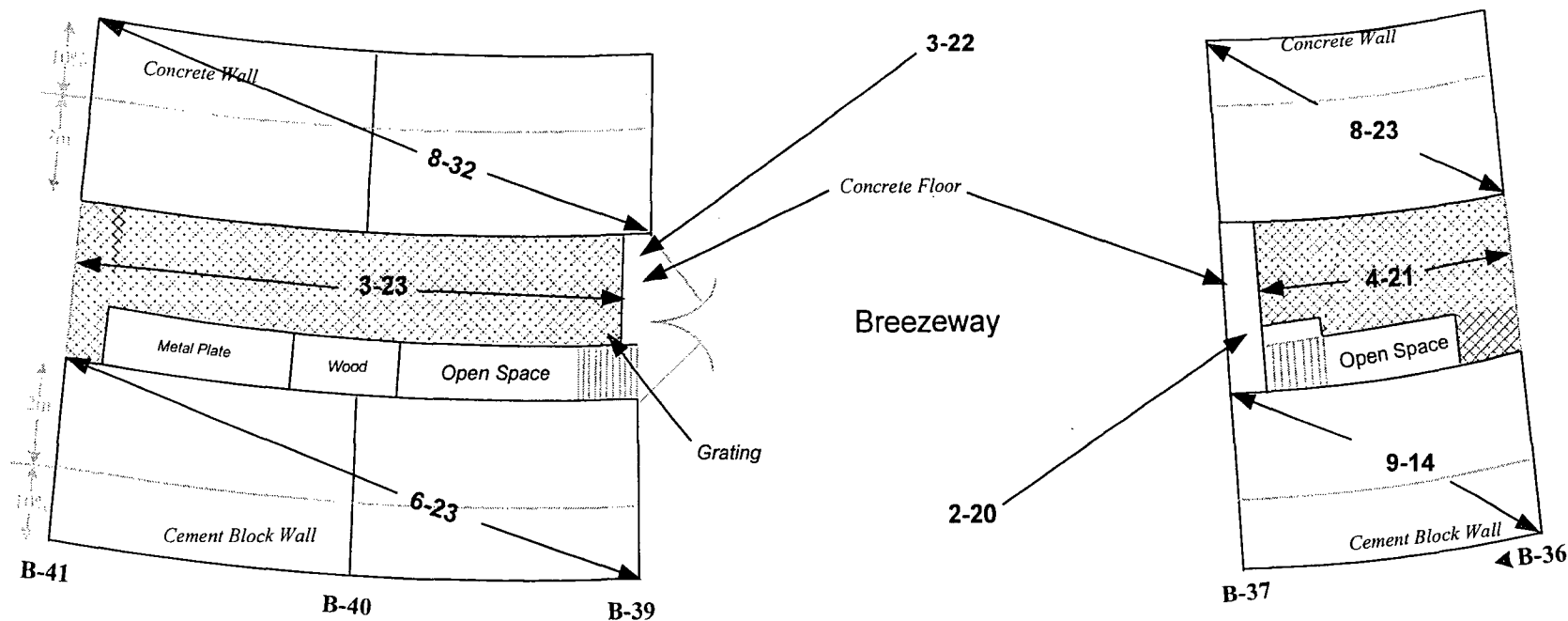
100% of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest α Result (33 cpm) = Natural Background

B# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	07/31/02
Efficiency	21.09%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	109
Surveyors: B. Hunter, S. Finchum Date: 05/03-06/02	

Figure 30: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Alpha Scan Survey Locations and Results.



- # = α Range in cpm

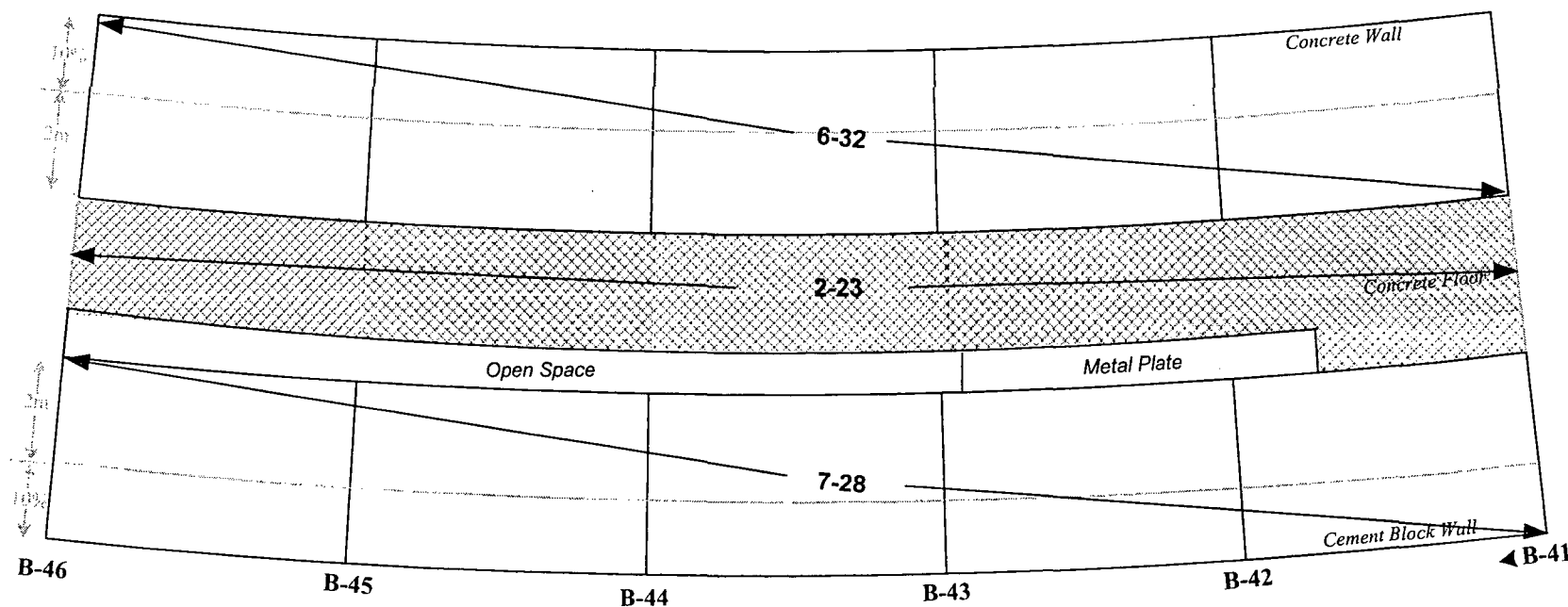
100% of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest α Result (32 cpm) = Natural Background

B# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	07/31/02
Efficiency	21.09%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	109
Surveyors: B. Hunter, S. Finchum Date: 05/03-06/02	

Figure 31: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Alpha Scan Survey Locations and Results.



- # = α Range in cpm

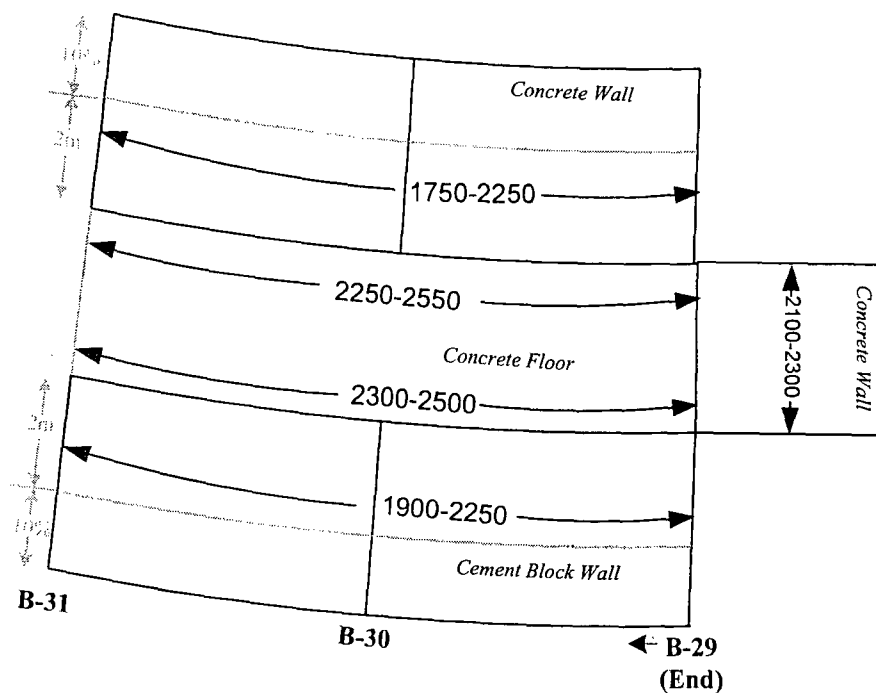
100% of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest α Result (32 cpm) = Natural Background

B# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	148425
Calibration Due	07/31/02
Efficiency	21.09%
α β γ	α
Probe Number	086236
Probe Size cm ²	434 cm ²
Background	10 - 40 cpm
MDA(dpm/100cm ²)	109
Surveyors: B. Hunter, S. Finchum Date: 05/03-06/02	

Figure 32: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

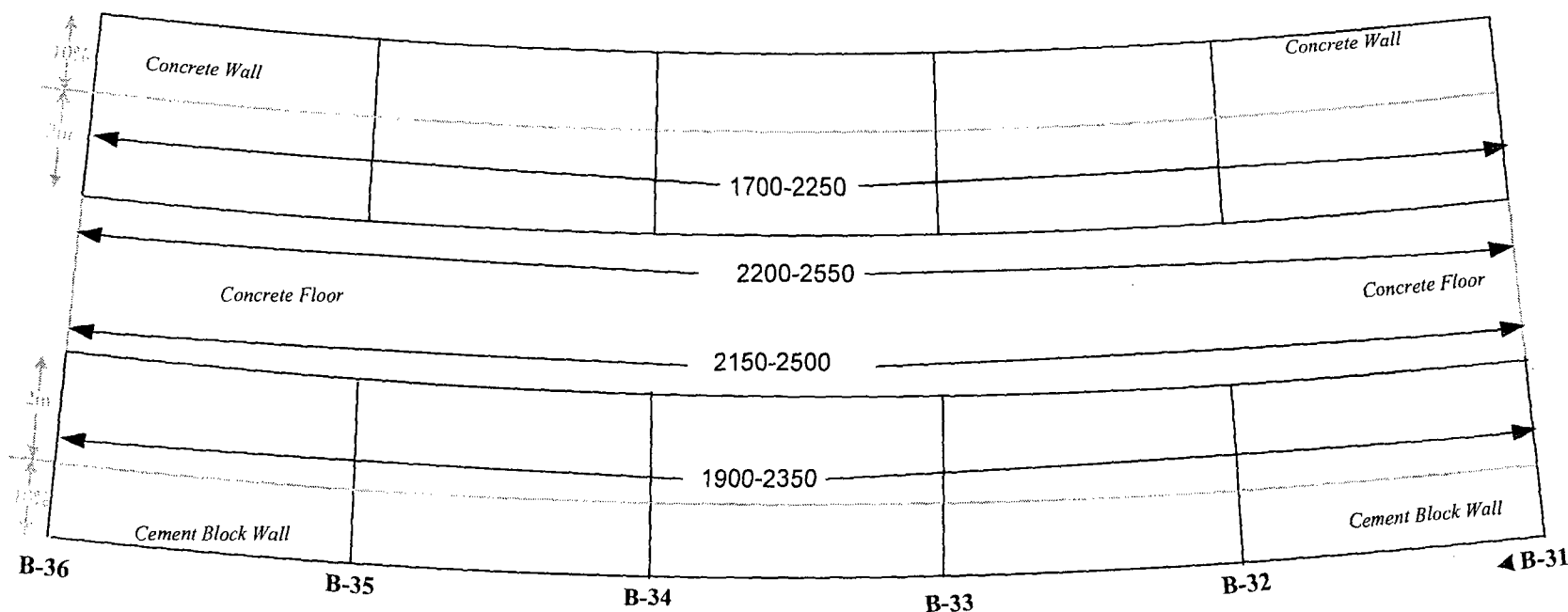
100% of Original floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2550 cpm) = <MDA (438 dpm/100 cm²)

B-# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	84459
Calibration Due	07/24/02
Efficiency	31.08%
α β γ	β
Probe Number	086215
Probe Size cm ²	434 cm ²
Background cpm	1840 - 2100 , concrete 1640 - 1850, cement block
MDA(dpm/100cm ²) $\chi=0.3$	438 on concrete 388 on cement block
Surveyors: B. Hunter	
Date: 2/18/02	

Figure 33: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

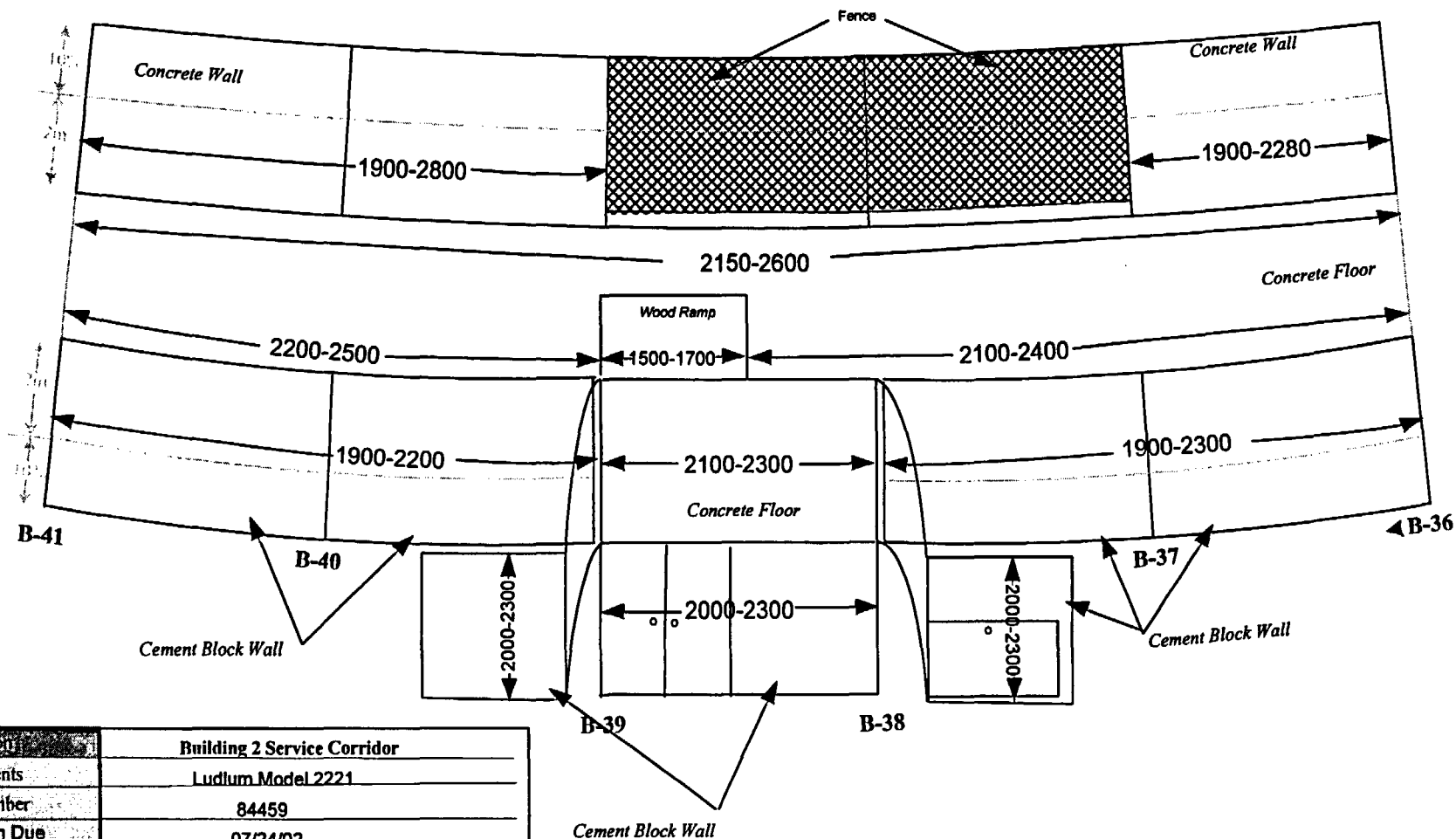
100% of Original floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2350 cpm) = 449 dpm/100 cm²

B-# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	84459
Calibration Due	07/24/02
Efficiency	31.08%
α β γ	β
Probe Number	086215
Probe Size cm ²	434 cm ²
Background cpm	1840 - 2100 , concrete 1640 - 1850, cement block
MDA(dpm/100cm ²) $X=0.3$	438 on concrete 388 on cement block
Surveyors: B. Hunter	
Date: 2/18-19/02	

Figure 34: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Beta Scan Survey Locations and Results.



Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	84459
Calibration Due	07/24/02
Efficiency	31.08%
α β γ	β
Probe Number	086215
Probe Size cm ²	434 cm ²
Background cpm	1840 - 2100 , concrete 1640 - 1850, cement block
MDA(dpm/100cm ²) x=0.3	438 on concrete 388 on cement block
Surveyors: B. Hunter	
Date: 2/18/02	

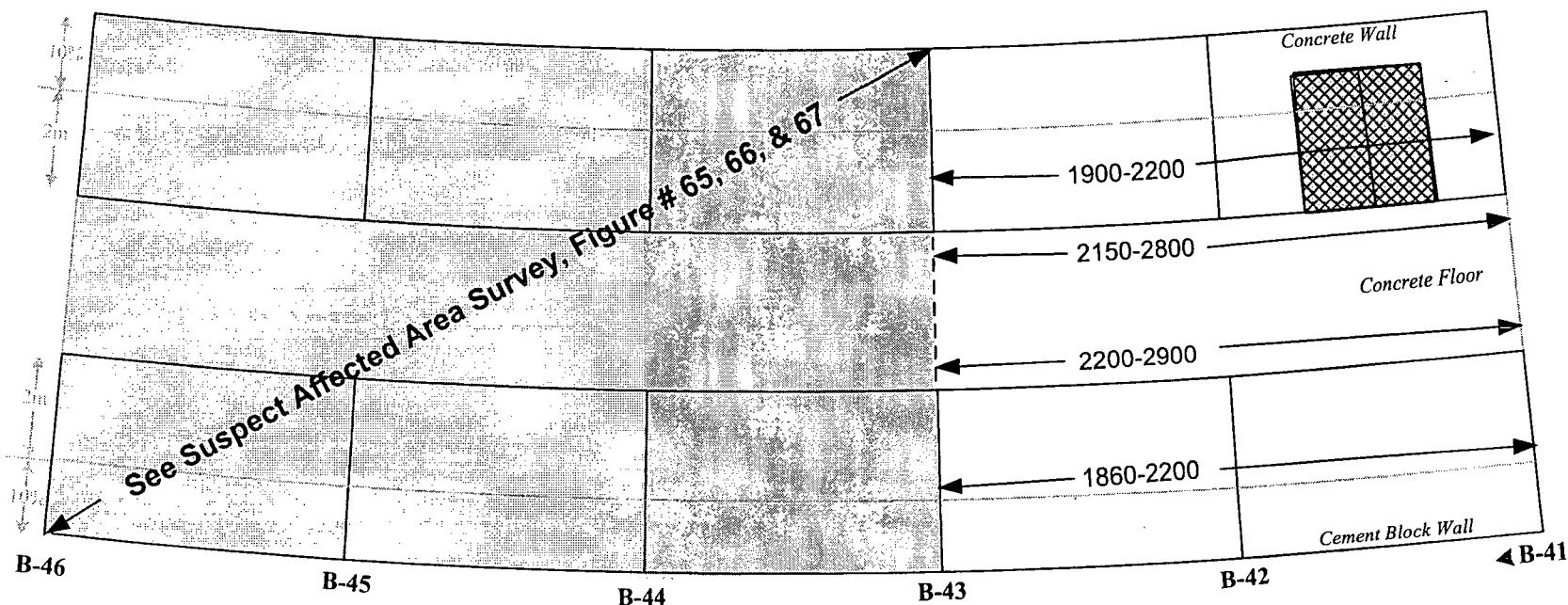
- #### = β Range in cpm

100% of Original floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2800 cpm) = 615 dpm/100 cm²

B-# = Column Number

Figure 35: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Beta Scan Survey Locations and Results.



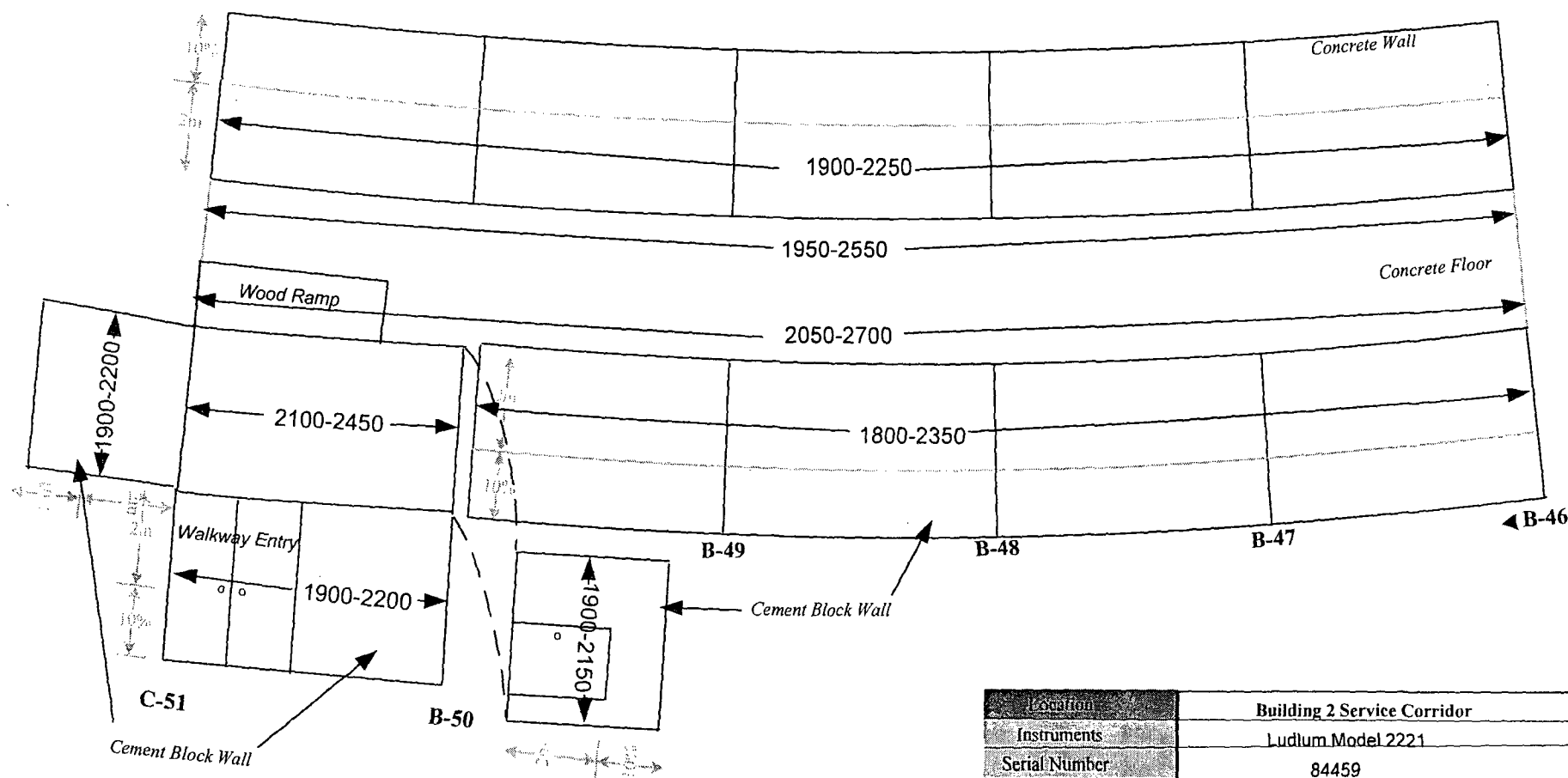
- #### = β Range in cpm

100% of Original floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2900 cpm) = 689 dpm/100 cm²

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	84459
Calibration Due	09/27/02
Efficiency	31.08%
α β γ	β
Probe Number	086215
Probe Size cm ²	434 cm ²
Background cpm	1840 - 2100 , concrete 1640 - 1850, cement block
MDA(dpm/100cm ²) X=0.3	438 on concrete 388 on cement block
Surveyors: S. Finchum	
Date: 4/02/02	

Figure 36: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-46 to C51, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

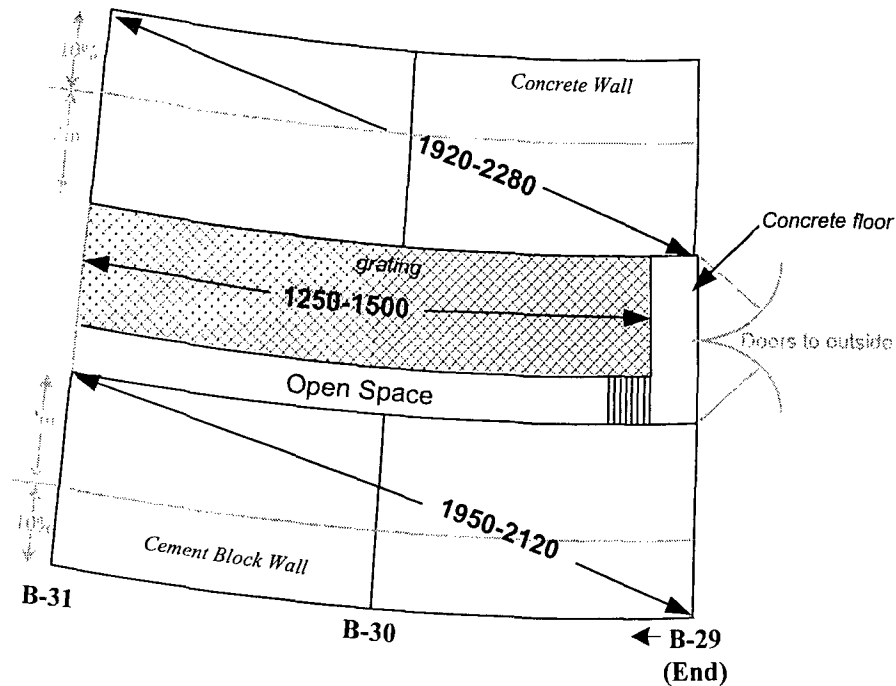
100% of Original floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2700 cpm) = 541 dpm/100 cm²

B-# = Column Number

Location	Building 2 Service Corridor
Instruments	Ludlum Model 2221
Serial Number	84459
Calibration Due	07/24/02
Efficiency	31.08%
α β γ	β
Probe Number	086215
Probe Size cm ²	434 cm ²
Background cpm	1840 - 2100, concrete 1640 - 1850, cement block
MDA(dpm/100cm ²) X=0.3	438 on concrete 388 on cement block
Surveyors: B. Hunter	
Date: 2/18&19/02	

Figure 37: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

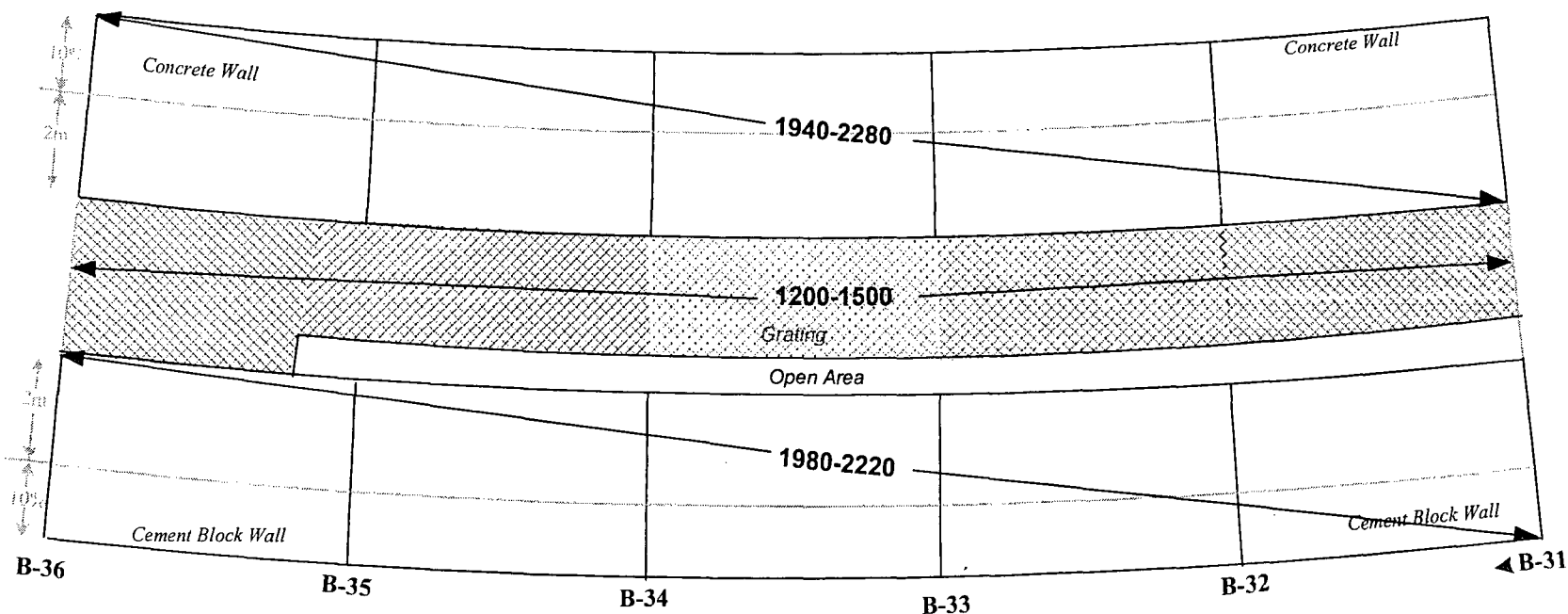
100% of Of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2280 cpm) = <MDA (438 dpm/100 cm²)

B-# = Column Number

Location	Building 2 Service Corridor	
Instruments	Ludlum Model 2221	
Serial Number	84459	
Calibration Due	9/27/02 and 11/12/02	
Efficiency	31.08%	
α β γ	β	
Probe Number	086215	
Probe Size cm ²	434 cm ²	
Background:cpm	1840 - 2100 , concrete	1640 - 1850, cement block 1730-1800, Metal Grating
MDA(dpm/100cm ²) X=0.3	438 on concrete	388 on cement block 393 on Metal Grating
Surveyors: B. Hunter/S. Finchum Date: 5/09-16/02		

Figure 38: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

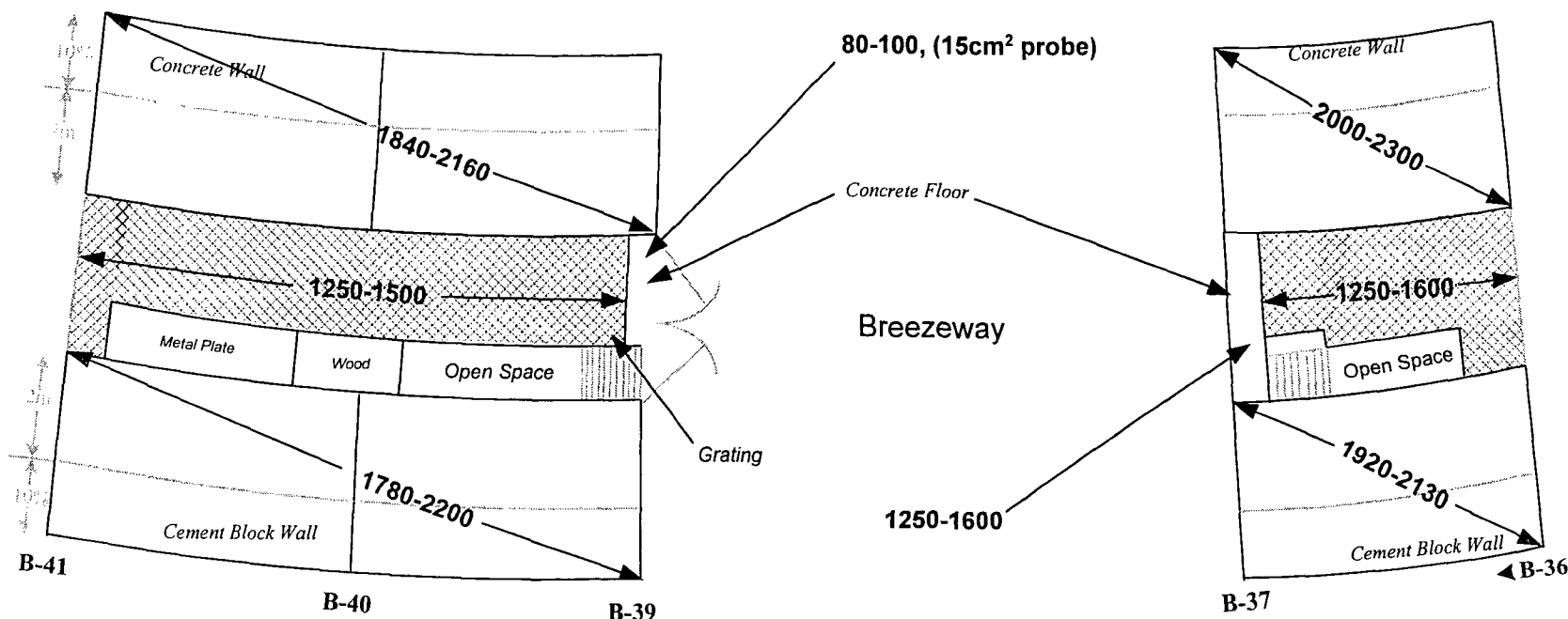
100% of Of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2280 cpm) = <MDA (438 dpm/100 cm²)

B-# = Column Number

Location	Building 2 Service Corridor	
Instruments	Ludlum Model 2221	
Serial Number	84459	
Calibration Due	9/27/02 and 11/12/02	
Efficiency	31.08%	
α β γ	β	
Probe Number	086215	
Probe Size cm ²	434 cm ²	
Background cpm	1840 - 2100 , concrete	1640 - 1850, cement block 1730-1800, Metal Grating
MDA(dpm/100cm ²) $X=0.3$	438 on concrete	388 on cement block 393 on Metal Grating
Surveyors: B. Hunter/S. Finchum		
Date: 5/09-16/02		

Figure 39: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Beta Scan Survey Locations and Results.



2759

- #### = β Range in cpm

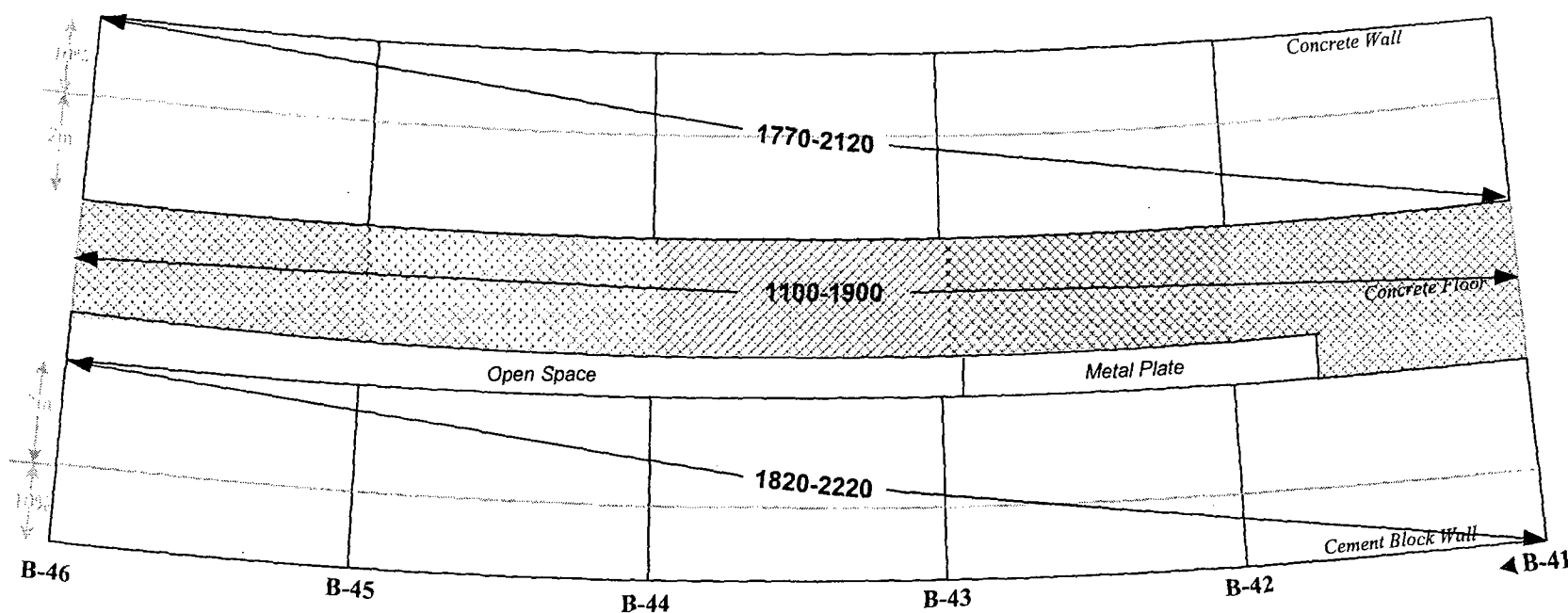
100% of Of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2280 cpm) = <MDA (438 dpm/100 cm²)

B-# = Column Number

Location	Building 2 Service Corridor	
Instruments	Ludlum Model 2221	Ludlum Model 3
Serial Number	84459	143349
Calibration Due	9/27/02 and 11/12/02	8/12/02
Efficiency	31.08%	24.16%
α β γ	β	β
Probe Number	086215	145867
Probe Size cm ²	434 cm ²	15 cm ²
Background cpm	1840 - 2100 , concrete 1640 - 1850, cement block 1730-1800, Metal Grating	80-120 , concrete
MDA(dpm/100cm ²) $X=0.5$	438 on concrete 388 on cement block 393 on Metal Grating	2759 on concrete
Surveyors: B. Hunter/S. Finchum		Date: 5/09-16/02

Figure 40: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Beta Scan Survey Locations and Results.



- #### = β Range in cpm

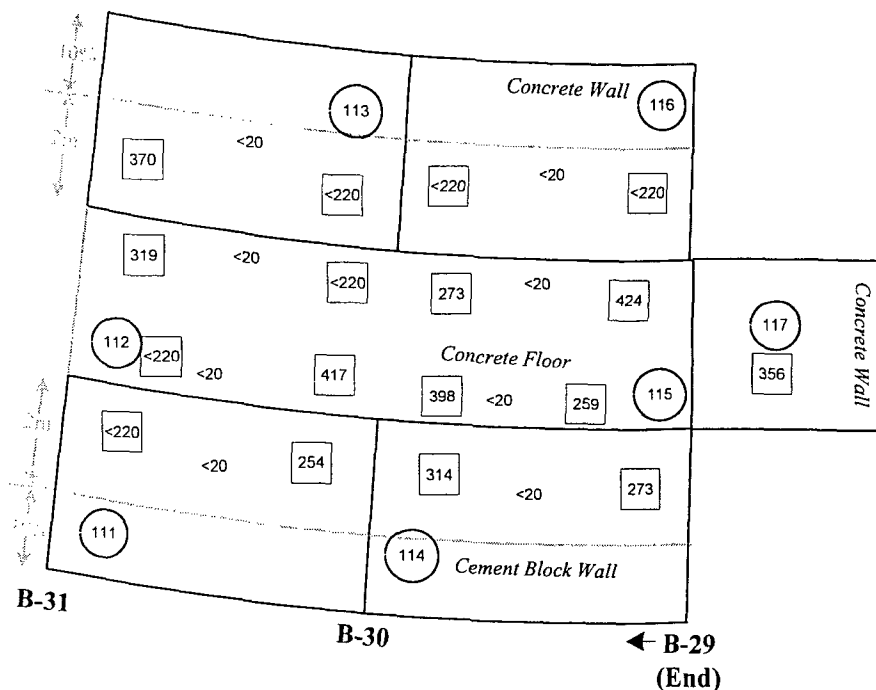
100% of Of floor and wall surfaces up to 2m scanned, 10% of walls above 2m

The Highest β Result (2220 cpm) = <MDA (388 dpm/100 cm²)

B-# = Column Number

Location	Building 2 Service Corridor	
Instruments	Ludlum Model 2221	
Serial Number	84459	
Calibration Due	9/27/02 and 11/12/02	
Efficiency	31.08%	
α β γ	β	
Probe Number	086215	
Probe Size cm ²	434 cm ²	
Background cpm	1840 - 2100 , concrete	1640 - 1850, cement block 1730-1800, Metal Grating
MDA(dpm/100cm ²) $X=0.3$	438 on concrete	388 on cement block 393 on Metal Grating
Surveyors: B. Hunter/S. Finchum Date: 5/09-16/02		

Figure 41: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

= Beta in dpm/100 cm²

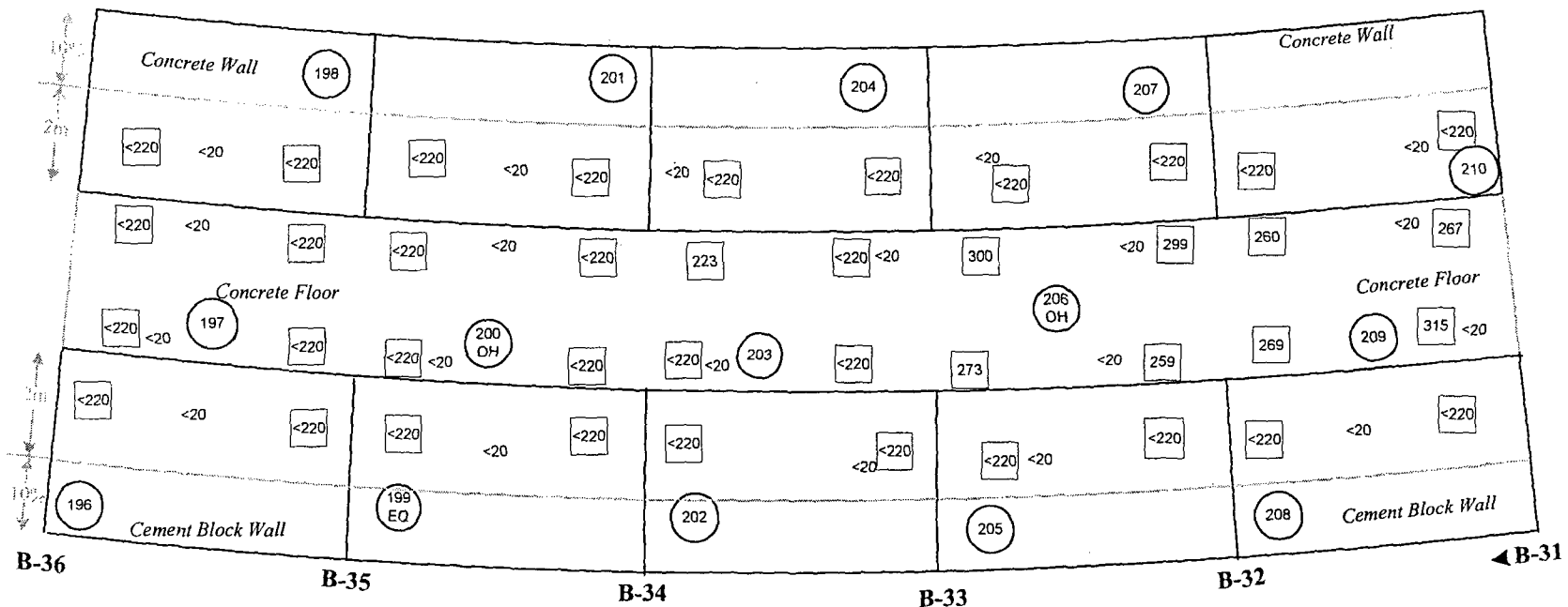
= wipe location
EQ=Equipment wipe

OH= Overhead wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Number	91103	84423
Calibration Due	3/18/02	8/05/02
	22.14%	36.47%
α β γ	α	β
Probe Number	092192	119444
Probe Size cm ²	50cm ²	100 cm ²
Background	0-20 cpm	1042 cp2m
MDA in DPM/100 cm ²	312	210
Surveyors: B. Hunter/ J. Sullivan		
Dates: 02/11/02 (α), 02/19/02 (β), 04/04/02 (wipes)		

Figure 42: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

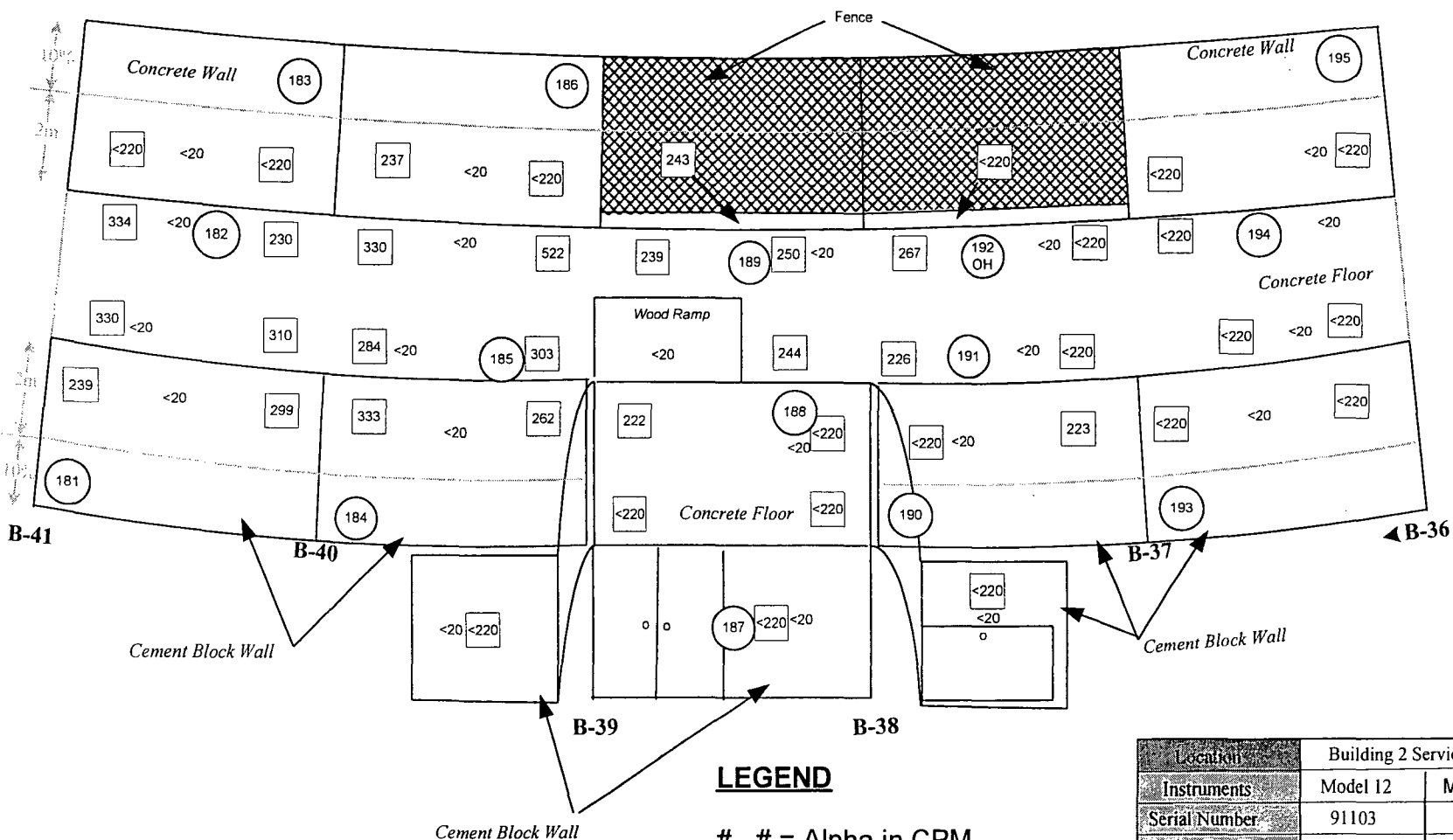
= Beta in dpm/100 cm²

= wipe location
OH= Overhead wipe
EQ=Equipment wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Number	91103	84423
Calibration Due	3/18/02	8/05/02
	22.14%	36.47%
α β γ	α	β
Probe Number	092192	119444
Probe Size cm ²	50cm ²	100 cm ²
Background	0-20 cpm	1042 cp2m
MDA in DPM/100 cm ²	312	210
Surveyors: B. Hunter/ J. Sullivan		
Dates: 02/11/02 (α), 02/19/02 (β), 04/04/02 (wipes)		

Figure 43: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

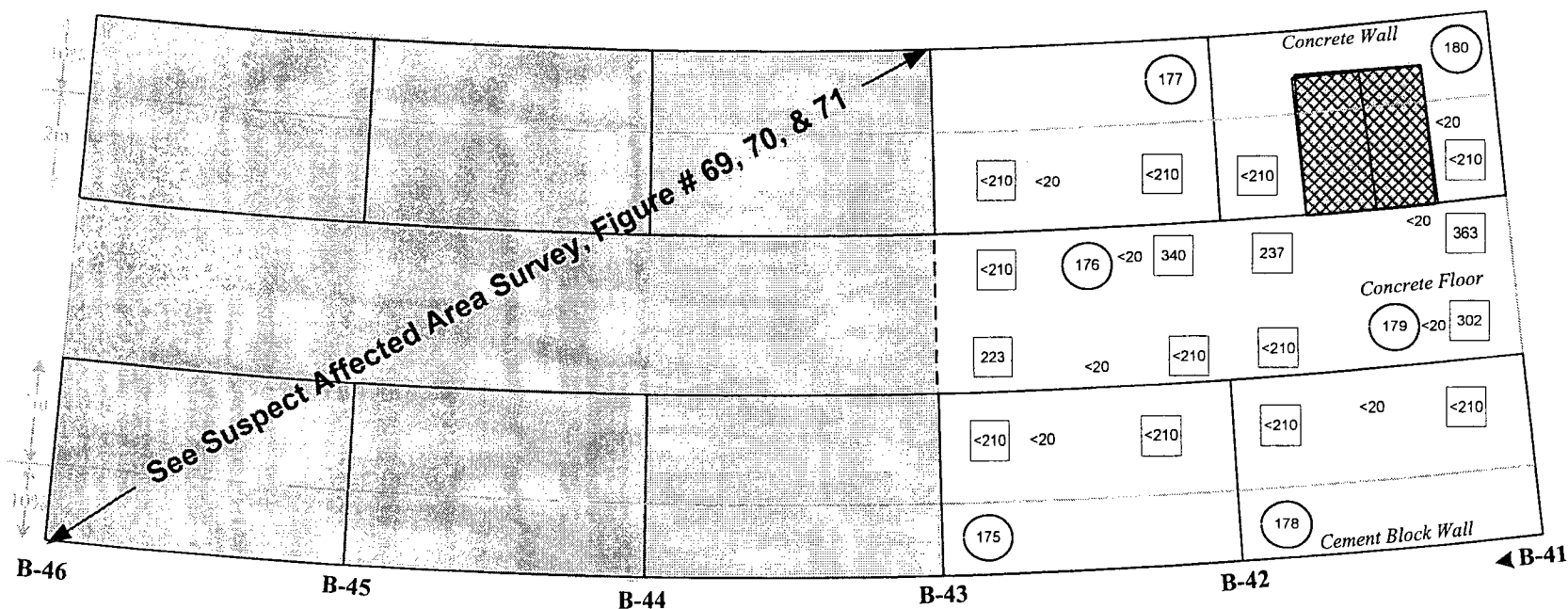
= Beta in dpm/100 cm²

= wipe location
OH= Overhead wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Number	91103	84423
Calibration Due	3/18/02	8/05/02
	22.14%	36.47%
α β γ	α	β
Probe Number	092192	119444
Probe Size cm ²	50cm ²	100 cm ²
Background	0-20 cpm	1042 cp2m
MDA in DPM/100 cm ²	312	210
Surveyors: B. Hunter/ J. Sullivan		
Dates: 02/08/02 (α), 02/19/02 (β), 04/04/02 (wipes)		

Figure 44: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



<20

LEGEND

- # = Alpha in CPM

= Beta in dpm/100 cm²

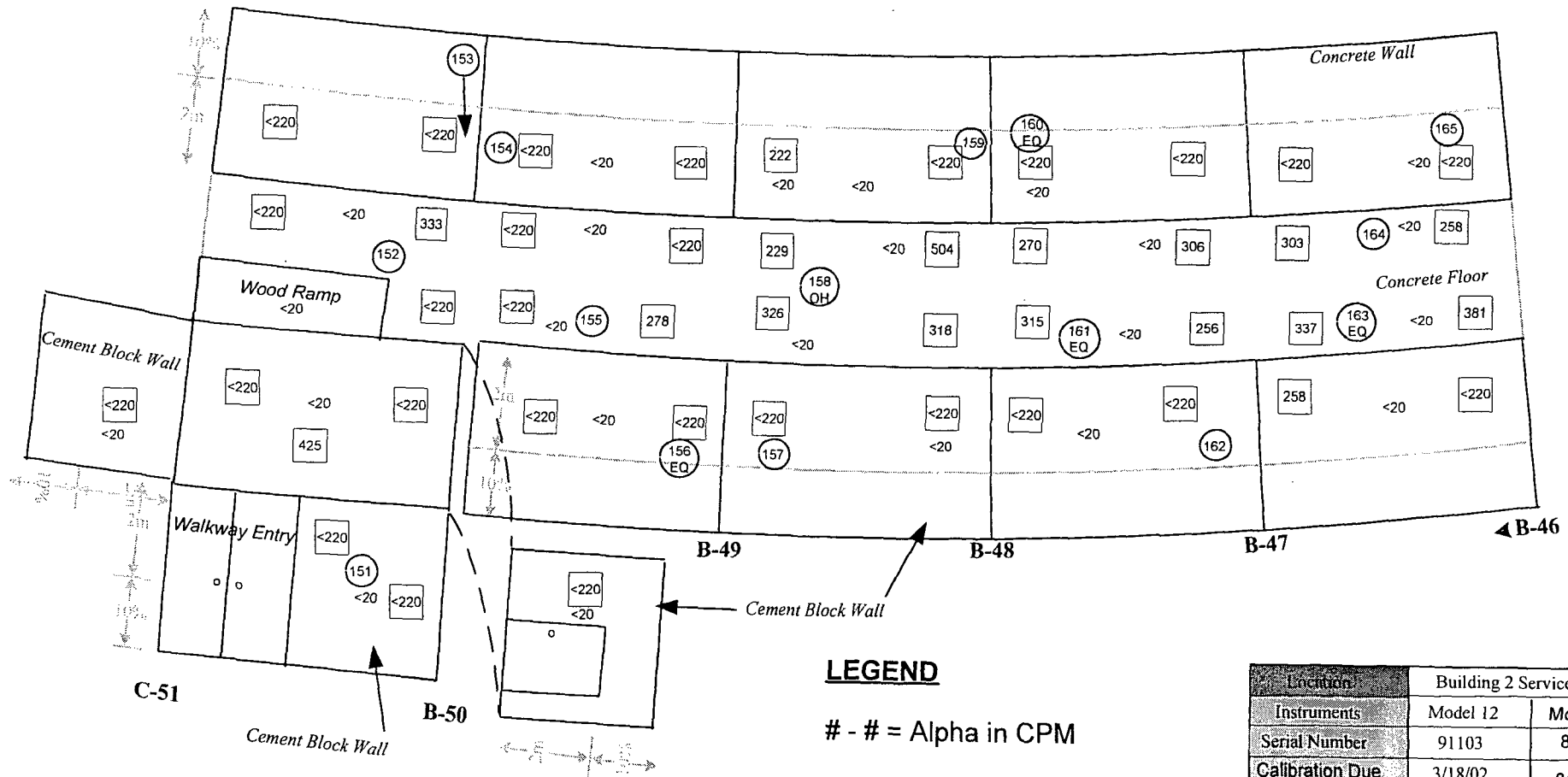
= wipe location
EQ=Equipment wipe

OH= Overhead wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Number	91103	84423
Calibration Due	3/18/02	8/05/02
	22.14%	36.47%
α β γ	α	β
Probe Number	092192	119444
Probe Size cm ²	50cm ²	100 cm ²
Background	0-20 cpm	1042 cp2m
MDA in DPM/100 cm ²	312	210
Surveyors: B. Hunter/J. Sullivan		
Dates: 02/07/02 (α & Wipes), 2/22/02 (β),		

Figure 45: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-46 to C51, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

= Beta in dpm/100 cm²

⊕ = wipe location
EQ=Equipment wipe
OH= Overhead wipe

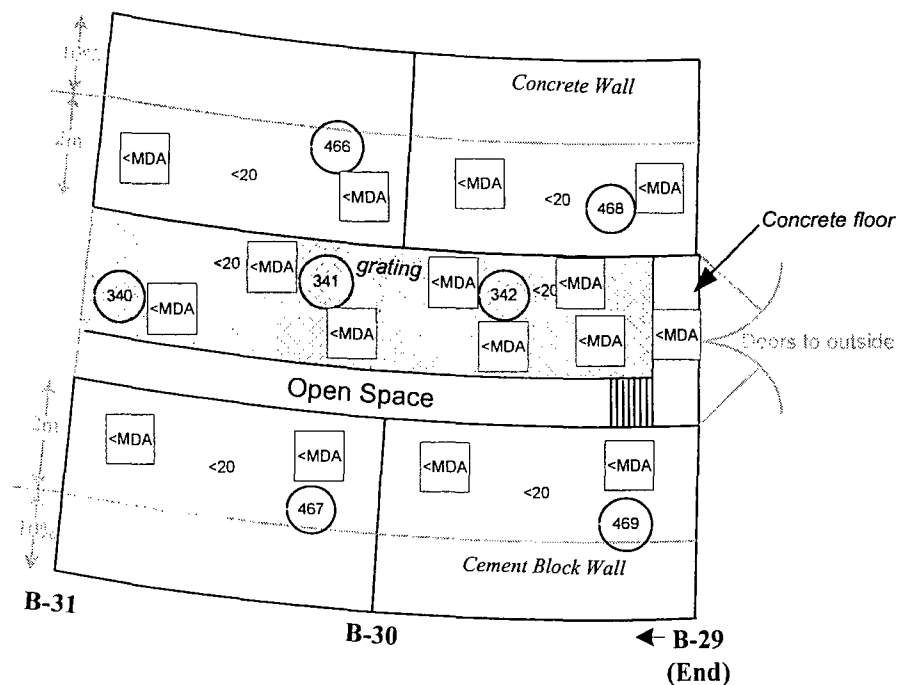
B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Number	91103	84423
Calibration Due	3/18/02	8/05/02
	22.14%	36.47%
α β γ	α	β
Probe Number	092192	119444
Probe Size cm ²	50cm ²	100 cm ²
Background	0-20 cpm	1042 cp2m
MDA in DPM/100 cm ²	312	210

Surveyors: B. Hunter/ J. Sullivan

Dates: 02/07/02 (α), 3/27/02 (β), 04/04/02 (wipes)

Figure 46: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

= Beta in dpm/100 cm²

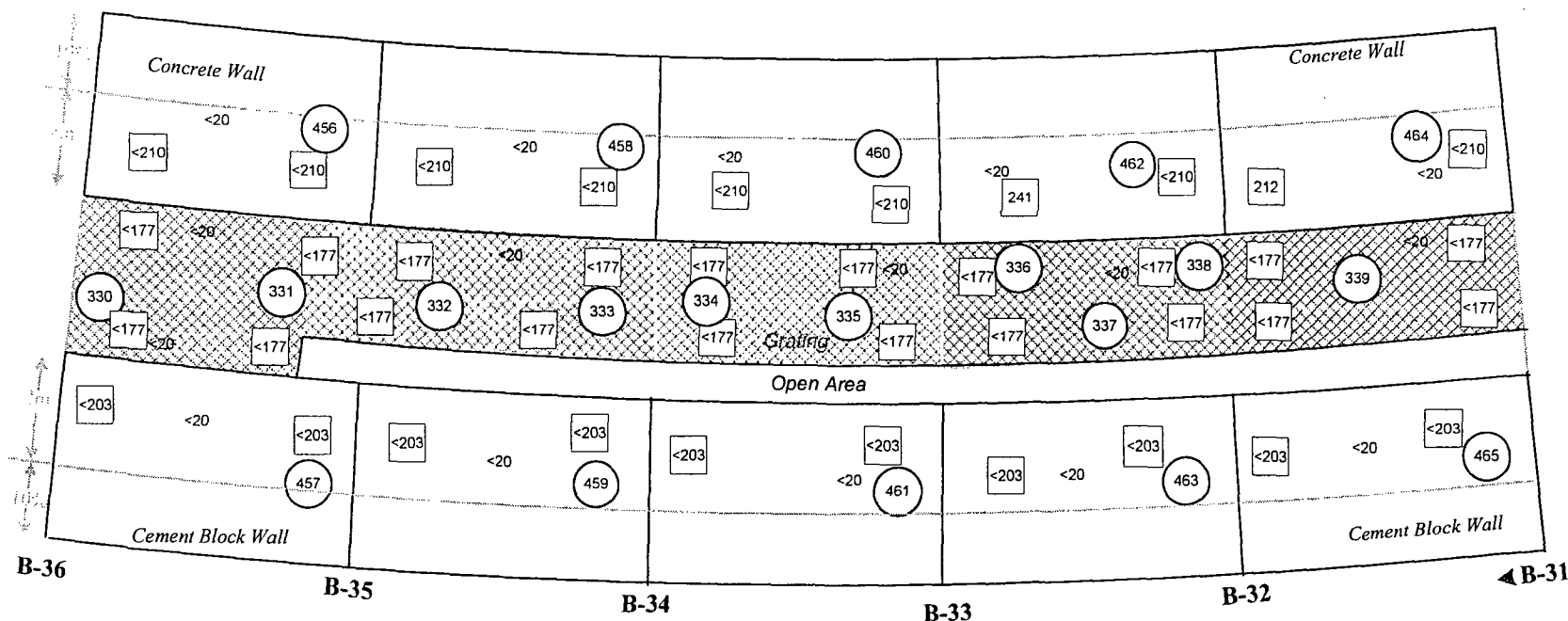
= wipe location
EQ=Equipment wipe

OH= Overhead wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Numbers	138801	84423
Calibration Due	5/11/02	8/05/02
Efficiency	22.52%	36.47%
α β γ	α	β
Probe Number	145696	119444
Probe Size, cm ²	50cm ²	100 cm ²
Background	0-20 cpm, All Surfaces	1042 cp2m, Concrete 978 cp2m, Cement Block 738 cp2m Metal Grate
MDA in DPM/100 cm ²	315	210, Concrete 203, Cement Block 177, Metal Grate
Technician(s): B. Hunter/ S. Finchum		
Date: 4/01/02, 4/25/02, 5/02/02		

Figure 47: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

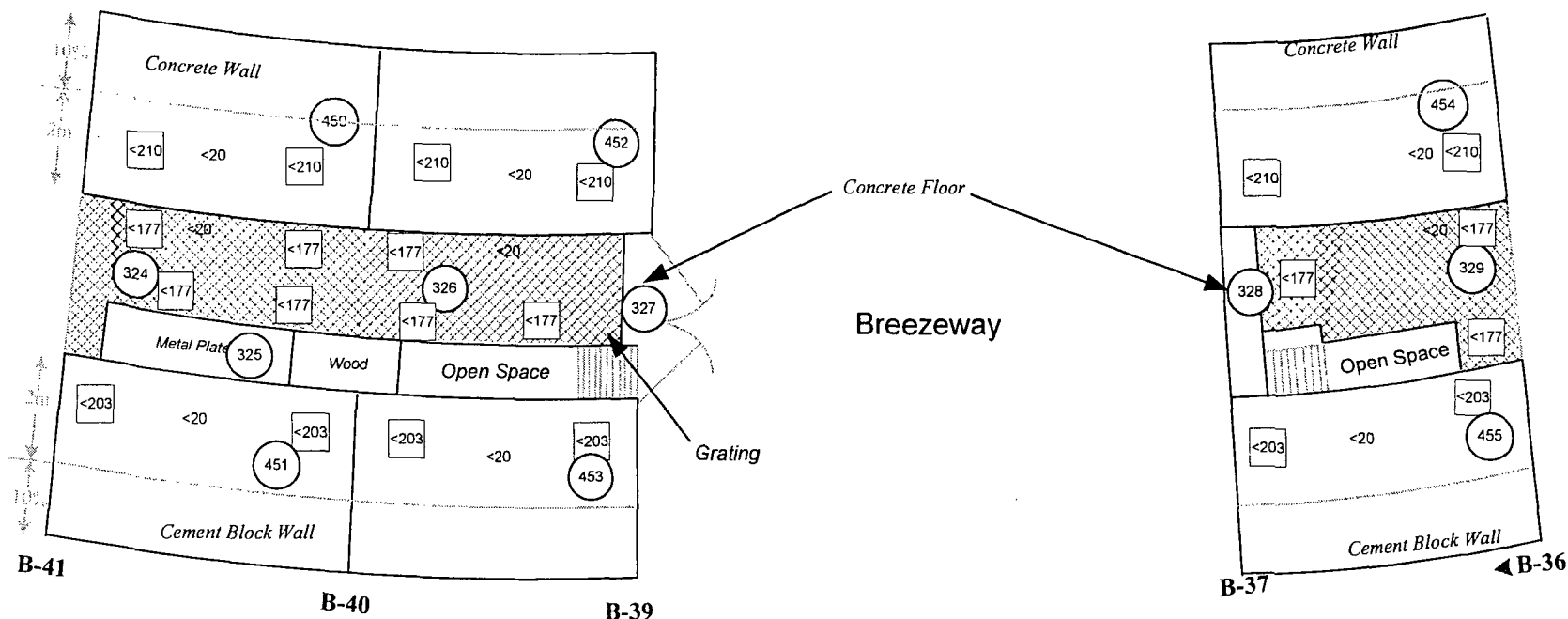
= Beta in dpm/100 cm²

= wipe location
OH= Overhead wipe
EQ=Equipment wipe

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Numbers	138801	84423
Calibration Due	5/11/02	8/05/02
Efficiency	22.52%	36.47%
α β γ	α	β
Probe Number	145696	119444
Probe Size, cm ²	50cm ²	100 cm ²
Background	0-20 cpm, All Surfaces	1042 cp2m, Concrete 978 cp2m, Cement Block 738 cp2m Metal Grate
MDA in DPM/100 cm ²	315	210, Concrete 203, Cement Block 177, Metal Grate
Technician(s): B. Hunter/ S. Finchum		
Date: 4/01/02, 4/25/02, 5/02/02		

Figure 48: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-36 to B-41, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

- # = Alpha in CPM

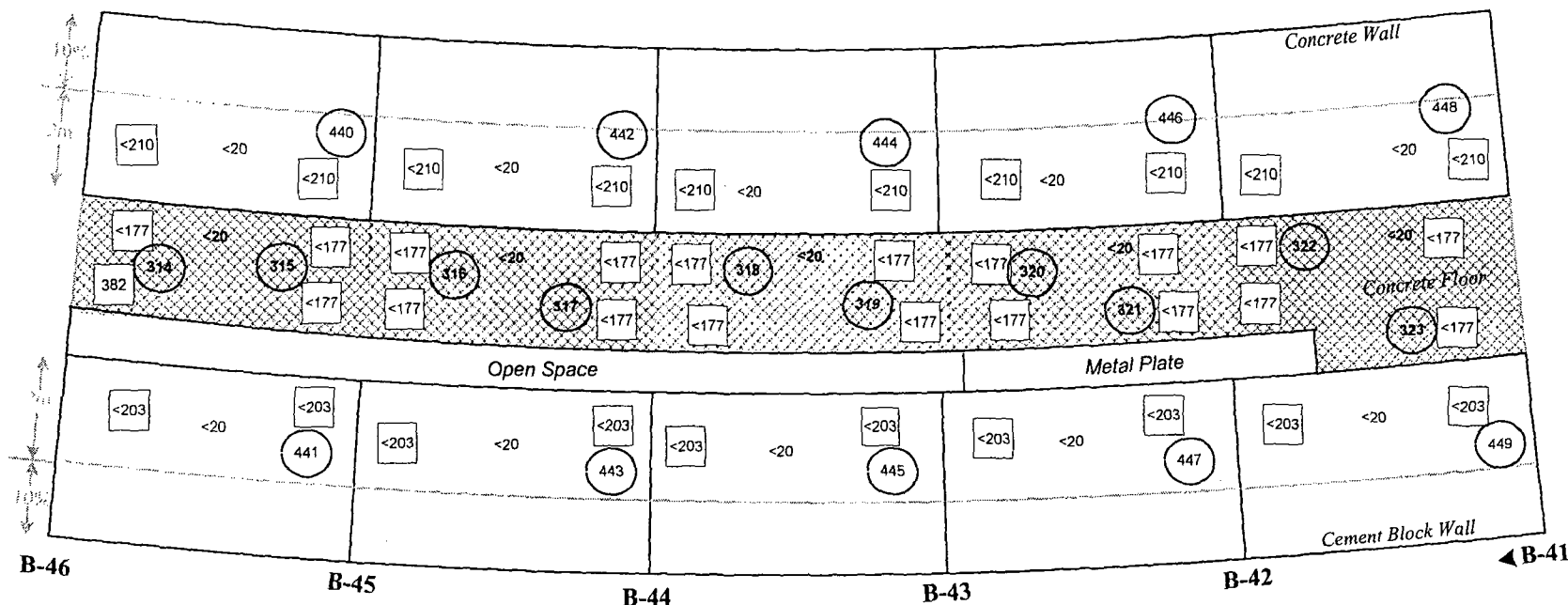
= Beta in dpm/100 cm²

= wipe location

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Numbers	138801	84423
Calibration Due	5/11/02	8/05/02
Efficiency	22.52%	36.47%
α β γ	α	β
Probe Number	145696	119444
Probe Size, cm ²	50cm ²	100 cm ²
Background	0-20 cpm, All Surfaces	1042 cp2m, Concrete 978 cp2m, Cement Block 738 cp2m Metal Grate
MDA in DPM/100 cm ²	315	210, Concrete 203, Cement Block 177, Metal Grate
Technician(s): B. Hunter/ S. Finchum		
Date: 4/01/02, 4/25/02, 5/02/02		

Figure 49: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Fixed Alpha and Beta Measurement Locations and Results, and Loose Surface Contamination (Wipe) Survey Locations



LEGEND

= Alpha in CPM

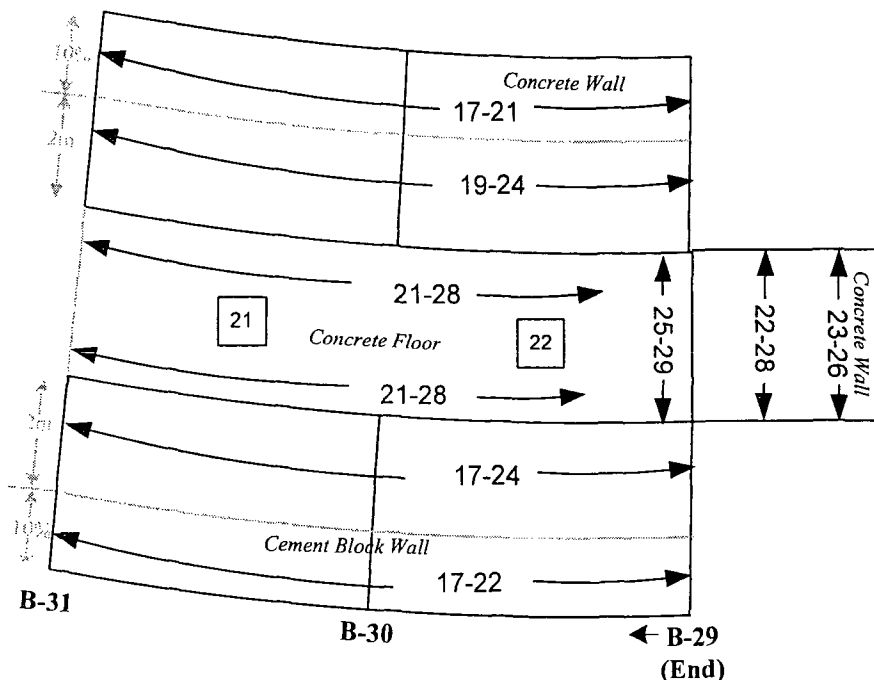
= Beta in dpm/100 cm²

= wipe location

B# = Column Number

Location	Building 2 Service Corridor	
Instruments	Model 12	Model 2221
Serial Numbers	138801	84423
Calibration Due	5/11/02	8/05/02
Efficiency	22.52%	36.47%
α β γ	α	β
Probe Number	145696	119444
Probe Size, cm ²	50cm ²	100 cm ²
Background	0-20 cpm, All Surfaces	1042 cp2m, Concrete 978 cp2m, Cement Block 738 cp2m Metal Grate
MDA in DPM/100 cm ²	315	210, Concrete 203, Cement Block 177, Metal Grate
Technician(s): B. Hunter/ S. Finchum		
Date: 4/01/02, 4/25/02, 5/02/02		

Figure 50: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-29 to B-31, Exposure Rate Fixed Measurement and Scan Survey Locations and Results.



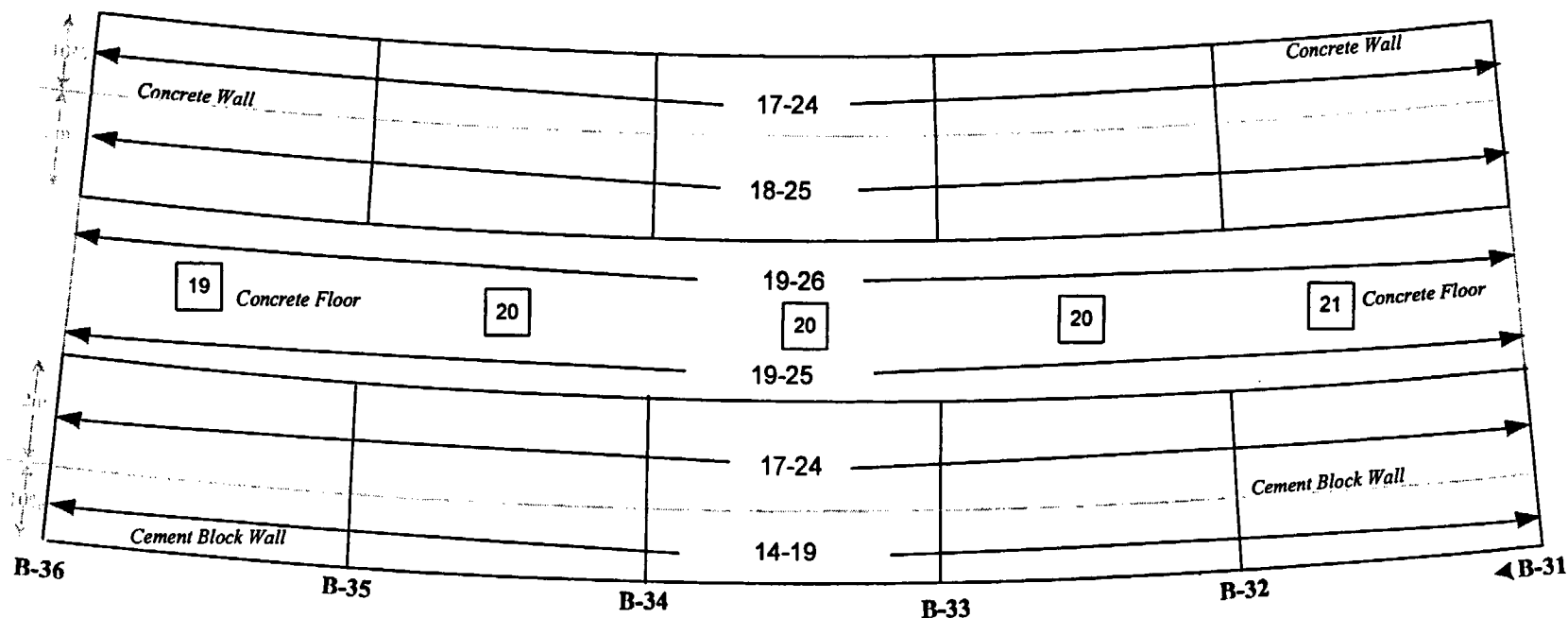
= Exposure Rate @ 1 meter in $\mu\text{R/hr}$.

- # = γ Range in $\mu\text{R/hr}$, 100% of New floor and walls up to 2m scanned, 10% of walls above 2m.

All Fixed Measurements = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors	W. Schuck
Date	1/21-23/02

Figure 51: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-31 to B-36, Exposure Rate Fixed Measurement and Scan Survey Locations and Results.



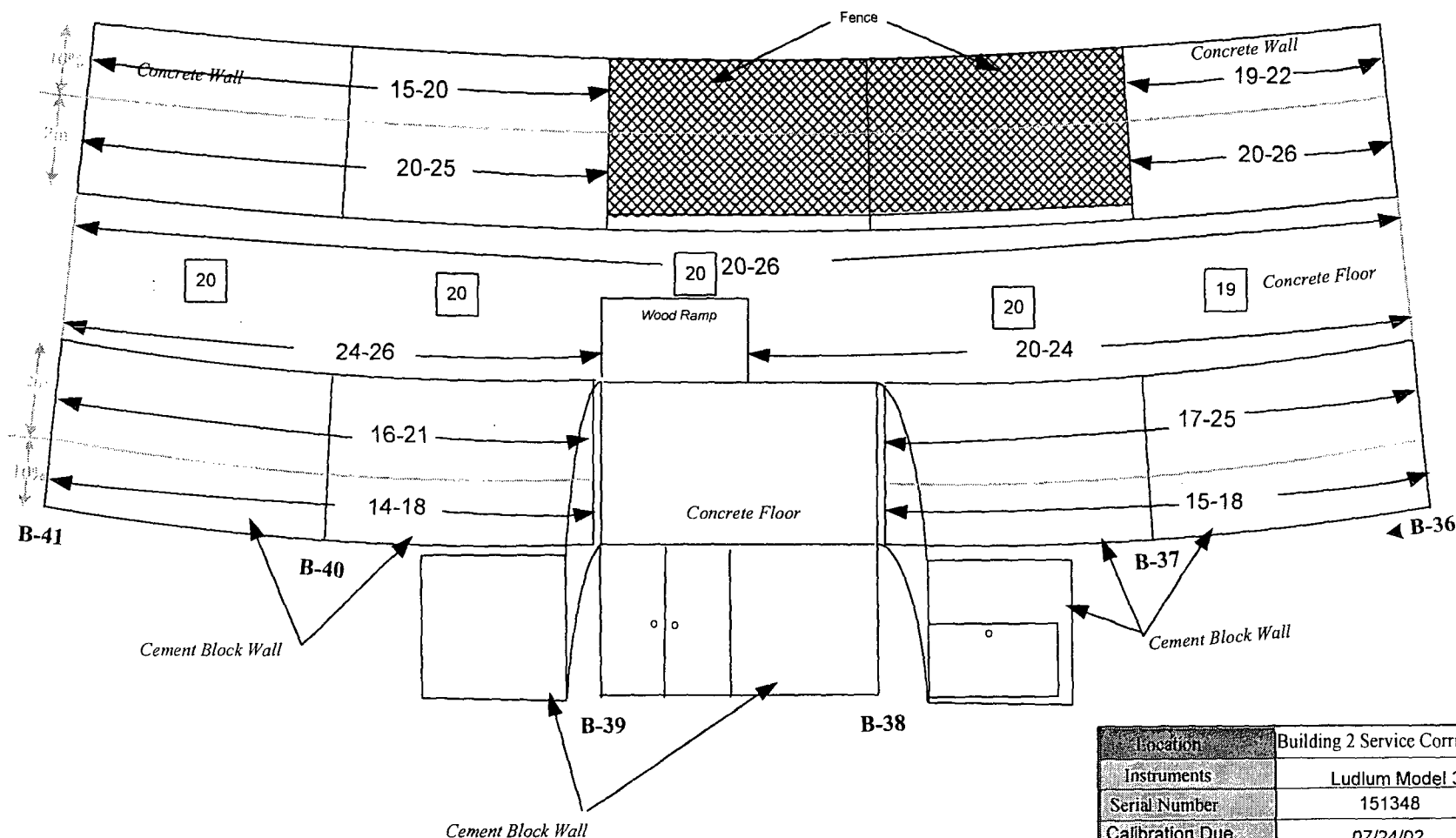
= Exposure Rate @ 1 meter in $\mu\text{R/hr}$.

- # = γ Range in $\mu\text{R/hr}$, 100% of New floor and walls up to 2m scanned, 10% of walls above 2m.

All Fixed Measurements = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : <u>W. Schuck</u> Date: <u>1/21-23/02</u>	

Figure 52: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-36 to B-41, Exposure Rate Fixed Measurement and Scan Survey Locations and Results.



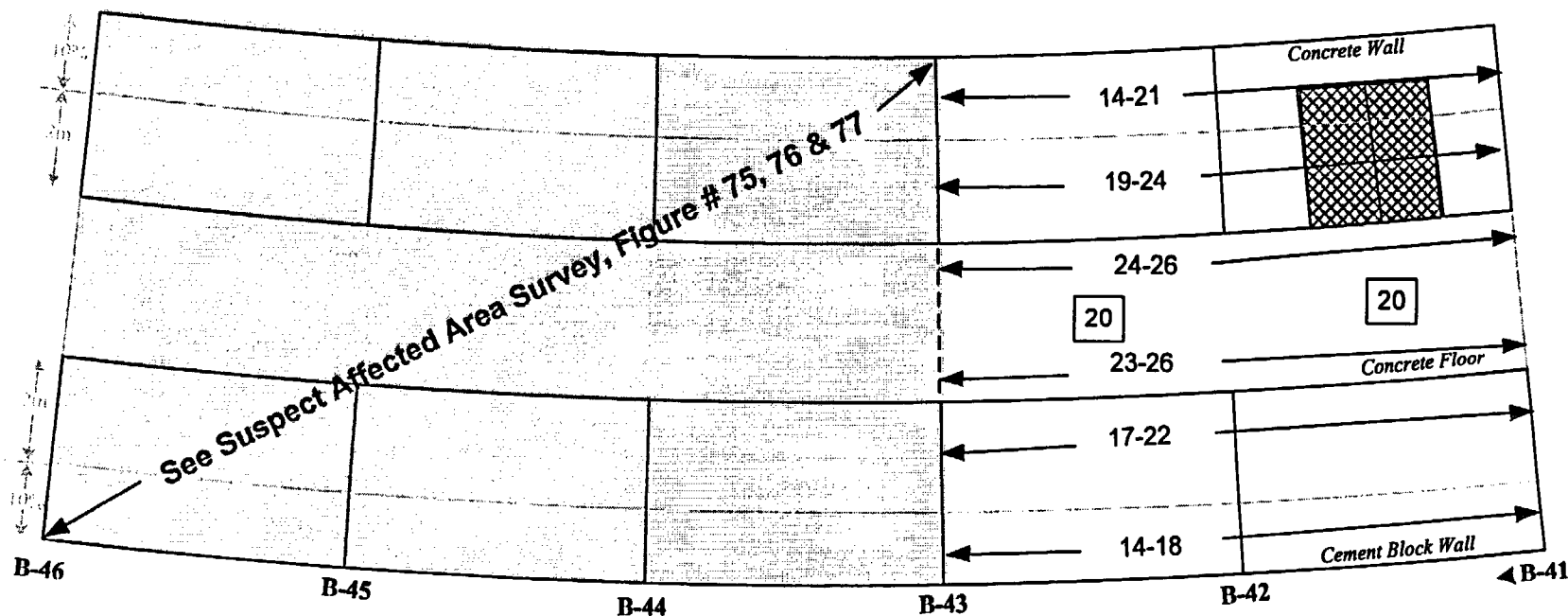
= Exposure Rate @ 1 meter in $\mu\text{R/hr}$.

- # = γ Range in $\mu\text{R/hr}$, 100% of New floor and walls up to 2m scanned, 10% of walls above 2m.

All Fixed Measurements = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : W. Schuck Date: 1/21-23/02	

Figure 53: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-41 to B-46, Exposure Rate Fixed Measurement and Scan Survey Locations and Results.



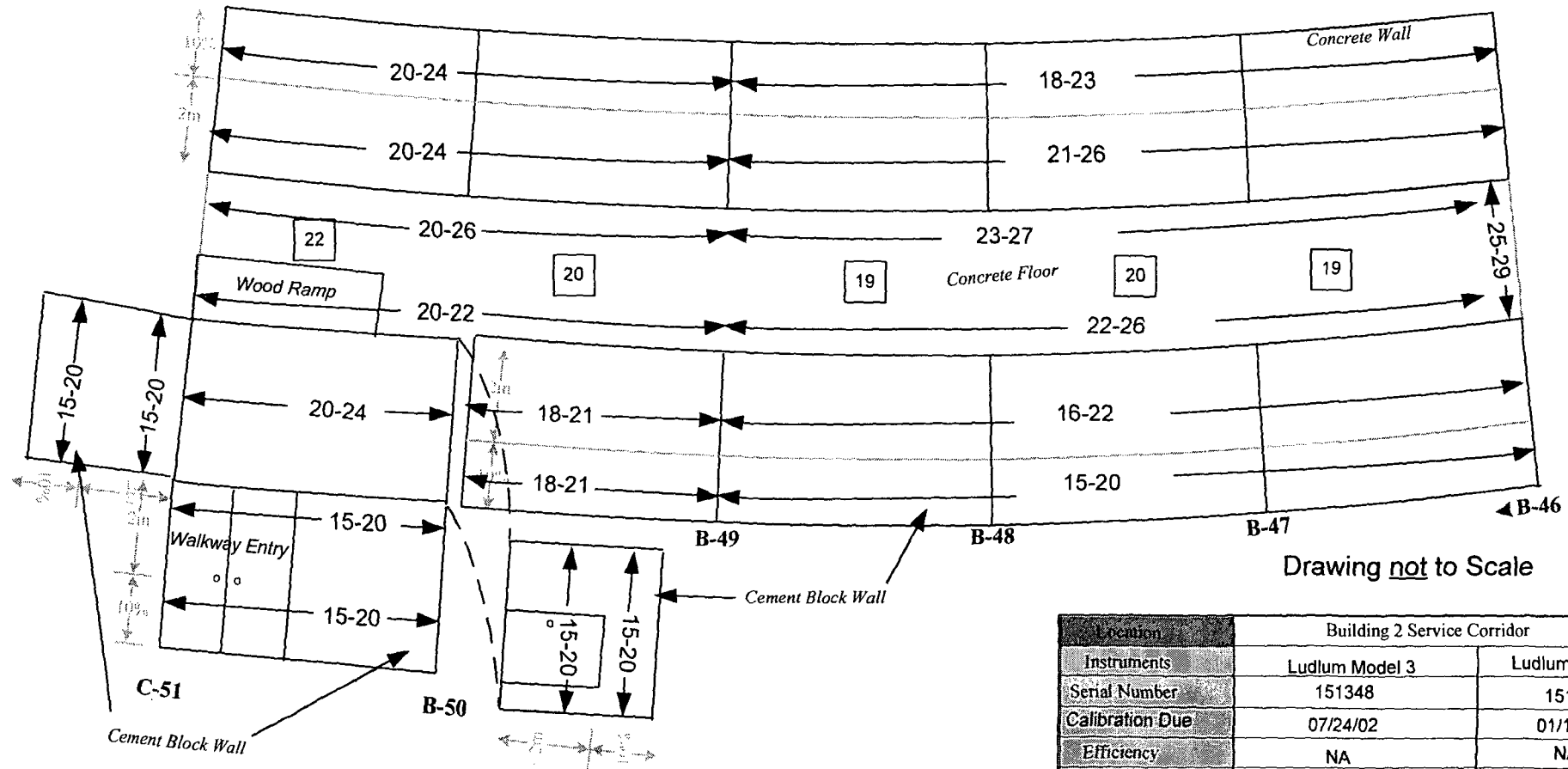
= Exposure Rate @ 1 meter in $\mu\text{R/hr}$.

- # = γ Range in $\mu\text{R/hr}$, 100% of New floor and walls up to 2m scanned, 10% of walls above 2m.

All Fixed Measurements = Natural Background

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : W. Schuck Date: 1/21-23/02	

Figure 54: Building 2 Service Corridor, Section B, Level 1, Non-Suspect Affected Area, Column B-46 to C51, Exposure Rate Fixed measurement and Scan Survey Locations and Results.



Drawing not to Scale

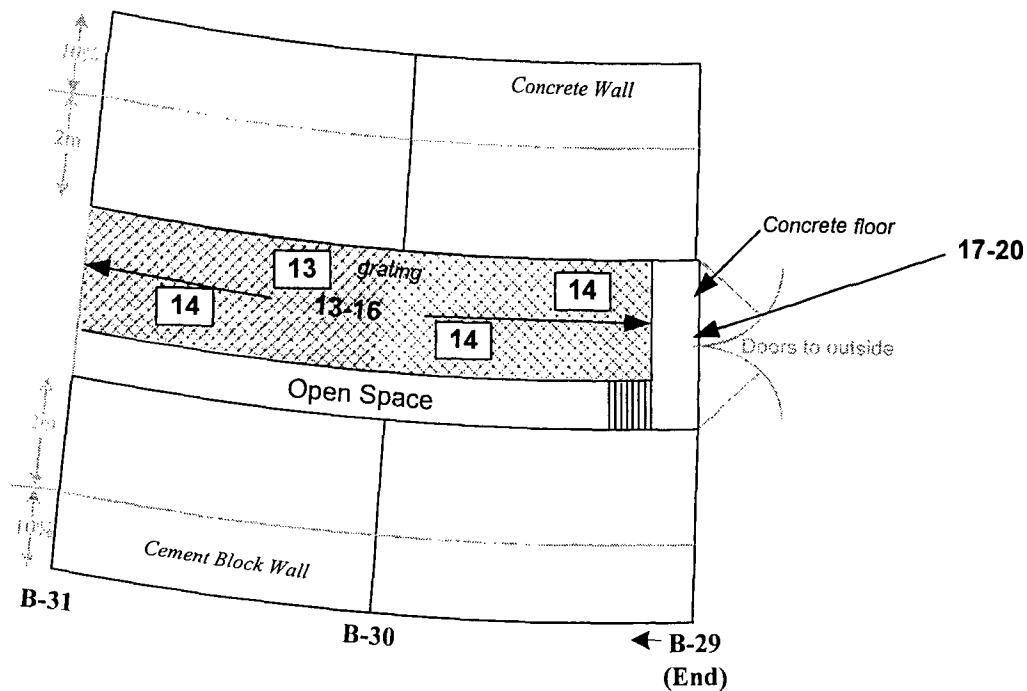
= Exposure Rate @ 1 meter in $\mu\text{R/hr}$.

- # = γ Range in $\mu\text{R/hr}$, 100% of New floor and walls up to 2m scanned, 10% of walls above 2m.

The Area between columns C-51 and B-49 were scanned on 12/13/05

Location	Building 2 Service Corridor	
Instruments	Ludlum Model 3	Ludlum Model 3
Serial Number	151348	151348
Calibration Due	07/24/02	01/11/06
Efficiency	NA	NA
α β γ	γ	γ
Probe Number	163169	163169
Probe	2 x 2 NaI(Tl)	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces	
Surveyors : <u>B. Hunter</u> Date: <u>4/29/02</u>		
Surveyors : <u>S. Cowan</u> Date: <u>12/13/05</u>		

Figure 55: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-29 to B-31, Fixed Exposure Rate and Exposure Rate Scan Survey Locations and Results.

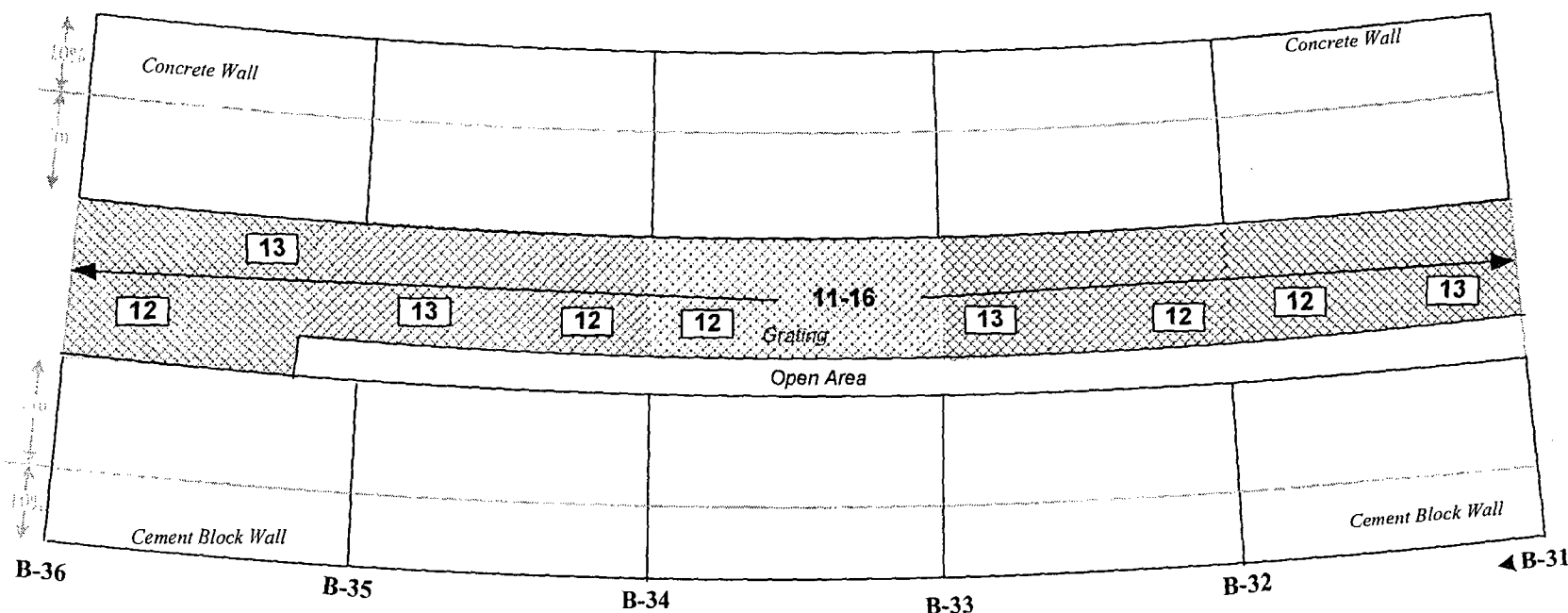


= $\mu\text{R/hr}$ at 1 meter

##-## $\mu\text{R/hr}$ Range for 100% scan at contact with surface

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : B. Hunter Date: 4/26/02	

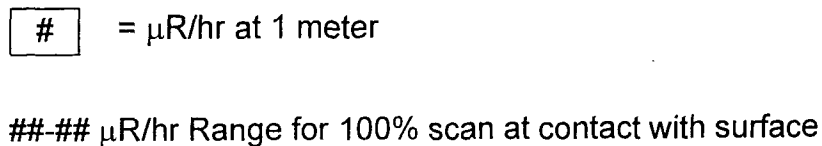
Figure 56: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-31 to B-36, Fixed Exposure Rate and Exposure Rate Scan Survey Locations and Results.



= $\mu\text{R/hr}$ at 1 meter

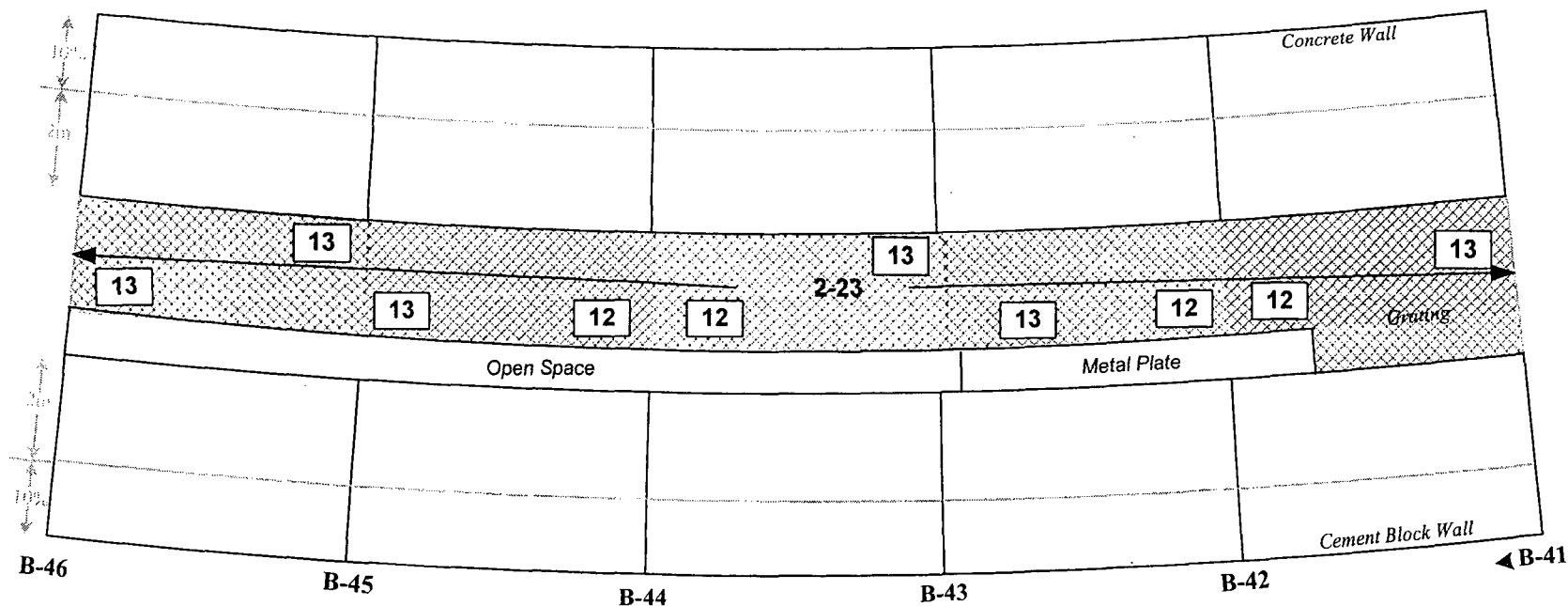
##-## $\mu\text{R/hr}$ Range for 100% scan at contact with surface

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : B. Hunter Date: 4/26/02	



Location:	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors: B. Hunter Date: 4/26-29/02	

Figure 58: Building 2 Service Corridor, Section B, Level 2, Non-Suspect Affected Area, Column B-41 to B-46, Fixed Exposure Rate and Exposure Rate Scan Survey Locations and Results.



= $\mu\text{R/hr}$ at 1 meter

##-## $\mu\text{R/hr}$ Range for 100% scan at contact with surface

Location	Building 2 Service Corridor
Instruments	Ludlum Model 3
Serial Number	151348
Calibration Due	07/24/02
Efficiency	NA
α β γ	γ
Probe Number	163169
Probe	2 x 2 NaI(Tl)
Typical Background in $\mu\text{R/hr}$	13-15, @ 1m, Concrete 20-25, @ 1m in Enclosed Concrete Spaces 22-28 @ contact in Enclosed Concrete Spaces
Surveyors : B. Hunter Date: 4/29/02	

—

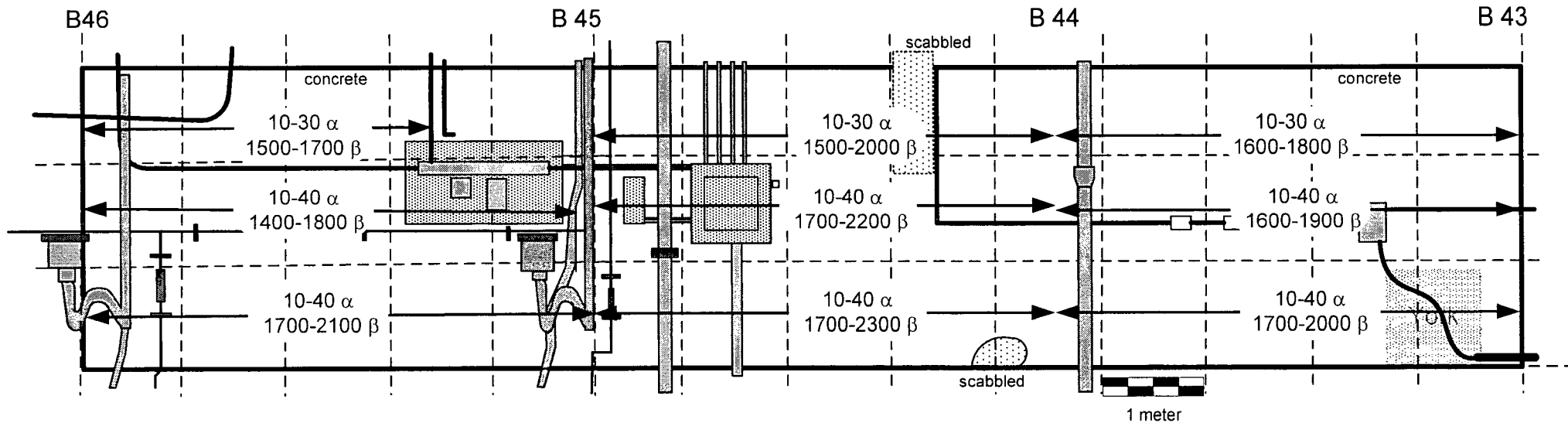


1. 100% of accessible original surface scanned.
2. $\leftarrow \# \# \alpha \rightarrow$ Denotes alpha scan results in cpm.
3. $\leftarrow \# \# \beta \rightarrow$ Denotes beta scan results in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial #	154202	84459
Probe	434 cm ² β	434 cm ² α
Probe Serial #	149017	086215
Cal Due Date	03-24-04	02-02-04
Efficiency %	30.39	21.58
Bkgd concrete	1300-2000 cpm	10-60 cpm
Scan MDA	375 dpm/100 cm	112 dpm/100 cm ²

Date: 10-21-03

Figure 60: Building 2 Service Corridor Section B First (Lowest) Level Inner Wall Column B 43 to B 46
Alpha and Beta Scan Measurement Locations and Results



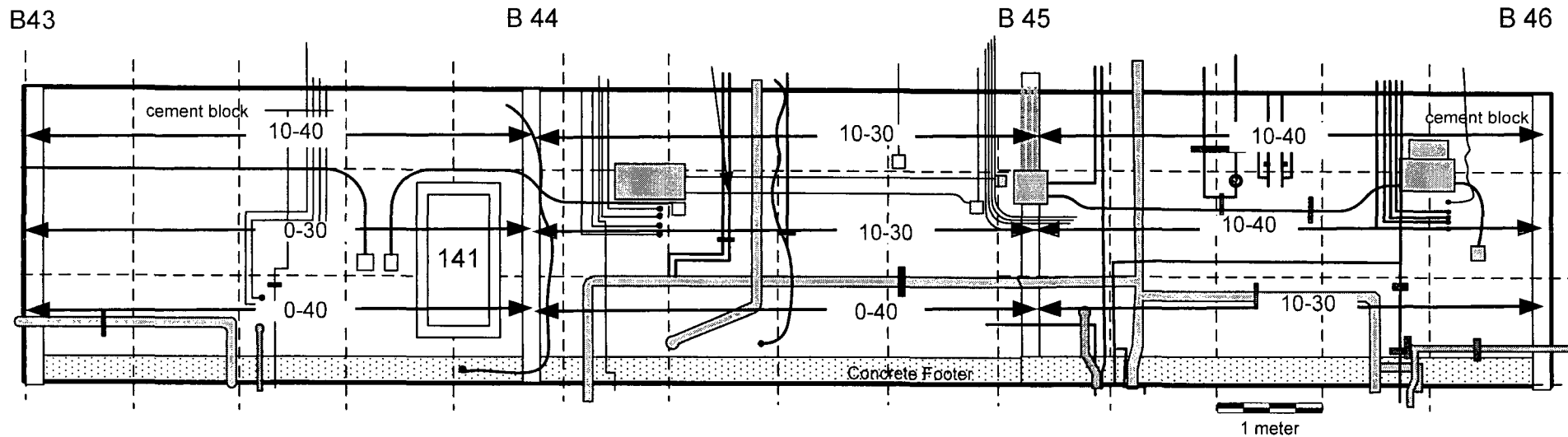
Notes:

1. 100% of accessible surface scanned 2 meters and below, 10% above 2 meters.
2. $\leftarrow \#\#\alpha \rightarrow$ Denotes alpha scan results in cpm.
3. $\leftarrow \#\#\beta \rightarrow$ Denotes beta scan results in cpm.

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial #	154202	84459
Probe	434 cm ² β	434 cm ² α
Probe Serial #	149017	086215
Cal Due Date	03-24-04	02-02-04
Efficiency %	30.39	21.58
Bkgd concrete	1300-2000 cpm	10-60 cpm
Scan MDA	375 dpm/100 cm ²	112 dpm/100 cm ²
Bkgd metal	700-1300 cpm	0-40 cpm
Scan MDA	227 dpm/100 cm ²	64 dpm/100 cm ²
Bkgd wood	900-1400 cpm	0-40 cpm
Scan MDA	262 dpm/100 cm ²	64 dpm/100 cm ²

Surveys conducted by: G. Sayer & D. Koelker
Dates: 10-21-03 and 10-22-03

Figure 61: Building 2 Service Corridor Section B First (Lowest) Level Outer Wall Column B43 to B46
Alpha Scan Measurement Locations and Results



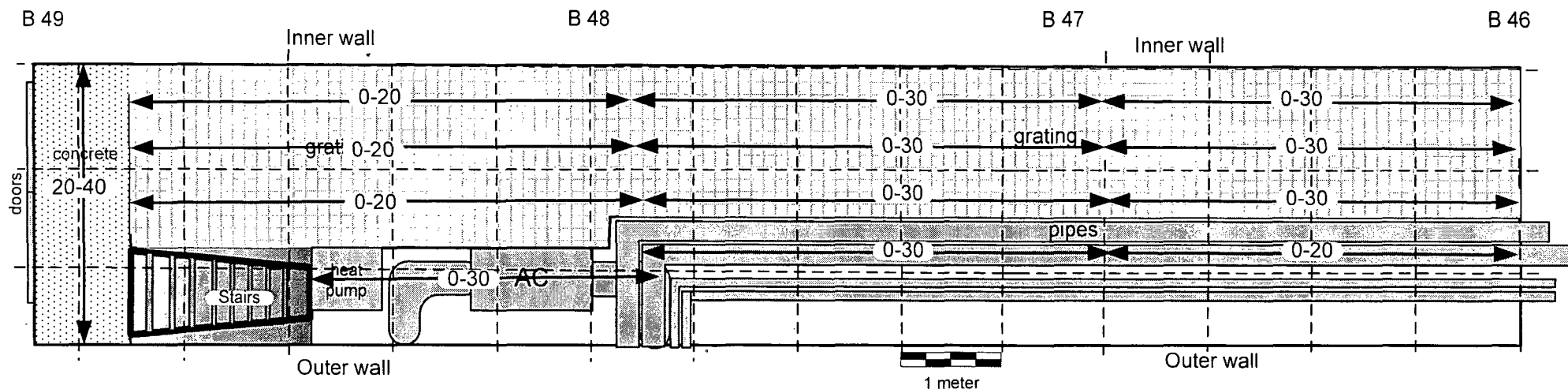
Notes:

1. 100% of accessible area, 2 meters and below, 10% above 2 meters was scanned for alpha.
2. $\leftarrow \# \# \rightarrow$ Denotes alpha scan in cpm as measured with the 434 cm² probe.
3. Areas not accessible with 434 cm² probe were scanned with the 50 cm² probe.
All readings <20 cpm.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial #	84459	138801
Probe	434 cm ² α	50 cm ² α
Probe Serial #	086215	145696
Cal Due Date	02-02-04	03-11-04
Efficiency %	21.58	22.52
Bkgd cement block	10-30 cpm	<20 cpm
Scan MDA	64 dpm/100 cm ²	209 dpm/100 cm ²

Surveys conducted by: G. Sayer & D. Koelker
Date: 10-22-03

Figure 62: Building 2 Service Corridor Section B Second (Middle) Level Floor Column B-46 to B-49
Alpha Scan Measurement Locations and Results



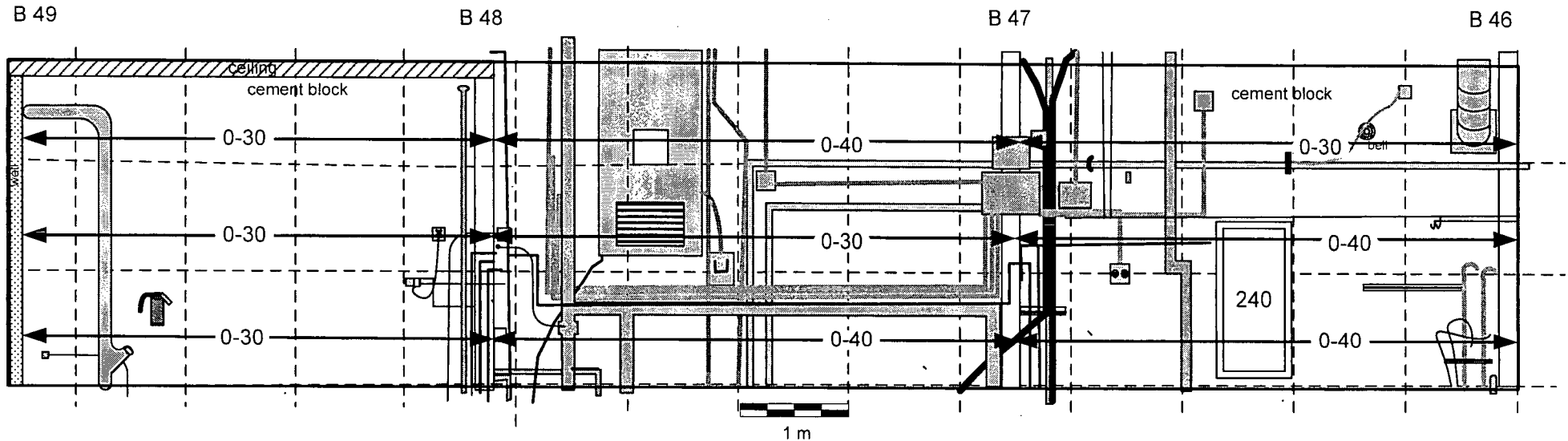
Notes:

1. 100% of accessible surfaces scanned.
2. $\leftarrow ### \rightarrow$ Denotes alpha scan in cpm. All results were at background.

Instrument	
Model	Ludlum 2221
Serial #	84459
Probe	434 cm ² α
Probe Serial #	086215
Cal Due Date	02-02-04
Efficiency %	21.58
Bkgd metal	0-40 cpm
Scan MDA metal	64 dpm/100 cm ²
Bkgd grating	0-40 cpm
Scan MDA grating	64 dpm/100 cm ²
Bkgd concrete	10-60 cpm
Scan MDA concrete	112 dpm/100 cm ²

Survey conducted by: R. Stowell & G. Sayer
Date: 12-09-03

Figure 63: Building 2 Service Corridor Section B Second (Middle) Level Inner Wall Column B 46 to B 49
Alpha Scan Measurement Locations and Results



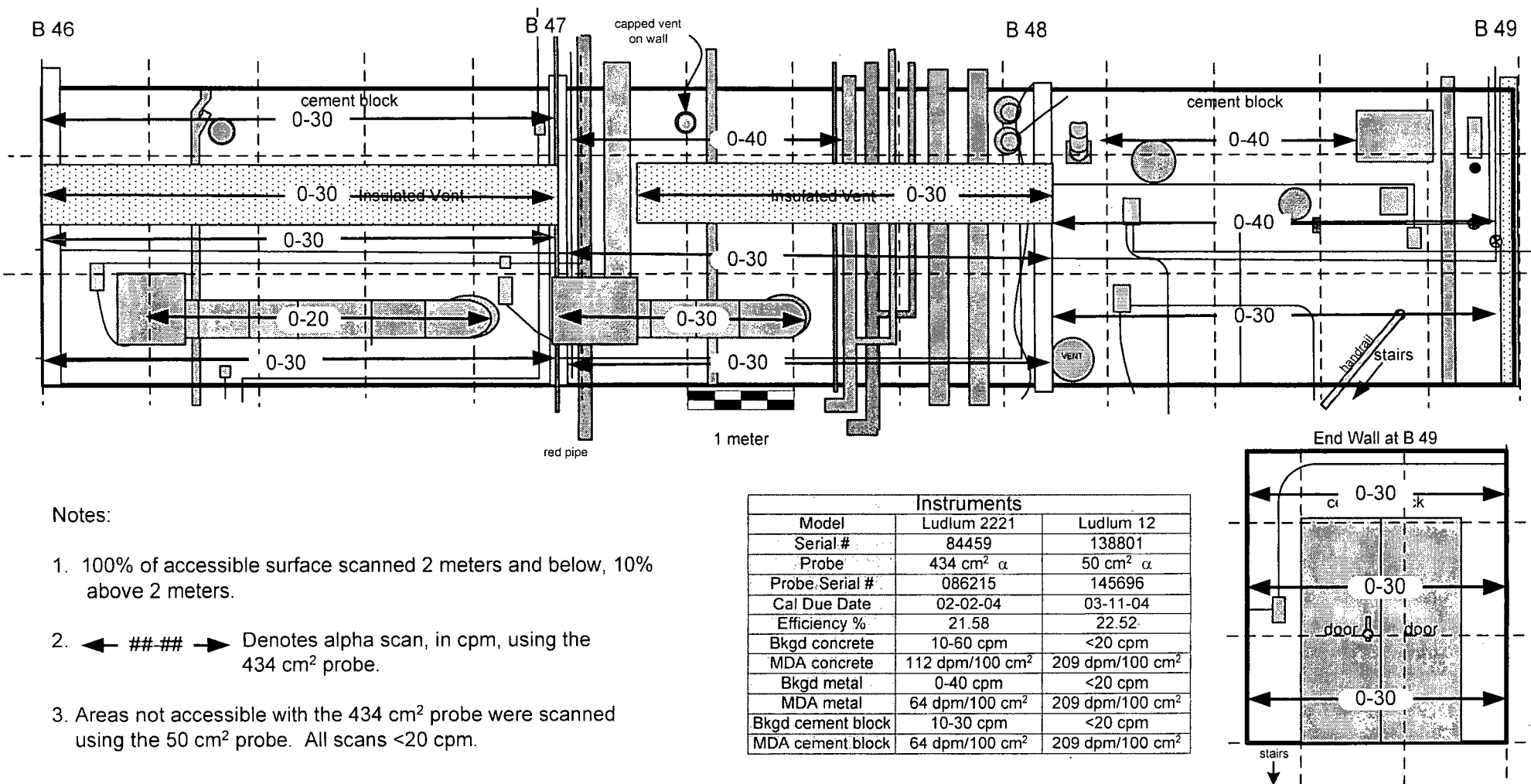
Notes:

1. 100% of accessible area, 2 meters and below, 10% above 2 meters was scanned for alpha.
2. $\leftarrow \# \# \rightarrow$ Denotes alpha scan in cpm as measured with the 434 cm² probe.
3. Areas not accessible with 434 cm² probe were scanned with the 50 cm² probe. All readings <20 cpm.

Instruments			
Model	Ludlum 2221	Ludlum 12	Ludlum 12
Serial #	85549	138801	138738
Probe	434 cm ² α	50 cm ² α	50 cm ² α
Probe Serial #	086215	145696	073360
Cal Due Date	02-02-04	03-11-04	05-17-04
Efficiency %	21.58	22.52	21.02
Bkgd metal	0-40 cpm	<20 cpm	<20 cpm
MDA metal	64 dpm/100 cm ²	209 dpm/100 cm ²	224 dpm/100 cm ²
Bkgd cement block	10-30 cpm	<20 cpm	<20 cpm
MDA cement block	64 dpm/100 cm ²	209 dpm/100 cm ²	224 dpm/100 cm ²

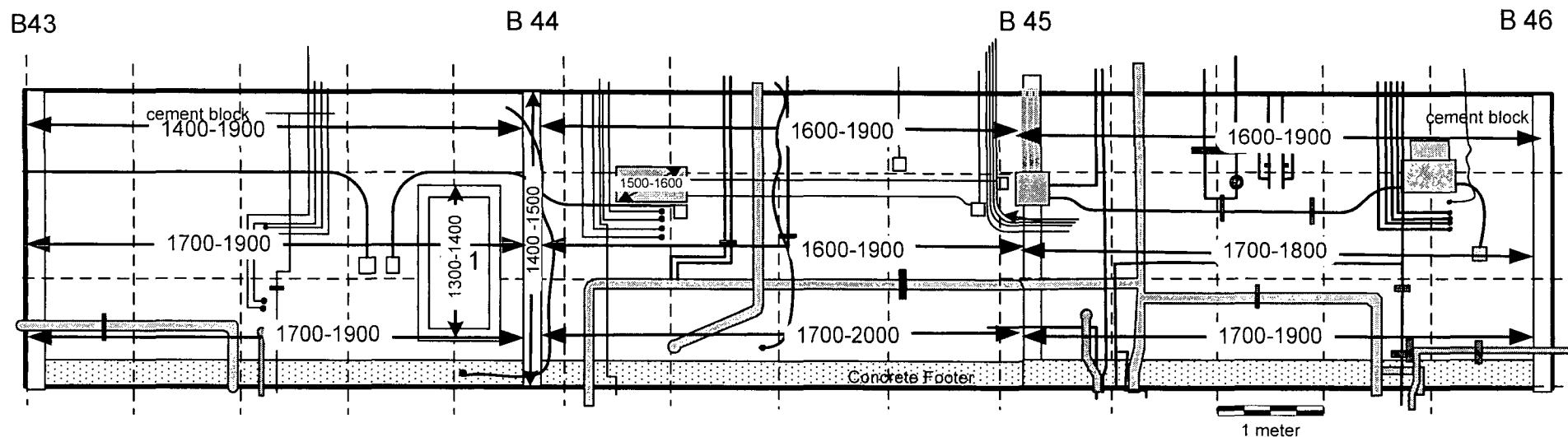
Survey conducted by: R. Stowell & G. Sayer
Dates: 12-08-03 to 12-09-03

Figure 64: Building 2 Service Corridor Section B Second (Middle) Level Outer Wall Column B 46 to B 49 & End Wall
Alpha Scan Measurement Locations and Results



Survey conducted by: R. Stowell & G. Sayer
Date: 12-09-03

Figure 65: Building 2 Service Corridor Section B First (Lowest) Level Outer Wall Column B43 to B46
Beta Scan Measurement Locations and Results



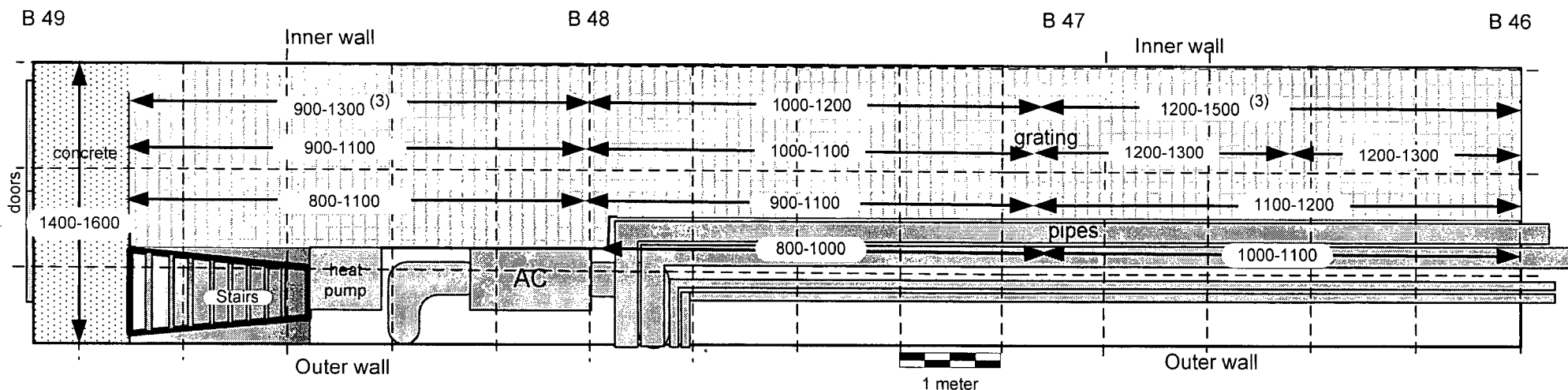
Notes:

1. 100% of accessible surface scanned 2 meters and below, 10% above 2 meters.
2. $\leftarrow \# \# \rightarrow$ Denotes beta scan in cpm as measured with the 434 cm² probe.
3. Surfaces not accessible with 434 cm² probe were scanned with 100 cm² probe.
All readings 400-600 cpm.
4. Surfaces not accessible with 100 cm² probe were scanned with 15 cm² probe.
All readings 40-80 cpm.

Instruments			
Model	Ludlum 2221	Ludlum 2221	Ludlum 3
Serial #	154202	86302	138880
Probe	434 cm ² β	100 cm ² β	15 cm ² β - γ
Probe Serial #	149017	142547	117851
Cal Due Date	03-24-04	04-06-04	03-11-04
Efficiency %	30.39	31.20	26.14
Bkgd cement block	1300-1500 cpm	220-340 cpm	50-80 cpm

Survey conducted by: G. Sayer & D. Koelker
Date: 10-22-03

Figure 66: Building 2 Service Corridor Section B Second (Middle) Level Floor Column B-46 to B-49
Beta Scan Measurement Locations and Results



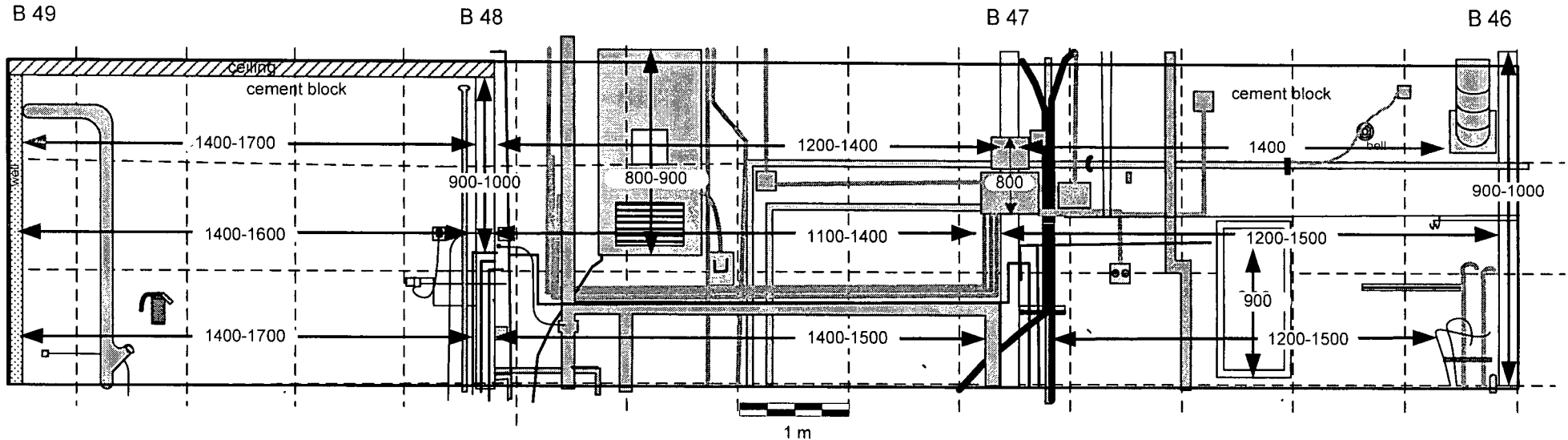
Notes:

1. 100% of accessible surfaces scanned.
2. \blacktriangleleft ##### \blacktriangleright Denotes beta scan in cpm.
3. Two small, $<100 \text{ cm}^2$, areas with elevated beta scan readings were found during the initial survey of the grating. These areas were decontaminated and resurveyed. Location, initial levels of contamination and post decontamination survey results are shown on Figure 81.

Instrument	
Model	Ludlum 2221
Serial #	154202
Probe	434 cm^2 β
Probe Serial #	149017
Cal Due Date	03-24-04
Efficiency %	30.39
Bkgd concrete	1300-2000 cpm
MDA concrete	375 dpm/100 cm^2
Bkgd metal	700-1300 cpm
MDA metal	227 dpm/100 cm^2
Bkgd grating	1000-1400 cpm
MDA grating	273 dpm/100 cm^2

Surveys conducted by: R. Stowell & G. Sayer
Dates: 12-03-03 to 12-08-03

Figure 67: Building 2 Service Corridor Section B Second (Middle) Level Inner Wall Column B 46 to B 49
Beta Scan Measurements Locations and Results



Notes:

- 100% of accessible surface scanned 2 meters and below, 10% above 2 meters.
- ← ## → Denotes beta scan in cpm as measured with the 434 cm² probe.
- Surfaces not accessible with 434 cm² probe were scanned with 100 cm² probe. All readings 250-400 cpm.
- Surfaces not accessible with 100 cm² probe were scanned with 15 cm² probe. All readings 40-80 cpm.

Instruments			
Model	Ludlum 2221	Ludlum 2221	Ludlum 3
Serial #	154202	86302	138880
Probe	434 cm ² β	100 cm ² β	15 cm ² β-γ
Probe Serial #	149017	142547	117851
Cal Due Date	03-24-04	05-04-07	05-10-04
Efficiency %	30.39	31.20	26.14
Bkgd cement block	1300-1500 cpm	220-340 cpm	50-80 cpm
Bkgd metal	700-1300 cpm	180-280 cpm	40-70 cpm

Survey conducted by: G. Sayer
Date: 12-04-03

Figure 68

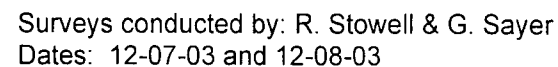
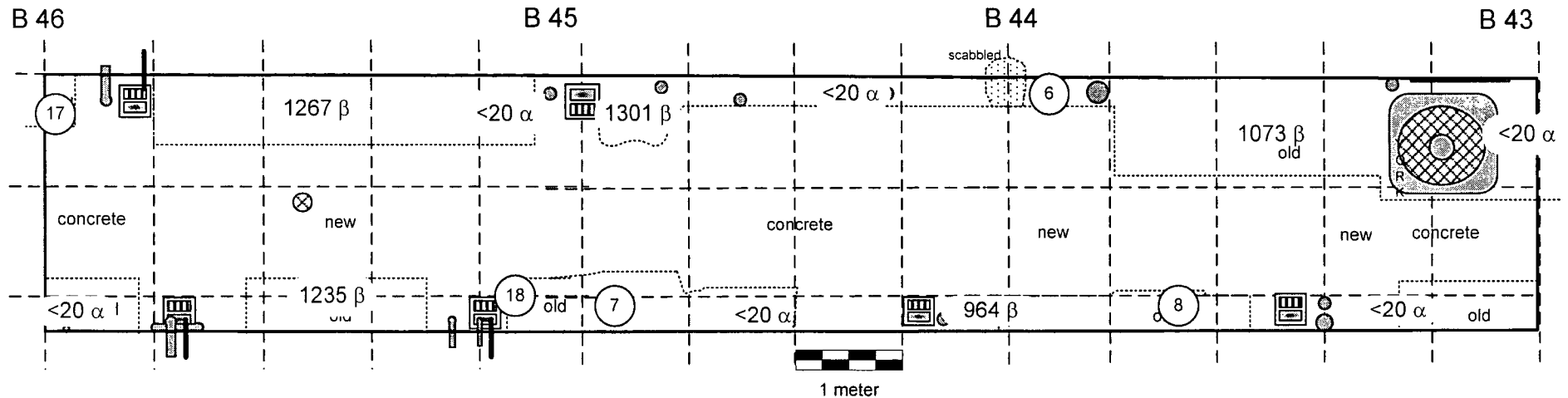


Figure 69: Building 2 Service Corridor Section B First (Lowest) Level Floor Column B 43 to B 46
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



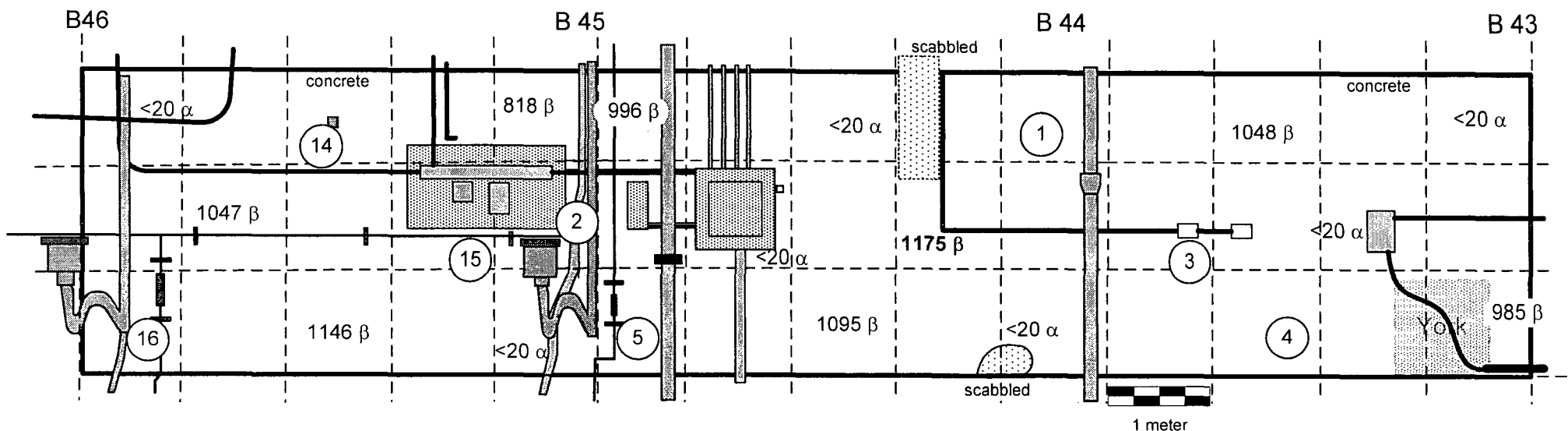
Notes:

1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background.
2. ### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1301 cp2m, 768 dpm/ 100cm².
3. (##) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	04-06-04	03-11-04
Efficiency %	31.20	22.52
Bkgd concrete	822 ± 344cp2m	<20 cpm
MDA	218 dpm/ 100 cm ²	209 dpm/ 100 cm ²

Survey conducted by: G. Sayer & D. Koelker
Date: 10-21-03

Figure 70: Building 2 Service Corridor Section B First (Lowest) Level Inner Wall Column B 43 to B 46
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



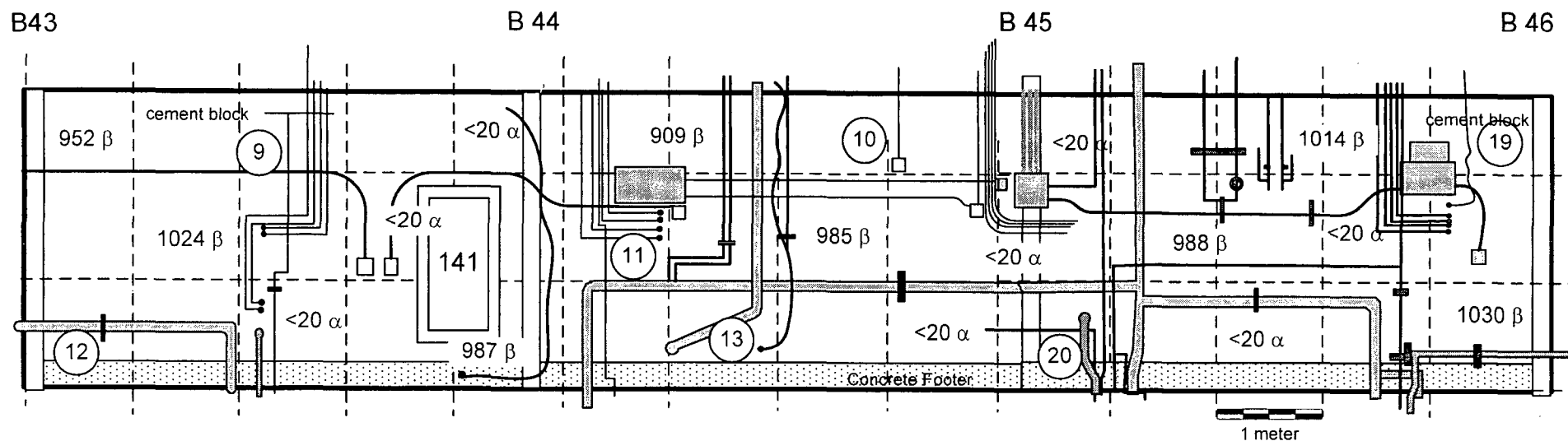
Notes:

1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background, <20 cpm.
2. ##### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1175 cp2m, 566 dpm/100 cm².
3. (##) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	04-06-04	03-11-04
Efficiency %	31.20	22.52
Background	822 \pm 344 cp2m	<20 cpm
MDA	218 dpm/100 cm ²	209 dpm/100 cm ²

Surveys conducted by: G. Sayer & D. Koelker
Date: 10-21-03

Figure 71: Building 2 Service Corridor Section B First (Lowest) Level Outer Wall Column B43 to B46
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



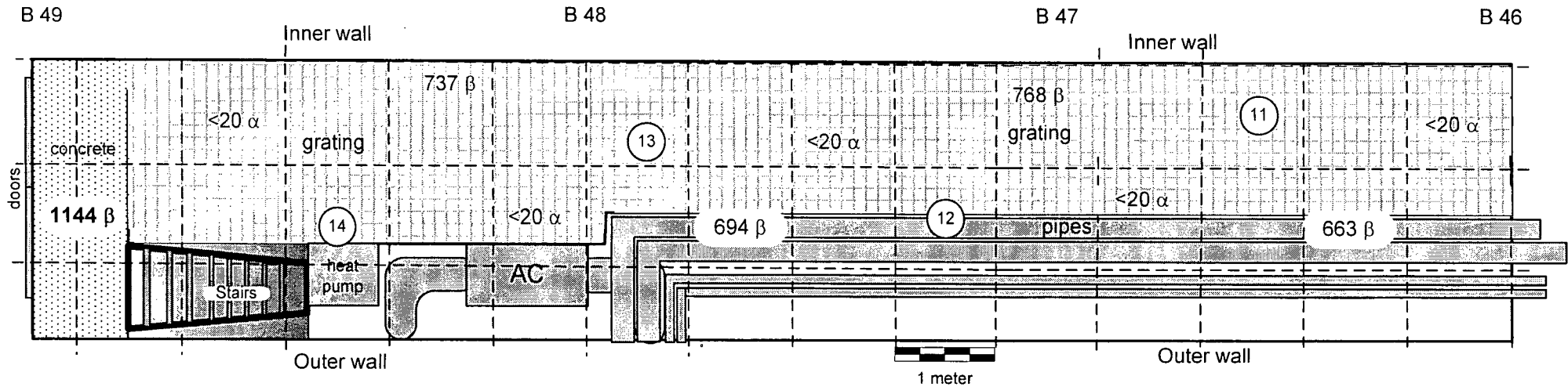
Notes:

1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background, <math><20</math> cpm.
2. ##### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1030 cp2m, 333 dpm/100 cm^2 .
3. (##) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm^2 β	50 cm^2 α
Probe Serial #	142547	145696
Cal Due Date	04-06-04	03-11-04
Efficiency %	31.20	22.52
Background	822 \pm 344 cp2m	<math><20</math> cpm
MDA	218 dpm/100 cm^2	209 dpm/100 cm^2

Surveys conducted by: G. Sayer & D. Koelker
Date: 10-21-03

Figure 72: Building 2 Service Corridor Section B Second (Middle) Level Floor Column B46 to B49
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



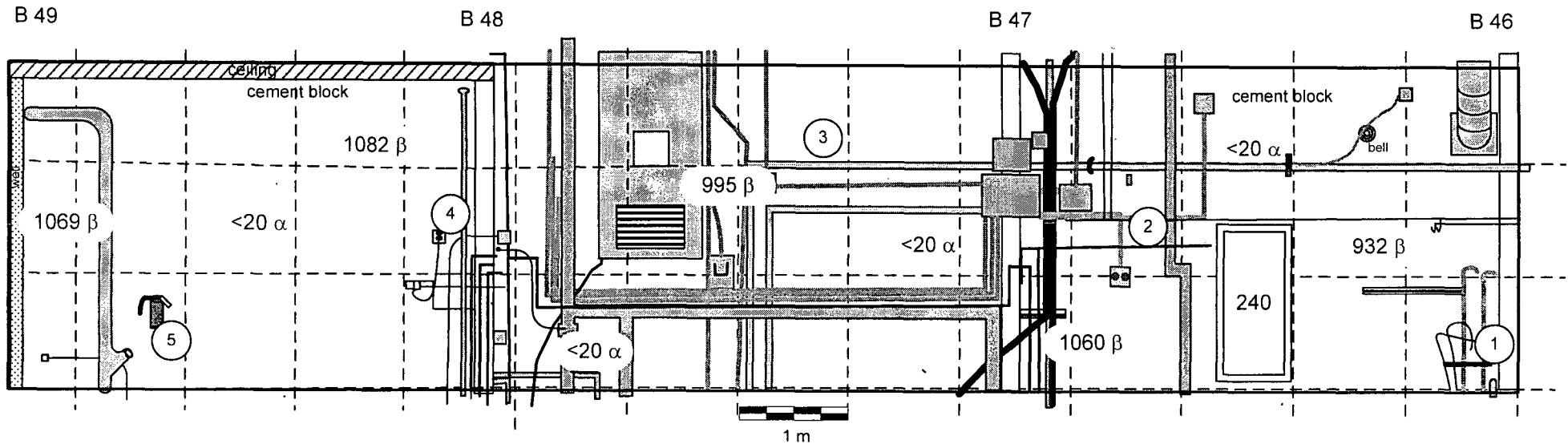
Notes:

1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background.
2. ##### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1144 cp2m, 516 dpm/100 cm².
3. (##) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	05-04-04	03-11-04
Efficiency %	31.20	22.52
Bkgd metal	435 +/- 170cp2m	<20 cpm
MDA metal	160 dpm/100 cm ²	209 dpm/100 cm ²
Bkgd concrete	822 +/- 344 cp2m	<20 cpm
MDA concrete	218dpm/100 cm ²	209 dpm/100 cm ²
Bkgd metal grating	588 +/- 141 cp2m	<20 cpm
MDA metal grating	185 dpm/100 cm ²	209 dpm/100 cm ²

Survey conducted by: G. Sayer
Date: 12-03-03

Figure 73: Building 2 Service Corridor Section B Second (Middle) Level Inner Wall Column B 46 to B 49
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



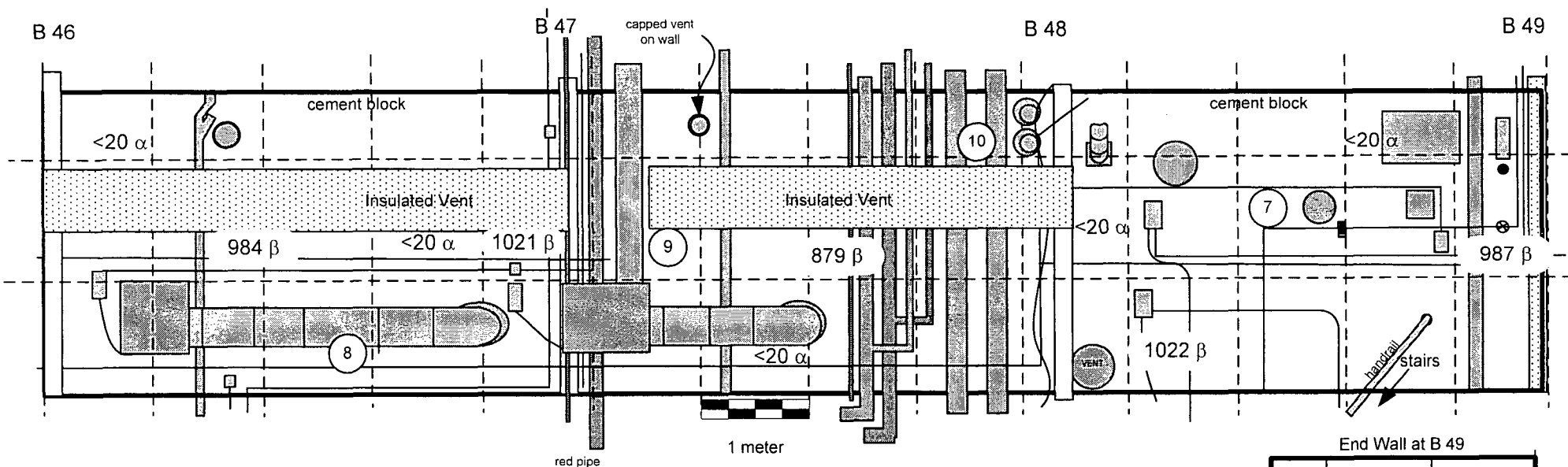
Notes:

1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background.
2. ##### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1082 cp2m, 659 dpm/100 cm².
3. (#) Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	05-04-04	03-11-04
Efficiency %	31.20	22.52
Bkgd cement block	671 +/- 126 cp2m	<20 cpm
MDA cement block	197 dpm/100 cm ²	209 dpm/100 cm ²

Survey conducted by: G. Sayer
Date: 12-03-03

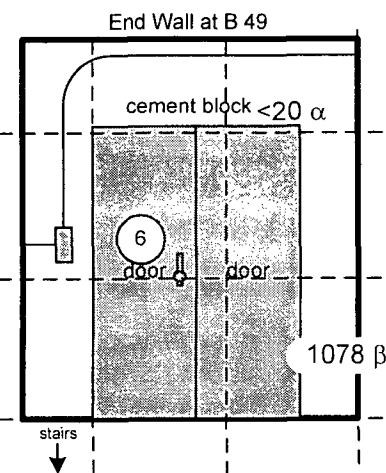
Figure 74: Building 2 Service Corridor Section B Second (Middle) Level Outer Wall Column B 46 to B 49 & End Wall
Alpha and Beta Fixed Measurement Locations and Results and Wipe Survey Locations



Notes:

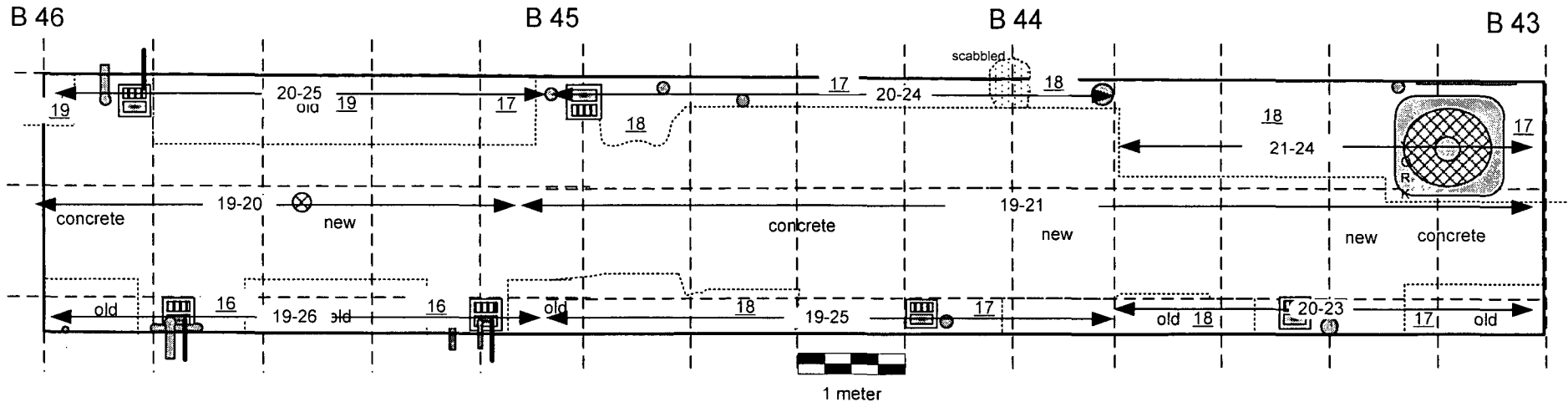
1. ## α Denotes fixed alpha measurement in cpm. All fixed alpha measurements were at background.
2. #### β Denotes fixed beta measurement in cp2m. Maximum fixed beta measurement was 1022 cp2m, 563 dpm/100 cm².
3. # Denotes wipe location. Wipe results are provided in Table 5.

Instruments		
Model	Ludlum 2221	Ludlum 12
Serial #	86302	138801
Probe	100 cm ² β	50 cm ² α
Probe Serial #	142547	145696
Cal Due Date	05-04-04	03-11-04
Efficiency %	31.20	22.52
Bkgd cement block	671 +/- 126 cp2m	<20 cpm
MDA cement block	197 dpm/100 cm ²	209 dpm/100 cm ²
Bkgd metal	435 +/- 170 cp2m	<20 cpm
MDA metal	160 dpm/100 cm ²	209 dpm/100 cm ²
Bkgd concrete	822 +/- 344 cp2m	<20 cpm
MDA concrete	218 dpm/100 cm ²	209 dpm/100 cm ²



Survey conducted by: G. Sayer
Date: 12-03-03

Figure 75: Building 2 Service Corridor Section B First (Lowest) Level Floor Column B 43 to B 46
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



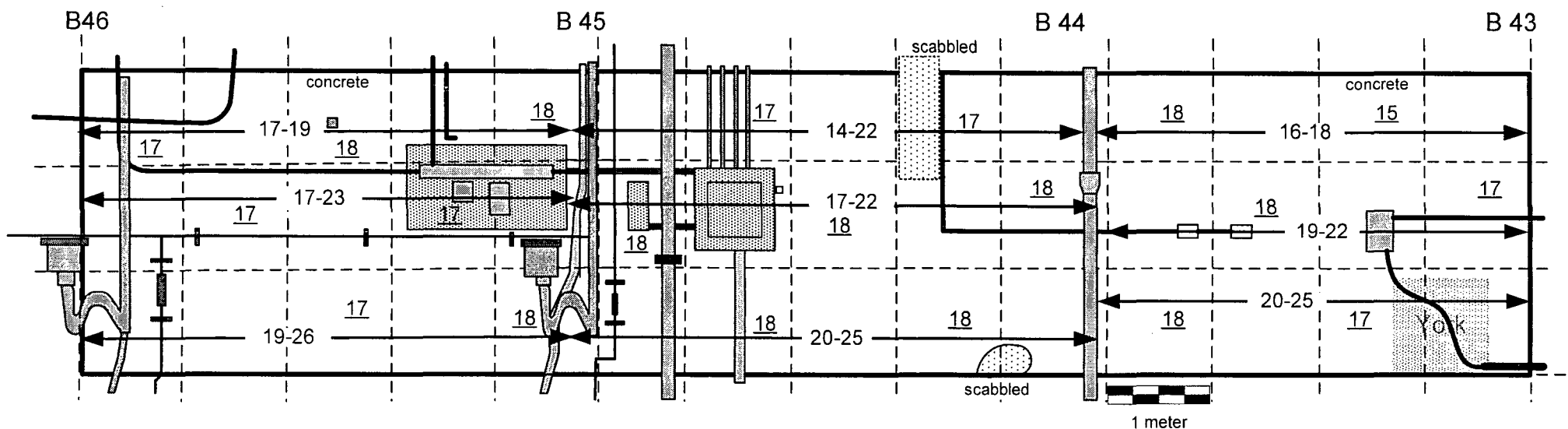
Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. **← ##-## →** Denotes exposure rate surface scan in $\mu\text{R/hr}$
3. 100% of accessible surfaces scanned.

Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153551	153590
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe Serial #	155109	155190
Cal Due Date	01-06-05	11-17-03
Background	15-21 $\mu\text{R/hr}$ @ 1 meter	15-24 $\mu\text{R/hr}$ on contact

Surveys conducted by: G. Sayer, D. Koelker & D. Dove
Dates: 10-20-03 & 10-11-04

Figure 76: Building 2 Service Corridor Section B First (Lowest) Level Inner Wall Column B 43 to B 46
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



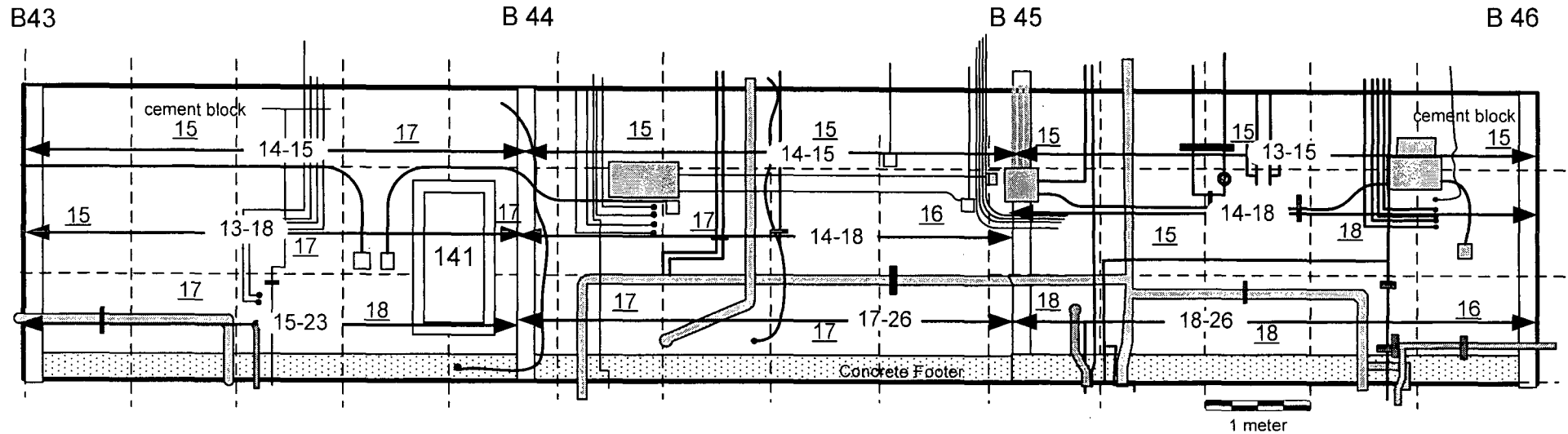
Notes:

1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$ taken at ~1 meter from the surface.
2. $\longleftrightarrow \text{###} \longrightarrow$ Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 100% of accessible surfaces scanned 2 meters and below, 10% scanned above 2 meters.

Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153590	153551
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe #	155190	155109
Cal Due Date	11-17-03	01-06-05
Bkgd concrete	15-24 $\mu\text{R/hr}$ contact	15-21 $\mu\text{R/hr}$ @ 1 m
Bkgd metal	9-17 $\mu\text{R/hr}$ contact	10-13 $\mu\text{R/hr}$ @ 1 m

Surveys conducted by: G. Sayer, D. Koelker & D. Dove
Dates: 10-20-03 & 10-11-04

Figure 77: Building 2 Service Corridor Section B First (Lowest) Level Outer Wall Column B43 to B46
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



Notes:

1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~1 meter from the surface.
2. $\longleftrightarrow \text{###} \longrightarrow$ Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 100% of accessible surfaces scanned 2 meters and below, 10% scanned above 2 meters.

Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153590	153551
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe Serial #	155190	155109
Cal Due Date	11-17-03	01-06-05
Background cement block	13-20 $\mu\text{R/hr}$ contact	14-18 $\mu\text{R/hr}$ @ 1 meter

Surveys conducted by: G. Sayer, D. Koelker & D. Dove
Dates: 10-20-03 & 10-11-04

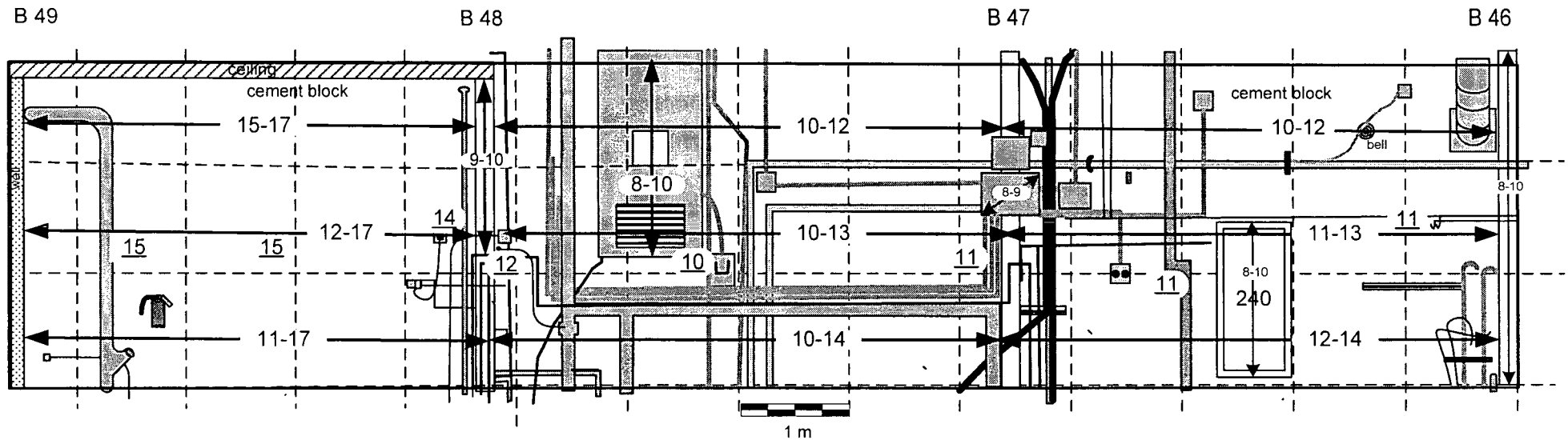
Figure 78



- | Instrument | | |
|----------------|----------------------|------------------|
| Model | Ludlum 3 | |
| Serial # | 153590 | |
| Probe | 2" X 2" NaI γ | |
| Probe Serial # | 155190 | |
| Cal Due Date | 02-12-04 | |
| Background | contact | @ 1 meter |
| metal | 9-17 μ R/hr | 13-19 μ R/hr |
| concrete | 15-24 μ R/hr | 14-22 μ R/hr |
| cement block | 13-20 μ R/hr | 13-20 μ R/hr |

Survey conducted by: R. Stowell & G. Sayer
Date: 11-26-03

Figure 79: Building 2 Service Corridor Section B Second (Middle) Level Inner Wall Column B 46 to B 49
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



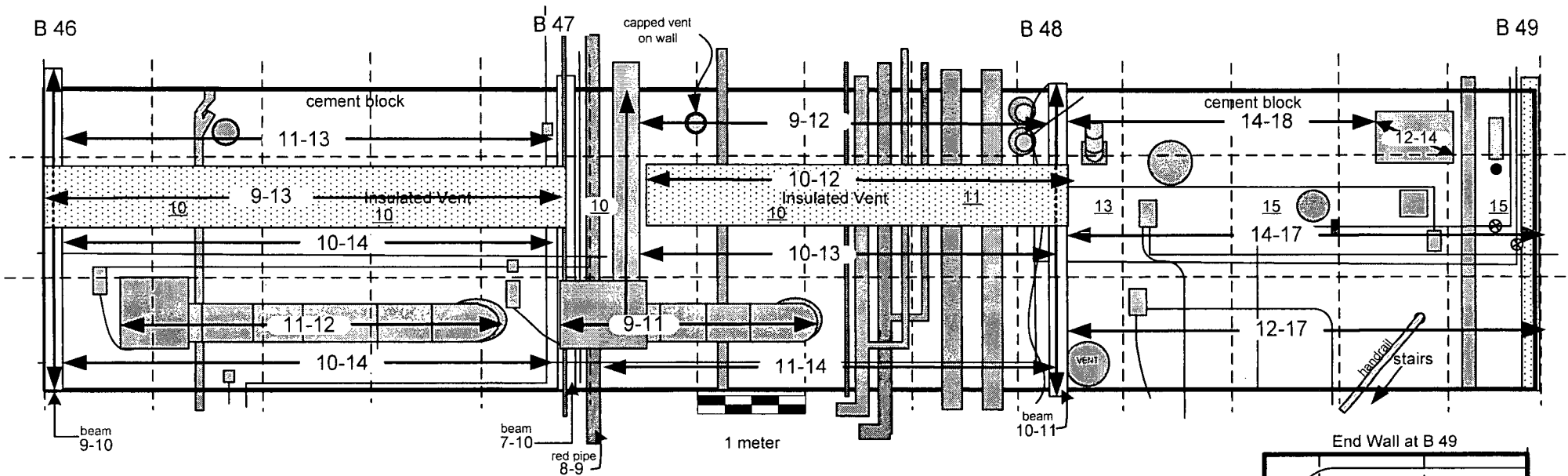
Notes:

1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. $\leftarrow \# \# \rightarrow$ Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 100% of accessible surfaces scanned 2 meters and below, 10% above 2 meters.

Instrument		
Model	Ludlum 3	
Serial #	153590	
Probe	2" X 2" NaI γ	
Probe Serial #	155190	
Cal Due Date	02-12-04	
Background	contact	@ 1 meter
metal	9-17 $\mu\text{R/hr}$	13-19 $\mu\text{R/hr}$
concrete	15-24 $\mu\text{R/hr}$	14-22 $\mu\text{R/hr}$
cement block	13-20 $\mu\text{R/hr}$	13-20 $\mu\text{R/hr}$

Survey conducted by: R. Stowell & G. Sayer
Date: 11-26-04

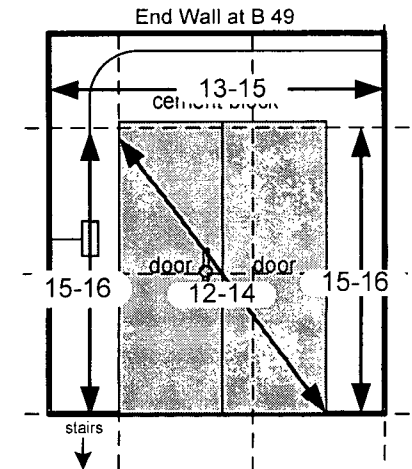
Figure 80: Building 2 Service Corridor Section B Second (Middle) Level Outer Wall Column B 46 to B 49 & End Wall
Fixed Exposure Rate and Exposure Rate Scan Measurement Locations and Results



Notes:

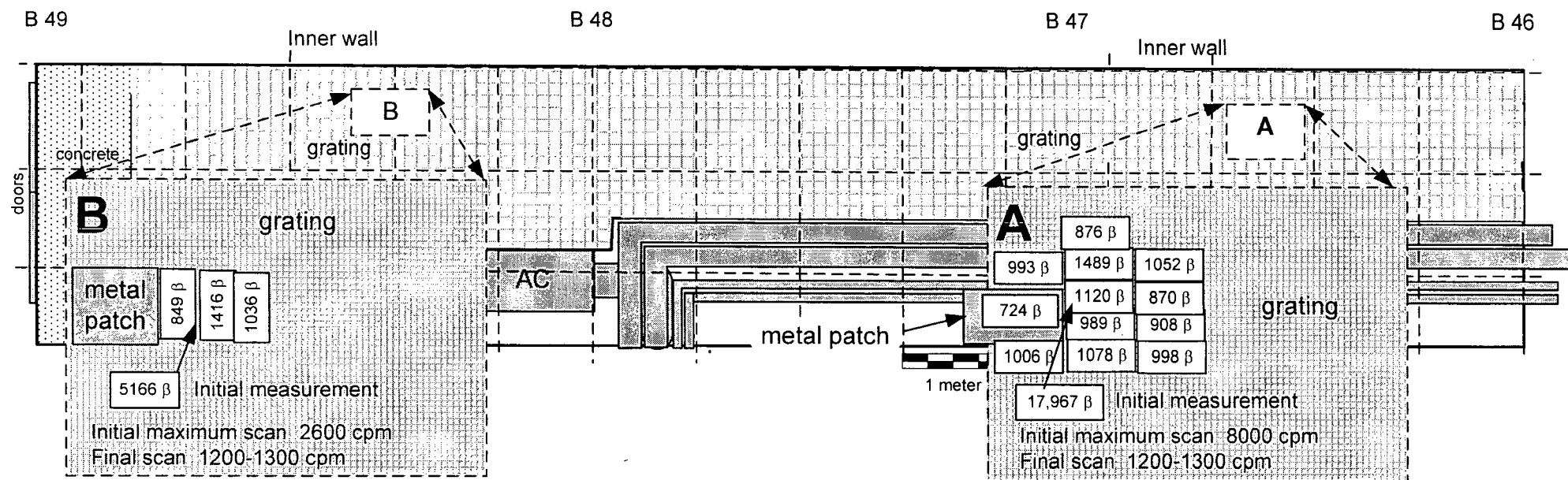
1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. \longleftrightarrow ## \longrightarrow Denotes exposure rate surface scan in $\mu\text{R/hr}$.
3. 100% of accessible surfaces scanned 2 meters and below, 10% above 2 meters.

Instrument		
Model	Ludlum 3	
Serial #	153590	
Probe	2" X 2" NaI γ	
Probe Serial #	155190	
Cal Due Date	02-12-04	
Background	contact	@ 1 meter
metal	9-17 $\mu\text{R/hr}$	13-19 $\mu\text{R/hr}$
concrete	15-24 $\mu\text{R/hr}$	14-22 $\mu\text{R/hr}$
cement block	13-20 $\mu\text{R/hr}$	13-20 $\mu\text{R/hr}$



Survey conducted by: R. Stowell & G. Sayer
Date: 11-26-03

Figure 81: Building 2 Service Corridor Section B Second (Middle) Level Floor Column B-46 to B-49
Post Decontamination Survey



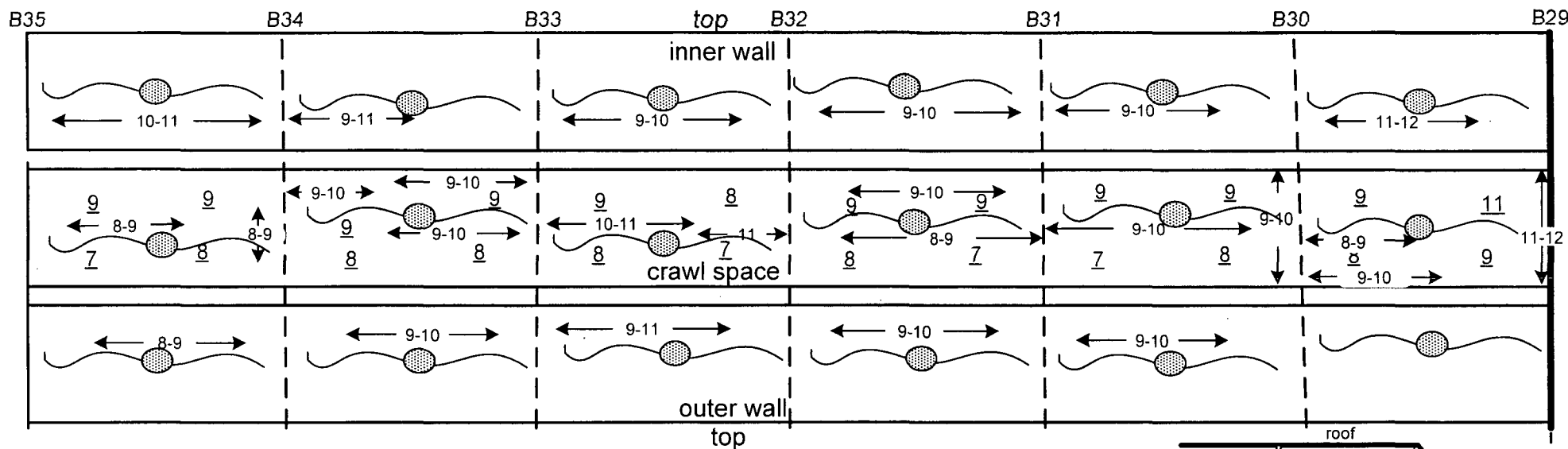
Notes:

- Two small areas of contamination, A & B, were found on the grating during the beta surface scan survey.
- The elevated levels were confirmed with two-minute fixed beta measurements.
- The areas were decontaminated and resurveyed.
- #### β Denotes two-minute fixed beta measurement in cp2m.
- In area A, the initial maximum fixed measurement was 17,967 cp2m, 27,850 dpm/100 cm². Final maximum fixed measurement was 1489 cp2m, 1444 dpm/100 cm².
- In area B, the initial maximum fixed measurement was 5166 cp2m, 7,336 dpm/100 cm². Final maximum fixed beta measurement was 1416 cp2m, 1327 dpm/100 cm².

Instruments		
Model	Ludlum 2221	Ludlum 2221
Serial #	154202	86302
Probe	434 cm ² β	100 cm ² β
Probe Serial #	149017	142547
Cal Due Date	03-24-04	05-04-04
Efficiency %	30.39	31.20
Bkgd grating	1000-1400 cpm	588 +/- 141 cp2m
MDA grating	273 dpm/100 cm ²	185 dpm/100 cm ²

Surveys conducted by: R. Stowell & G. Sayer
 Dates: 12-03-03 to 12-05-03

Figure 82: Building 2 Service Corridor Section B Overhead Crawl Space Column B29 to B35
Exposure Rate Fixed and Scan Measurement and Large Area Wipe Locations and Results



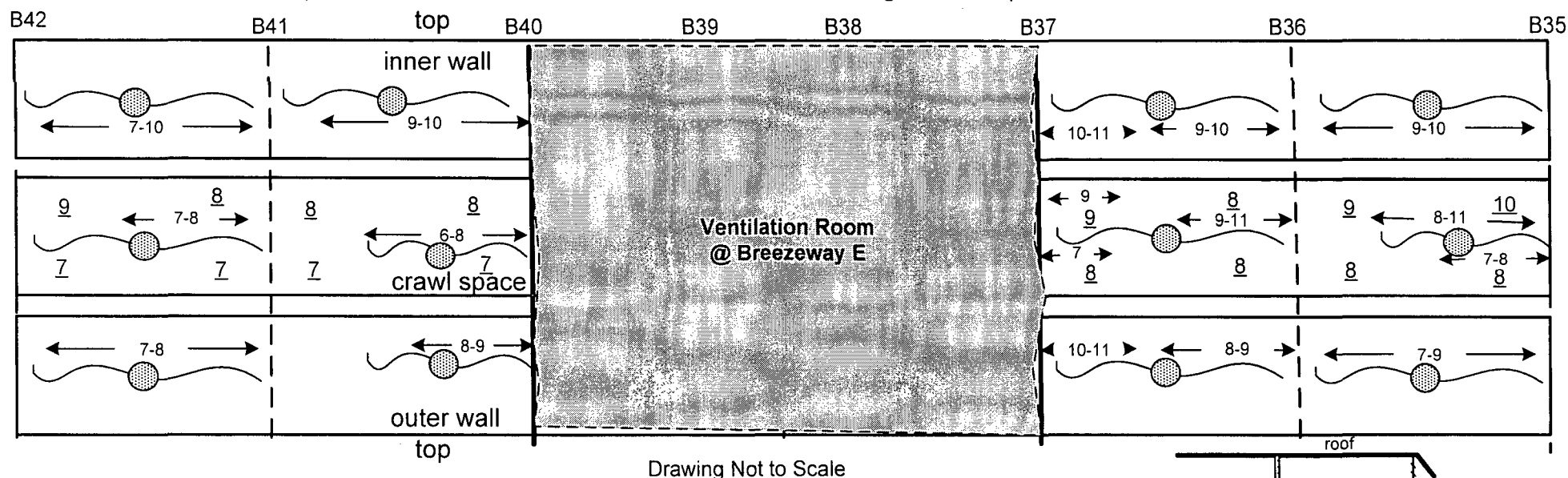
Notes:

1. ## Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface.
2. $\leftarrow \#\#\rightarrow$ Denotes exposure rate scan in $\mu\text{R/hr}$. 10% of surfaces scanned.
3. Denotes large area wipe. Wipes collected on inner and outer walls and on vent ducts and piping in the crawl space.
4. All large area wipes \leq to background for alpha and beta.

Surveys conducted by: D. Koelker, G. Sayer & R. Stowell
Dates: 10-16-03 & 02-04-05

Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153551	153551
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe Serial #	155109	155109
Cal Due Date	04-08-05	11-17-03
Bkgd. Metal	10-13 $\mu\text{R/hr}$ @ 1m	9-13 $\mu\text{R/hr}$ cont.
Bkgd. cem. block	14-18 $\mu\text{R/hr}$ @ 1m	14-19 $\mu\text{R/hr}$ cont.
Model	Ludlum 3	Ludlum 12
Serial Number	143349	138801
Probe	15 cm^2 β - γ	50 cm^2 α
Probe Serial #	145967	145696
Cal Due Date	02-03-04	03-11-04
Efficiency	29.18%	22.52%
Background	40-60 cpm	<20 cpm

Figure 83: Building 2 Service Corridor Section B Overhead Crawl Space Column B35 to B42
Exposure Rate Fixed and Scan Measurement and Large Area Wipe Locations and Results



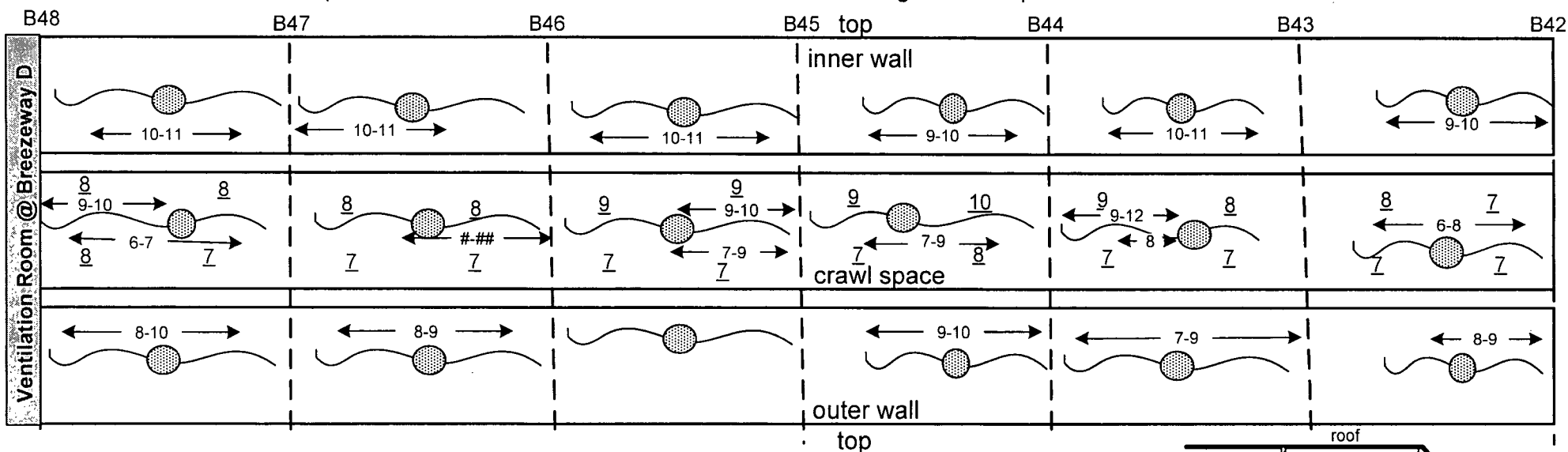
Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface
2. **← ### →** Denotes exposure rate scan in $\mu\text{R/hr}$. 10% of surfaces scanned.
3. **~~~~~●~~~~~** Denotes large area wipe. Wipes collected on inner and outer walls and on vent ducts and piping in the crawl space.
4. All large area wipes \leq background for alpha and beta.

Surveys conducted by: D. Koelker, G. Sayer & R. Stowell
Dates: 10-16-03 & 02-04-05

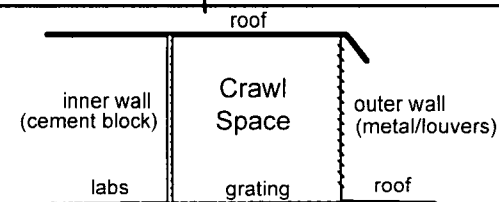
Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153551	153551
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe Serial #	155109	155109
Cal Due Date	04-08-05	11-17-03
Bkgd. Metal	10-13 $\mu\text{R/hr}$ @ 1m	9-13 $\mu\text{R/hr}$ cont.
Bkgd. cem. block	14-18 $\mu\text{R/hr}$ @ 1m	14-19 $\mu\text{R/hr}$ cont.
Model	Ludlum 3	Ludlum 12
Serial Number	143349	138801
Probe	15 cm^2 β - γ	50 cm^2 α
Probe Serial #	145967	145696
Cal Due Date	02-03-04	03-11-04
Efficiency	29.18%	22.52%
Background	40-60 cpm	<20 cpm

Figure 84: Building 2 Service Corridor Section B Overhead Crawl Space Column B42 to B48
Exposure Rate Fixed and Scan Measurement and Large Area Wipe Locations and Results



Notes:

1. **##** Denotes fixed exposure rate measurement, in $\mu\text{R/hr}$, taken at ~ 1 meter from the surface
2. **← ## →** Denotes exposure rate scan in $\mu\text{R/hr}$. 10% of surfaces scanned.
3. **~•~** Denotes large area wipe. Wipes collected on inner and outer walls and on vent ducts and piping in the crawl space.
4. All large area wipes \leq background for alpha and beta.



Surveys conducted by: D. Koelker, G. Sayer & R. Stowell
Dates: 10-16-03 & 02-04-05

Instruments		
Model	Ludlum 3	Ludlum 3
Serial #	153551	153551
Probe	2" X 2" NaI γ	2" X 2" NaI γ
Probe Serial #	155109	155109
Cal Due Date	04-08-05	11-17-03
Bkgd. Metal	10-13 $\mu\text{R/hr}$ @ 1m	9-13 $\mu\text{R/hr}$ cont.
Bkgd. cem. block	14-18 $\mu\text{R/hr}$ @ 1m	14-19 $\mu\text{R/hr}$ cont.
Model	Ludlum 3	Ludlum 12
Serial Number	143349	138801
Probe	15 cm ² β - γ	50 cm ² α
Probe Serial #	145967	145696
Cal Due Date	02-03-04	03-11-04
Efficiency	29.18%	22.52%
Background	40-60 cpm	<20 cpm

General Atomics'

**Final Radiological Survey Report for the Building 2
Service Corridor Section "B"**

Appendix A

**Final Survey Plans for the Building 2
Service Corridor Section "B"**

January 17, 2002

Prepared by: Laura Gonzales

Laura Gonzales 1/18/02

Final Survey Plan for the Building 2 Service Core

Background

Previous History and Use

The Service Core is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service core. Additionally, 55 gallon drums were located in the service core which were used to store low levels or radioactively contaminated liquid waste. Previous surveys of the service corridor identified areas of contamination which have since been cleaned.

Exhaust Ducts, Motors and Fans

Ventilation ducting in the service core were identified in 1994 as being radioactively contaminated (some of these ducts were labeled with "Caution, Radioactive Materials" labels). In February 1994, removal of all radioactively contaminated ducts began and continued until they were all removed. In addition, a plan to inspect all lab exhausts and vents was formulated and surveys began. By May 1994, the surveys were completed. All contaminated ducts and/or exhausters were removed. As a result, no known contamination exists in the ventilation ducts.

Concrete Floor Surveys

The concrete was removed (after surveys showed it met the release criteria) and placed in GA's Main Site Soil Staging Area (SSA) Bin T-31. The survey results were documented in Figures A-1 through A-10, Figures B-1 through B-10 and Figures C-1 through C-10 of the SSA Bin T-31 release request package. The concrete was removed in order to remove the sewer drain lines.

Sewer Drain Lines

The sewer drain lines within the service corridor were removed and disposed of as radioactive waste. In addition, the sewer drain "lead outs" to 3 concrete storage vaults were also removed and disposed of as radioactive waste. The concrete storage vaults were decontaminated, as needed, and then released to unrestricted use. A Final Radiological Survey Report was submitted to the NRC and the State of CA in April 2001 summarizing the data collected in the resulting trench along with a request to release the trench to unrestricted use as follows: [Keith Asmussen Letter dated April 4, 2001 to Ms. Mary Adams and Dr. Ronald Rogus (696/CAL-3353) "Request to Release a Certain Portion of General Atomics' Site to Unrestricted Use and Delete it From License: Namely, Building 2 Service Corridor Drain Line Trench"]. The NRC had the lead NRC inspection report dated 10/16/01 was received by GA (70-734/01-03) as well as NRC released per NRC SNM-696 license amendment #72 releasing the trench to unrestricted use. A copy of the inspection report and license amendment was sent to the State on November 28, 2001 as follows: [Keith Asmussen Letter dated November 28, 2001 to Ms. Sudana Kwok (CAL-3422) "Transmittal of Copy of NRC SNM-696 License Amendment No. 72 Which Releases the Following to Unrestricted Use: (1) Building 2

Service Corridor Drain Line Trench and (2) LINAC North Land Area; with a copy of NRC Inspection Report 70-734/01-03"].

After NRC release of the trench to unrestricted use, GA obtained NRC and State of CA approval to backfill the trench with clean soil and to pour new concrete on the surface. This was done in December 2001. *Therefore, the majority of the concrete floor (on the lower level laboratories) is new and does not need to be surveyed (only the edges, ~18" from the each wall).*

Prior Decontamination

In addition to the removal of contaminated ventilation ducts and exhausters in 1994, several attempts to survey and decontaminate, as needed, have been made since then.

During implementation of a detailed Survey Plan dated December 8, 1997, approximately 42 contaminated areas were located. Each area was characterized and decontaminated, as needed. Decontamination was accomplished by using a wire brush, needle gun, jack-hammer, or other similar aggressive decontamination methods (including cutting-out grating and disposing it as radioactive waste). Post-decontamination surveys verified that decontamination was successful.

Purpose of Survey

This purpose of this Final Plan is to conduct a detailed survey in the Building 2 service core to ensure that the service core now meets the criteria for unrestricted release.

Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions in the service core satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 μ R/hr above background measured at 1 meter above the surface. Samples will be counted in GA's Health Physics laboratory. Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience following approved Health Physics procedures and this Plan. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Classification

Based on the fact that decontamination was previously performed, no additional radioactive contamination is expected to be found. Therefore, the service corridor is now classified as a "non-suspect affected" area.

Release Criteria (per GA Site Decommissioning Plan)

Concrete Surface

The applicable guidelines for residual contamination on concrete surfaces is based on the contaminant. At the current time, there is no known radiologically contaminated area within the service corridor. If elevated levels are found above normal background levels, samples will be collected and analyzed in order to determine what the contaminant(s) are and limits applied accordingly as follows:

Uranium

5,000 dpm α /100 cm², averaged over a 1 m² area
15,000 dpm α /100 cm², total, maximum in a 100 cm² area
1,000 α dpm/100 cm², removable activity

Gamma Emitters

5,000 dpm/100 cm², averaged over a 1 m² area
15,000 dpm/100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Sr-90

1,000 dpm α /100 cm², averaged over a 1 m² area
3,000 dpm α /100 cm², total, maximum in a 100 cm² area
200 α dpm/100 cm², removable activity

Thorium

1000 dpm/100cm², averaged over a 1 m² area
3000 dpm/100cm², maximum in a 100 cm² area if the average over 1 m² is met
200 dpm/100cm², removable activity

As interpreted by the NRC, the average 1000 dpm/100cm² and the maximum 3000 dpm/100cm² should apply to both alpha and beta measurements, independently, for surface contamination involving natural thorium. ("Interpretation of Thorium Surface Decontamination Limits," U.S. Nuclear Regulatory Commission, February 9, 1992). Thorium emits alpha radiation and beta radiation in a 1:0.67 ratio; therefore, *if beta radiation measurements are used to demonstrate compliance with the release criteria*, the corresponding average and maximum beta activity guidelines are 670 dpm/100cm² and 2000 dpm/100cm², respectively.

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 μ R/hr above background.

Final Survey Plan

1. **Grid** as needed to properly identify the area and location of measurements.
2. **Exposure Rate Scanning** - Using a microR meter, scan 100% of the *old* floor concrete & 100% of the lower walls. Also, on the second floor, scan 100% of the grating and 100% of the lower walls (if possible).
3. **Conduct a 100% beta survey on the *old* concrete floor and lower walls (below 2 m) using a 434 cm² detector (wherever possible).** Check elevated areas using a hand held frisker (15 cm² pancake detector) and use the frisker in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
4. **Conduct a 100% alpha survey on the *old* concrete floor using and lower walls (below 2 m) using a 434 cm² detector (wherever possible).** Check elevated areas using a hand held 50 cm² alpha probe and/or use hand held probe in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
5. **Conduct a 10% beta scan on all accessible walls above 2 m using a 434 cm² detector (where ever possible).** Check elevated areas using a hand held frisker (15 cm² pancake detector) and use the frisker in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
6. **Conduct a 10% alpha scan on all accessible walls above 2 m using a 434 cm² detector (where ever possible).** Check elevated areas using a hand held 50 cm² alpha probe and/or use hand held probe in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
- 7.* **Conduct measurements on the floor & on the lower walls (at 1 m from the floor) – 1 every 4 m**

***For Measurements:**
 - a. Alternate between an alpha fixed measurement, a beta fixed measurement and a smear.
 - b. Use a 50 cm² alpha probe for the alpha fixed measurements (~6 sec each).
 - c. Use the 100 cm² beta gas flow proportional counter - 2 min each measurement for beta.
 - d. For smears, take a 100 cm² wipe.
- 8.* **Conduct fixed measurement(s)** using the 100 cm² beta detector on any location which appears to have been remediated or any similar suspect area (i.e., different color concrete or stained concrete).
9. **Surveys of the Overhead Fixtures** - Do about a 10% survey.
 - ✓ Ventilation Ducts – Conduct scans, fixed beta and alpha measurements and smears
 - ✓ Lights - Conduct scans, fixed beta and alpha measurements and smears
 - ✓ Other Overhead Fixtures and Other Structures – Survey as needed and document.
10. **Exposure Rate Surveys at 1 m from the surface** - every 2 m. On lower and upper level.
11. **Floor Drains** - scan and smear all floor drains. Collect sample if possible.

12. **Grating on Second Floor**

- ✓ Conduct 100% gamma scan using microR meter,
- ✓ Conduct exposure rate measurements every 2 m at 1 m from the surface, and
- ✓ Conduct a measurement (alternate from alpha fixed, beta fixed and smear) 1 every 4 m.

13. **Lower Walls on Second Floor (unaffected)**

- ▶ Conduct 10% gamma scan using microR meter (if accessible)
- ▶ Conduct a measurement (alternate from alpha fixed, beta fixed and smear) 1 every 4 m.

Alert Levels

Alpha Alert Levels

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >300 cpm above the appropriate background using the 434 cm² probe.
- >200 cpm above the appropriate background using the 100 cm² probe.
- >150 cpm above background using a portable GM detector.

Exposure Rate Measurements

- > 25 µR/hr at surface
- > 20 µR/hr at 1 m

Beta Alert Levels

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed to determine if increased survey coverage is required or to evaluate if decontamination is required.

Documentation

Every survey conducted must be documented on a drawing showing the approximate locations surveyed. Include the results (include units), the technician's signature, date, instrument(s) used (including model and serial number of both the rate meter and the detector), calibration due date, % efficiency, background readings (if applicable) and any other applicable information.

On a weekly basis (on Fridays), provide the surveys to Laura Gonzales for review.

January 17, 2002

Revised February 12, 2002

Prepared by: Laura Gonzales



Final Survey Plan for the Building 2 Service Core

Background

Previous History and Use

The Service Core is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service core. Additionally, 55 gallon drums were located in the service core which were used to store low levels or radioactively contaminated liquid waste. Previous surveys of the service corridor identified areas of contamination which have since been cleaned.

Exhaust Ducts, Motors and Fans

Ventilation ducting in the service core were identified in 1994 as being radioactively contaminated (some of these ducts were labeled with "Caution, Radioactive Materials" labels). In February 1994, removal of all radioactively contaminated ducts began and continued until they were all removed. In addition, a plan to inspect all lab exhausts and vents was formulated and surveys began. By May 1994, the surveys were completed. All contaminated ducts and/or exhausters were removed. As a result, no known contamination exists in the ventilation ducts.

Concrete Floor Surveys

The concrete was removed (after surveys showed it met the release criteria) and placed in GA's Main Site Soil Staging Area (SSA) Bin T-31. The survey results were documented in Figures A-1 through A-10, Figures B-1 through B-10 and Figures C-1 through C-10 of the SSA Bin T-31 release request package. The concrete was removed in order to remove the sewer drain lines.

Sewer Drain Lines

The sewer drain lines within the service corridor were removed and disposed of as radioactive waste. In addition, the sewer drain "lead outs" to 3 concrete storage vaults were also removed and disposed of as radioactive waste. The concrete storage vaults were decontaminated, as needed, and then released to unrestricted use. A Final Radiological Survey Report was submitted to the NRC and the State of CA in April 2001 summarizing the data collected in the resulting trench along with a request to release the trench to unrestricted use as follows: [Keith Asmussen Letter dated April 4, 2001 to Ms. Mary Adams and Dr. Ronald Rogus (696/CAL-3353) "Request to Release a Certain Portion of General Atomics' Site to Unrestricted Use and Delete it From License: Namely, Building 2 Service Corridor Drain Line Trench"]. The NRC had the lead NRC inspection report dated 10/16/01 was received by GA (70-734/01-03) as well as NRC released per NRC SNM-696 license amendment #72 releasing the trench to unrestricted use. A copy of the inspection report and license amendment was sent to the State on November 28, 2001 as follows: [Keith Asmussen Letter dated November 28, 2001 to Ms. Sudana Kwok (CAL-3422) "Transmittal of Copy of NRC SNM-696 License Amendment No. 72 Which Releases the Following to Unrestricted Use: (1) Building 2

Service Corridor Drain Line Trench and (2) LINAC North Land Area; with a copy of NRC Inspection Report 70-734/01-03"].

After NRC release of the trench to unrestricted use, GA obtained NRC and State of CA approval to backfill the trench with clean soil and to pour new concrete on the surface. This was done in December 2001. *Therefore, the majority of the concrete floor (on the lower level laboratories) is new and does not need to be surveyed (only the edges, ~18" from the each wall).*

Prior Decontamination

In addition to the removal of contaminated ventilation ducts and exhausters in 1994, several attempts to survey and decontaminate, as needed, have been made since then.

During implementation of a detailed Survey Plan dated December 8, 1997, approximately 42 contaminated areas were located. Each area was characterized and decontaminated, as needed. Decontamination was accomplished by using a wire brush, needle gun, jack-hammer, or other similar aggressive decontamination methods (including cutting-out grating and disposing it as radioactive waste). Post-decontamination surveys verified that decontamination was successful.

Purpose of Survey

This purpose of this Final Plan is to conduct a detailed survey in the Building 2 service core to ensure that the service core now meets the criteria for unrestricted release.

Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions in the service core satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 μ R/hr above background measured at 1 meter above the surface. Samples will be counted in GA's Health Physics laboratory. Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience following approved Health Physics procedures and this Plan. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Classification

Based on the fact that decontamination was previously performed, no additional radioactive contamination is expected to be found. Therefore, the service corridor is now classified as a "non-suspect affected" area (both the lower and the upper levels).

Release Criteria (per GA Site Decommissioning Plan)

Concrete Surface

The applicable guidelines for residual contamination on concrete surfaces is based on the contaminant. At the current time, there is no known radiologically contaminated area within the service corridor. If elevated levels are found above normal background levels, samples will be collected and analyzed in order to determine what the contaminant(s) are and limits applied accordingly as follows:

Uranium

5,000 dpm α /100 cm², averaged over a 1 m² area
15,000 dpm α /100 cm², total, maximum in a 100 cm² area
1,000 α dpm/100 cm², removable activity

Gamma Emitters

5,000 dpm/100 cm², averaged over a 1 m² area
15,000 dpm/100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Sr-90

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

Thorium

1000 dpm/100cm², averaged over a 1 m² area
3000 dpm/100cm², maximum in a 100 cm² area if the average over 1 m² is met
200 dpm/100cm², removable activity

As interpreted by the NRC, the average 1000 dpm/100cm² and the maximum 3000 dpm/100cm² should apply to both alpha and beta measurements, independently, for surface contamination involving natural thorium. ("Interpretation of Thorium Surface Decontamination Limits," U.S. Nuclear Regulatory Commission, February 9, 1992). Thorium emits alpha radiation and beta radiation in a 1:0.67 ratio; therefore, *if beta radiation measurements are used to demonstrate compliance with the release criteria*, the corresponding average and maximum beta activity guidelines are 670 dpm/100cm² and 2000 dpm/100cm², respectively.

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 μ R/hr above background.

Final Survey Plan

1. **Grid** as needed to properly identify the area and location of measurements.
2. **Exposure Rate Scanning** - Using a microR meter, scan 100% of the *old* floor concrete & 100% of the lower walls (lower level only).
3. **Conduct a 100% beta survey on the *old* concrete floor and lower walls (below 2 m) using a 434 cm² detector (wherever possible).** Check elevated areas using a hand held frisker (15 cm² pancake detector) and use the frisker in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
4. **Conduct a 100% alpha survey on the *old* concrete floor and lower walls (below 2 m) using a 434 cm² detector (wherever possible).** Check elevated areas using a hand held 50 cm² alpha probe and/or use hand held probe in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
5. **Conduct a 10% beta scan on all accessible walls above 2 m using a 434 cm² detector (where ever possible).** Check elevated areas using a hand held frisker (15 cm² pancake detector) and use the frisker in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
6. **Conduct a 10% alpha scan on all accessible walls above 2 m using a 434 cm² detector (where ever possible).** Check elevated areas using a hand held 50 cm² alpha probe and/or use hand held probe in areas where the 434 cm² probe cannot be used. Review past data to determine if contaminants have already been identified. If no data found, collect a sample and gamma scan.
- 7.* **Conduct measurements on the floor & on the lower walls (at 1 m from the floor) – 1 every 4 m**

*For Measurements:
 - a. Alternate between an alpha fixed measurement, a beta fixed measurement and a smear.
 - b. Use a 50 cm² alpha probe for the alpha fixed measurements (~6 sec each).
 - c. Use the 100 cm² beta gas flow proportional counter - 2 min each measurement for beta.
 - d. For smears, take a 100 cm² wipe.
- 8.* **Conduct fixed measurement(s) using the 100 cm² beta detector on any location which appears to have been remediated or any similar suspect area (i.e., different color concrete or stained concrete).**

9. **Surveys of the Overhead Fixtures** - Do about a 10% survey.
 - ✓ Ventilation Ducts – Conduct scans, fixed beta and alpha measurements and smears
 - ✓ Lights - Conduct scans, fixed beta and alpha measurements and smears
 - ✓ Other Overhead Fixtures and Other Structures – Survey as needed and document.
10. **Exposure Rate Surveys at 1 m from the surface** - every 2 m. On lower and upper level.
11. **Floor Drains** - scan and smear all floor drains. Collect sample if possible.
12. **Grating on Second Floor**
 - ✓ Conduct 100% gamma scan using microR meter,
 - ✓ Conduct 100% beta scan with the 434 cm²
 - ✓ Conduct 100% alpha scan with the 434 cm²
 - ✓ Conduct a measurement 1 every 4 m (alternate from alpha fixed, beta fixed and smear), and
 - ✓ Conduct exposure rate measurements every 2 m at 1 m from the surface
13. **Lower Walls (< 2m) on Second Floor**
 1. Conduct 10% beta scan with the 434 cm² probe (or 100 cm² probe)
 2. Conduct 10% alpha scan with the 434 cm² probe
 - Note: Where contamination potential exists; e.g., decontaminated walls, discolored wall, conduct additional scans of the area.
 3. Conduct a measurement (alternate from alpha fixed, beta fixed and smear) 1 every 4 m.
14. **Upper Walls (> 2 m) on Second Floor**
 1. Conduct 10% beta scan with the 434 cm² probe (or 100 cm² probe)
 2. Conduct 10% alpha scan with the 434 cm² probe

Note: Check elevated areas using a hand held frisker (15 cm² pancake detector) and use the frisker in areas where the 434 cm² probe cannot be used.

Alert Levels

Alpha Alert Levels

If the following “alert levels” are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >300 cpm above the appropriate background using the 434 cm² probe.
- >200 cpm above the appropriate background using the 100 cm² probe.
- >150 cpm above background using a portable GM detector.

Exposure Rate Measurements

> 25 μ R/hr at surface

> 20 μ R/hr at 1 m

Beta Alert Levels

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed to determine if increased survey coverage is required or to evaluate if decontamination is required.

Documentation

Every survey conducted must be documented on a drawing showing the approximate locations surveyed. Include the results (include units), the technician's signature, date, instrument(s) used (including model and serial number of both the rate meter and the detector), calibration due date, % efficiency, background readings (if applicable) and any other applicable information.

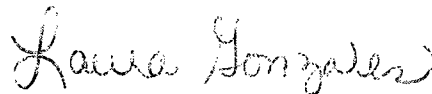
On a weekly basis (on Fridays), provide the surveys to Laura Gonzales for review.

Prepared By:


W. T. LaBonte

Date: March 17, 2003

Approved By:

 3/17/03

Building 2 Service Corridor Final Survey Plan Supplement

The purpose of this Final Survey Plan Supplement is to provide survey requirements for the "side rooms" adjacent to the service corridor that were not surveyed during the Final Survey, and instructions for the taking of samples in Sections "A", "B", and "C" to determine the isotopic content of residual contamination.

Background

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service corridor. Additionally, 55 gallon drums were located in the service corridor to store low levels of radioactive waste. A final survey for this service corridor was completed in accordance with a Survey Plan issued on January 17, 2002. This plan did not address the side rooms adjacent to the service corridor or the crawl space in the overhead. This supplement to the Final Survey Plan provides the minimum survey requirements for these areas and provides instruction for the sampling of sections "A", "B", and "C" to determine the isotopic content of the residual activity.

Classification

The service corridor is classified as a "Non-Suspect Affected" area. The "side rooms" and overhead have no history of radioactive material use or contamination, therefore, are classified as an "Unaffected" area.

Survey Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions within the Service Corridor satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 μ R/hr above background measured at 1 meter above the surface. Samples will be counted in the Health Physics laboratory (onsite). Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Release Criteria (per GA Site Decommissioning Plan)

Concrete/Asphalt Surface Release Criteria

The NRC release criteria for Sr-90 and Thorium-232, which is conservatively selected for beta measurements, is:

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

The NRC release criteria for most beta, gamma and Alpha activity (Sr-90 is not an alpha emitter) is:

5,000 dpm /100 cm², averaged over a 1 m² area
15,000 dpm /100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 µR/hr above background.

Alert Levels

Alpha Alert Values

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >250 cpm above the appropriate background using the 434 cm² probe.
- >100 cpm above the appropriate background using the 100 cm² probe.
- >40 cpm above background using a portable GM detector. (Note: this meter should ONLY be used in areas the 434cm² or 100 cm² probes will not fit).

Exposure Rate Measurements

- > 25 µR/hr at surface
- > 20 µR/hr at 1 m

Isotopic Determination Sampling

In each of the areas in section "A", "B", and "C" that were marked for additional surveying, remove the markings and enough additional material to fill ½ of a 100 ml container. Record the section and specific area (level and beam number) on the container and transport it to the HP Laboratory for gamma spectroscopy analysis.

Minimum Survey Requirements



Type of Survey/Activity	Non-Impacted Area
Crawl Space (Overhead)	
Gridding Required?	No
Minimum number of Measurements ⁽²⁾ ⁽³⁾	Perform a Large Area wipe of accessible surfaces every 4m. Analyze for α and β activity.
μ R/hr Readings (Scan Survey)	10% scan on all accessible surfaces with detector held ~1" from surface.
μ R/hr Readings (Fixed Measurements @ 1m from surface)	1 every 4m on accessible surfaces.
Side Rooms	
Gridding Required?	No
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² alpha probe).	10 % on floor and up to 2m on walls.
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² beta probe).	10 % on floor and up to 2m on walls.
Minimum number of Measurements ⁽²⁾ ⁽³⁾	1 measurement per 50 m ² , or, every 7m on floor and walls up to 2m. Alternate between (1) a wipe, (2) an alpha fixed measurement and (3) a beta fixed measurement on concrete surfaces .
μ R/hr Readings (Scan Survey)	10% scan on all surfaces below 2m with detector held ~1" from surface.
μ R/hr Readings (Fixed Measurements @ 1m from surface)	1 every 7m on floor and walls up to 2m.

1. Clean surfaces, debris or dirt removed.

(2) For the fixed measurements:

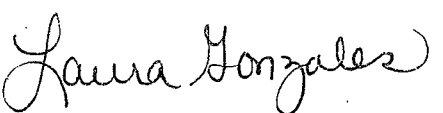
- For α measurements; use either the hand held alpha counter (*minimum* of ~6 second count). Document all readings in cpm.
- For β measurements; take a 2 minute count using the 100 cm² gas flow proportional detector (beta) with the Model 2221 ratemeter. Document all readings and mark on a drawing the locations the readings were taken.
- For wipes, analyze each 100 cm² wipe for α and β activity.

(3) A "measurement" is either (1) a "fixed" radiation measurement representing total activity or (2) a wipe (removable activity).

Prepared By:  W. T. LaBonte/ Richard Stowell

Date: May 28, 2003

Approved By:

 6/2/03

Building 2 Service Corridor Final Survey Plan Supplement-2

The purpose of this Final Survey Plan Supplement is to provide survey requirements for the locations in section A that had elevated activity requiring decontamination.

Background

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service corridor. Additionally, 55 gallon drums were located in the service corridor to store low levels of radioactive waste. A final survey for this service corridor was completed in accordance with a Survey Plan issued on January 17, 2002. This plan did not address the side rooms adjacent to the service corridor or the crawl space in the overhead. A supplement to the Final Survey Plan, issued in March, 2003, provided the minimum survey requirements for these areas and provides instruction for the sampling of sections "A", "B", and "C" to determine the isotopic content of the residual activity. During the performance of surveys in accordance with the original survey plan and it's supplement, elevated activity levels were discovered in section A of the service corridor that required decontamination. In accordance with the GA Site Decommissioning Plan, if elevated activity is detected in a Non-Suspect Affected Area, the area must re-classified and surveyed accordingly.

Classification

Section A of the Building 2 Service Corridor is Re- classified as a "Suspect Affected" area in the following locations:

1. First (lowest) level between column numbers A-20 to A-24, A-17 to A-18, A-11 to A-13, and C-1 to A-2.
2. The second level between column A-11 and A-13.
3. The Crawl Space (highest level) between column numbers A-11 and A-13.

Survey Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions within the Service Corridor satisfy the NRC and State of CA guidelines for release to unrestricted use.

The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 µR/hr above background measured at 1 meter above the surface. Samples will be counted in the Health Physics laboratory (onsite). Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Release Criteria (per GA Site Decommissioning Plan)

Concrete/Asphalt Surface Release Criteria

The NRC release criteria for Sr-90 and Thorium-232, which is conservatively selected for beta measurements, is:

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

The NRC release criteria for most beta, gamma and Alpha activity (Sr-90 is not an alpha emitter) is:

5,000 dpm /100 cm², averaged over a 1 m² area
15,000 dpm /100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 µR/hr above background.

Alert Levels

Alpha Alert Values

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >250 cpm above the appropriate background using the 434 cm² probe.
- >100 cpm above the appropriate background using the 100 cm² probe.
- >40 cpm above background using a portable GM detector. (Note: this meter should **ONLY** be used in areas the 434cm² or 100 cm² probes will not fit).

Exposure Rate Measurements

> 25 $\mu\text{R/hr}$ at surface

> 20 $\mu\text{R/hr}$ at 1 m

Minimum Survey Requirements

Type of Survey/Activity	Suspect Affected Area
Gridding Required?	YES (When Possible)
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² alpha probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m.
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² beta probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m.
Minimum number of Measurements ⁽²⁾ ⁽³⁾	1 measurement per 4 m ² (1 every 2m). Alternate between (1) a wipe, (2) an alpha fixed measurement and (3) a beta fixed measurement on concrete surfaces . Analyze wipes for α and β activity.
$\mu\text{R/hr}$ Readings (Scan Survey)	100% scan on all surfaces below 2m with detector held ~1" from surface, 10% above 2m.
$\mu\text{R/hr}$ Readings (Fixed Measurements @ 1m from surface)	1 measurement per 4 m ² (1 every 2m).

(1) Clean surfaces, debris or dirt removed.

(2) For the fixed measurements:

- For α measurements; use either the hand held alpha counter (*minimum* of ~6 second count). Document all readings in cpm.
- For β measurements; take a 2 minute count using the 100 cm² gas flow proportional detector (beta) with the Model 2221 ratemeter. Document all readings and mark on a drawing the locations the readings were taken.
- For wipes, analyze each 100 cm² wipe for α and β activity.


(3) A "measurement" is either (1) a "fixed" radiation measurement representing total activity or (2) a wipe (removable activity).

Prepared By: W. T. LaBonte



Date: October 17, 2003

Approved By:

 10/17/03

Building 2 Service Corridor Final Survey Plan Supplement-3

The purpose of this Final Survey Plan Supplement is to provide survey requirements for the locations in section B that had elevated activity requiring decontamination.

Background

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service corridor. Additionally, 55 gallon drums were located in the service corridor to store low levels of radioactive waste. A final survey for this service corridor was completed in accordance with a Survey Plan issued on January 17, 2002. This plan did not address the side rooms adjacent to the service corridor or the crawl space in the overhead. A supplement to the Final Survey Plan, issued in March, 2003, provided the minimum survey requirements for these areas and provides instruction for the sampling of sections "A", "B", and "C" to determine the isotopic content of the residual activity. During the performance of surveys in accordance with the original survey plan and it's supplement, elevated activity levels were discovered in section B of the service corridor that required decontamination. In accordance with the GA Site Decommissioning Plan, if elevated activity is detected in a Non-Suspect Affected Area, the area must re-classified and surveyed accordingly.

Classification

Section B of the Building 2 Service Corridor is Re- classified as a "Suspect Affected" area in the following locations:

1. First (lowest) level between column numbers B-43 and B-46 (floor and walls excluding the center 3 feet of the floor)
2. The second level between column B-46 and B-49 (grating and walls).

Survey Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions within the Service Corridor satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey

unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 µR/hr above background measured at 1 meter above the surface. Samples will be counted in the Health Physics laboratory (onsite). Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Release Criteria (per GA Site Decommissioning Plan)

Concrete/Asphalt Surface Release Criteria

The NRC release criteria for Sr-90 and Thorium-232, which is conservatively selected for beta measurements, is:

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

The NRC release criteria for most beta, gamma and Alpha activity (Sr-90 is not an alpha emitter) is:

5,000 dpm /100 cm², averaged over a 1 m² area
15,000 dpm /100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 µR/hr above background.

Alert Levels

Alpha Alert Values

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >250 cpm above the appropriate background using the 434 cm² probe.
- >100 cpm above the appropriate background using the 100 cm² probe.
- >40 cpm above background using a portable GM detector. (Note: this meter should ONLY be used in areas the 434cm² or 100 cm² probes will not fit).

Exposure Rate Measurements

> 25 $\mu\text{R/hr}$ at surface

> 20 $\mu\text{R/hr}$ at 1 m

Minimum Survey Requirements

Type of Survey/Activity	Suspect Affected Area
Gridding Required?	YES (When Possible)
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² alpha probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² beta probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
Minimum number of Measurements ⁽²⁾ ⁽³⁾	1 measurement per 4 m ² (1 every 2m). Alternate between (1) a wipe, (2) an alpha fixed measurement and (3) a beta fixed measurement on concrete surfaces . Analyze wipes for α and β activity. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
$\mu\text{R/hr}$ Readings (Scan Survey)	100% scan on all surfaces below 2m with detector held ~1" from surface, 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
$\mu\text{R/hr}$ Readings (Fixed Measurements @ 1m from surface)	1 measurement per 4 m ² (1 every 2m). Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.

(1) Clean surfaces, debris or dirt removed.

(2) For the fixed measurements:

- For α measurements; use either the hand held alpha counter (*minimum* of ~6 second count). Document all readings in cpm.
- For β measurements; take a 2 minute count using the 100 cm² gas flow proportional detector (beta) with the Model 2221 ratemeter. Document all readings and mark on a drawing the locations the readings were taken.
- For wipes, analyze each 100 cm² wipe for α and β activity.

(3) A "measurement" is either (1) a "fixed" radiation measurement representing total activity or (2) a wipe (removable activity).

Prepared By: W. T. LaBonte

W. T. LaBonte

Date: January 29, 2004

Approved By:

Laura Gonzalez 1/29/04

Building 2 Service Corridor Final Survey Plan Supplement-4

The purpose of this Final Survey Plan Supplement is to provide survey requirements for the locations in section C that had elevated activity requiring decontamination.

Background

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service corridor. Additionally, 55 gallon drums were located in the service corridor to store low levels of radioactive waste. A final survey for this service corridor was completed in accordance with a Survey Plan issued on January 17, 2002. This plan did not address the side rooms adjacent to the service corridor or the crawl space in the overhead. A supplement to the Final Survey Plan, issued in March, 2003, provided the minimum survey requirements for these areas and provides instruction for the sampling of sections "A", "B", and "C" to determine the isotopic content of the residual activity.

During the performance of surveys in accordance with the original survey plan and its supplement, elevated activity levels were discovered in section C of the service corridor that required decontamination. In accordance with the GA Site Decommissioning Plan, if elevated activity is detected in a Non-Suspect Affected Area, the area must re-classified and surveyed accordingly.

Classification

Section C of the Building 2 Service Corridor is Re- classified as a "Suspect Affected" area in the following locations:

1. First (lowest) level between column numbers C-51 - C-60, C-64 - C-69, and C-74 - C-1 (floor and walls excluding the center 3 feet of the floor)
2. The second level between column C-51 - C-53, C-56 - C-58, C-64 - C-68, and C-73 - C-75. (grating and walls).

Survey Objectives and Responsibility

The purpose of performing a final survey is to demonstrate that the radiological conditions within the Service Corridor satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity ("hot spot" area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 µR/hr above background measured at 1 meter above the surface. Samples will be counted in the Health Physics laboratory (onsite). Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience. The survey and final report documenting the survey will be performed by GA's Health Physics group.

Release Criteria (per GA Site Decommissioning Plan)

Concrete/Asphalt Surface Release Criteria

The NRC release criteria for Sr-90 and Thorium-232, which is conservatively selected for beta measurements, is:

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

The NRC release criteria for most beta, gamma and Alpha activity (Sr-90 is not an alpha emitter) is:

5,000 dpm /100 cm², averaged over a 1 m² area
15,000 dpm /100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 µR/hr above background.

Alert Levels

Alpha Alert Values

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

>250 cpm above the appropriate background using the 434 cm² probe.

>100 cpm above the appropriate background using the 100 cm² probe.

>40 cpm above background using a portable GM detector. (Note: this meter should **ONLY** be used in areas the 434cm² or 100 cm² probes will not fit).

Exposure Rate Measurements

> 25 µR/hr at surface

> 20 µR/hr at 1 m

Minimum Survey Requirements

Type of Survey/Activity	Suspect Affected Area
Gridding Required?	YES (When Possible)
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² alpha probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² beta probe).	100 % on accessible floor and walls up to 2m high. 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
Minimum number of Measurements ⁽²⁾ ⁽³⁾	1 measurement per 4 m ² (1 every 2m). Alternate between (1) a wipe, (2) an alpha fixed measurement and (3) a beta fixed measurement on concrete surfaces. Analyze wipes for α and β activity. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
µR/hr Readings (Scan Survey)	100% scan on all surfaces below 2m with detector held ~1" from surface, 10% above 2m. Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.
µR/hr Readings (Fixed Measurements @ 1m from surface)	1 measurement per 4 m ² (1 every 2m). Note: The center 3 feet of the floor on the 1st level is new, therefore it is not included in this classification and does not need to be surveyed.

(1) Clean surfaces, debris or dirt removed.

(2) For the fixed measurements:

- For α measurements; use either the hand held alpha counter (*minimum* of ~6 second count). Document all readings in cpm.
- For β measurements; take a 2 minute count using the 100 cm² gas flow proportional detector (beta) with the Model 2221 ratemeter. Document all readings and mark on a drawing the locations the readings were taken.
- For wipes, analyze each 100 cm² wipe for α and β activity.

(3) A "measurement" is either (1) a "fixed" radiation measurement representing total activity or (2) a wipe (removable activity).

Documentation

Every survey conducted must be documented **on a *daily basis*** on a drawing showing the approximate locations surveyed. Include the results (including units), the technicians signature, date, instrument(s) used (including model and serial number of both the ratemeter and the detector), calibration due date, % efficiency, background readings (if applicable) and any other applicable information.

Background Measurements

Background measurements must be made with each instrument used on each type of surface (i.e., concrete, metal, dry wall, etc.,) prior to using the instrument.

Instrument Response Checks

Instrument response checks must be made on a daily basis for each instrument in use, prior to use, to assure the instrument is properly responding to the type of applicable radiation.

General Atomics'
Final Radiological Survey Report for the
Building 2 Service Corridor Section "B"

Appendix B
Confirmatory Survey Plan and Summary

CONFIRMATORY SURVEY PLAN

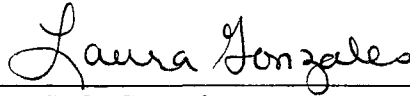
SECTION B

Prepared By: W. T. LaBonte



Date: October 17, 2003

Approved By:



L.Q. Gonzales

Building 2 Service Corridor Confirmatory Survey Plan

The purpose of this Confirmatory Survey Plan Supplement is to verify the radiological conditions identified during the performance of radiological surveys in accordance with the Final Survey Plan(s).

Background

The Service Corridor is used to provide utilities and other services to the Building 2 laboratories. Occasionally, contaminated equipment was stored in the service corridor. Additionally, 55 gallon drums were located in the service corridor to store low levels of radioactive waste. A final survey for this service corridor was completed in accordance with a Survey Plan issued on January 17, 2002. This plan did not address the side rooms adjacent to the service corridor or the crawl space in the overhead. A supplement to the Final Survey Plan, issued in March, 2003, provided the minimum survey requirements for these areas and provides instruction for the sampling of sections "A", "B", and "C" to determine the isotopic content of the residual activity. During the performance of surveys in accordance with the original survey plan and its supplement, elevated activity levels were discovered in section A of the service corridor that required decontamination. In accordance with the GA Site Decommissioning Plan, if elevated activity is detected in a Non-Suspect Affected Area, the area must re-classified and surveyed accordingly. Following decontamination of elevated activity areas, a third supplement to the Final Survey Plan was issued on October 17, 2003.

Classification

Section B of the Building 2 Service Corridor is Re- classified as a "Suspect Affected" area in the following locations:

1. First (lowest) level between column numbers B-43 and B-46 (excluding the center 3 feet of the floor because it is new)
2. The second level between column B-46 and B-49.

The remaining Service Corridor is classified as a “**Non-Suspect Affected Area**”.

The “Side Rooms” (Heating and Air Conditioning rooms, machine shop, elevator shafts, etc.) are classified as “**Unaffected Areas**”. No activity distinguishable from natural background was discovered in these side rooms, therefore, confirmatory surveys do not have to be performed in these areas.

Survey Objectives and Responsibility

The purpose of performing this confirmatory survey is to demonstrate that the radiological conditions within the Service Corridor satisfy the NRC and State of CA guidelines for release to unrestricted use. The objectives include (1) to show that the average surface contamination levels for each survey unit are within the authorized value, (2) to show that the maximum residual activity (“hot spot” area) do not exceed three times the average value in an area up to 100 cm² and (3) that a reasonable effort has been made to clean removable contamination and fixed contamination and (4) that the exposure rates in occupiable locations are less than 10 µR/hr above background measured at 1 meter above the surface. Samples will be counted in the Health Physics laboratory (onsite). Surveys will be taken only by qualified Health Physics Technicians having a minimum of 3 years Health Physics Technician experience.

Release Criteria (per GA Site Decommissioning Plan)

Concrete/Asphalt Surface Release Criteria

The NRC release criteria for Sr-90 and Thorium-232, which is conservatively selected for beta measurements, is:

1,000 dpm /100 cm², averaged over a 1 m² area
3,000 dpm /100 cm², total, maximum in a 100 cm² area
200 dpm/100 cm², removable activity

The NRC release criteria for most beta, gamma and Alpha activity (Sr-90 is not an alpha emitter) is:

5,000 dpm /100 cm², averaged over a 1 m² area
15,000 dpm /100 cm², total, maximum in a 100 cm² area
1,000 dpm/100 cm², removable activity

Exposure Rate Measurements

The guideline value for exposure rates measured at 1 m above the surface, is 10 µR/hr above background.

Alert Levels

Alpha Alert Values

If the following "alert levels" are exceeded, notify HP Management so an evaluation can be performed and to evaluate if decontamination is required.

- > 100 cpm alpha using the large area (434 cm²) probe (check area with a hand-held alpha meter).
- > 60 cpm using a 50 cm² hand-held alpha probe (~ 600 dpm/100 cm²)

Beta Monitoring

- >250 cpm above the appropriate background using the 434 cm² probe.
- >100 cpm above the appropriate background using the 100 cm² probe.
- >40 cpm above background using a portable GM detector. (Note: this meter should ONLY be used in areas the 434cm² or 100 cm² probes will not fit).

Exposure Rate Measurements

- > 25 μ R/hr at surface
- > 20 μ R/hr at 1 m

Minimum Survey Requirements

Type of Survey/Activity	Non-Suspect Affected Area	Suspect Affected Area
Gridding Required?	Not Required	YES (as established during final survey)
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² alpha probe).	No Survey Required	On the Lower Level <u>ONLY</u> , 10 % on accessible floor (excluding the center of the floor which is new, only survey approximately 6" from each wall) and walls up to 2m high.
Concrete Surfaces ⁽¹⁾ (Scan w/ 434 cm ² beta probe).	In the corridor only, perform a one (1) pass scan on the floor, using the 434 cm ² probe, along each wall.	On the Lower Level <u>ONLY</u> , 10 % on accessible floor (excluding the center of the floor which is new, only survey approximately 6" from each wall) and walls up to 2m high.
Minimum number of Measurements ⁽²⁾ ⁽³⁾	Spot check a minimum of 10 locations for fixed beta activity	Scan each of the remediated areas with a beta instrument. Taken at least one (1) fixed alpha, one (1) fixed beta in the area with the highest scan results in each remediated area. This applies to all three (3) levels.
μR/hr Readings (Scan Survey)	No Survey Required	On the Lower Level <u>ONLY</u> , 10% scan on all surfaces below 2m (excluding the center of the floor which is new) with detector held ~1" from surface.
μR/hr Readings (Fixed Measurements @ 1m from surface)	On the Lower Level <u>ONLY</u> , take 1 measurement every 10 m, in the center of the walkway, with the instrument held 1 m from the floor.	

(1) Clean surfaces, debris or dirt removed.

(2) For the fixed measurements:

- For α measurements; use either the hand held alpha counter (*minimum* of ~6 second count). Document all readings in cpm.
- For β measurements; take a 2 minute count using the 100 cm² gas flow proportional detector (beta) with the Model 2221 ratemeter. Document all readings and mark on a drawing the locations the readings were taken.
- For wipes, analyze each 100 cm² wipe for α and β activity.

(3) A "measurement" is either (1) a "fixed" radiation measurement representing total activity or (2) a wipe (removable activity).

CONFIRMATORY SURVEY SUMMARY

SECTION B

Appendix B

Building 2 Service Corridor "Section B" Confirmatory Survey Summary

Description

In October and November 2004, GA conducted an internal confirmatory survey of Section B of the Building 2 Service Corridor in accordance with a written plan (provided in this Appendix). The purpose of this survey was to determine if the final survey results effectively reflect the radiological conditions for this area. Following a review of the data collected, it was determined that the data, as documented by the surveyors, did not satisfy all of the survey requirements identified in the confirmatory survey plan. In March, 2006, portions of the confirmatory survey that appeared to be missing from the earlier effort, namely, Alpha and Beta scans with a 434 cm² proportional detector and fixed measurements in areas previously remediated, were performed.

The results of the confirmatory survey performed in October/November 2004 are as follows:

Exposure Rate Surface Scans and Results

100% of the "old" flooring and 10% of the walls in the Suspect Affected Areas were scanned with a 2"x2" NaI (TI) detector held within 1" of the surface. The results ranged from 18 to 30 μ R/hr on the "old" flooring on the lowest level (Level 1), 6 to 15 μ R/hr on the Second Level, 6 to 15 μ R/hr in the Crawl Space, and 20-25 μ R/hr in the Mechanical Room. These results are not distinguishable from natural background measurements in enclosed concrete spaces similar to this corridor. See attached Figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 for locations and results.

Fixed Exposure Rate Measurements

Five (5) fixed exposure rate measurements were taken at 1 meter from the floor in the Mechanical Room. The results ranged from 20 to 24 μ R/hr, which is natural background. See attached Figures 11 for locations and results.

Alpha and Beta Scanning

10% of the "flooring and 10% of the accessible walls were scanned with 50 cm² gas flow proportional alpha and 15 cm² GM beta detectors held within 1" of the surface. The alpha results were all at natural background levels. The highest beta result was 100 cpm, which is less than the MDA for the detector used. See attached Figures 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 for locations and results.

The additional measurements taken in March 2006 are as follows:

Alpha and Beta Scanning

10% of the original concrete floor surfaces on the first (lowest) level and 10% of the floor gating surfaces on the second level were scanned with 434 cm² gas flow proportional detectors held within 1' of the surface. All Alpha measurement results were at natural background levels. The highest Beta measurement result was 2200 cpm, which is less than the minimal detectable activity level (MDA) for the device used. See Figures 1a, 2a, 3a, 4a, 5a, 6a, and 7a for locations and results.

Fixed Measurements

Nine (9) Alpha and nine (9) Beta fixed measurements were taken on the first (lowest) level in locations that had been remediated in the past. In addition, five (5) Alpha and five (5) Beta fixed measurements were taken in random locations on the second level. All Alpha measurement results, on both levels, were at natural background activity levels. The highest Beta measurement on the first level was 1475 cp2m, which is 653 dpm/100 cm². This is far below the NRC- and State- approved release criteria. See Figures 1a, 2a, 3a, 4a, 5a, 6a, and 7a for locations and results.

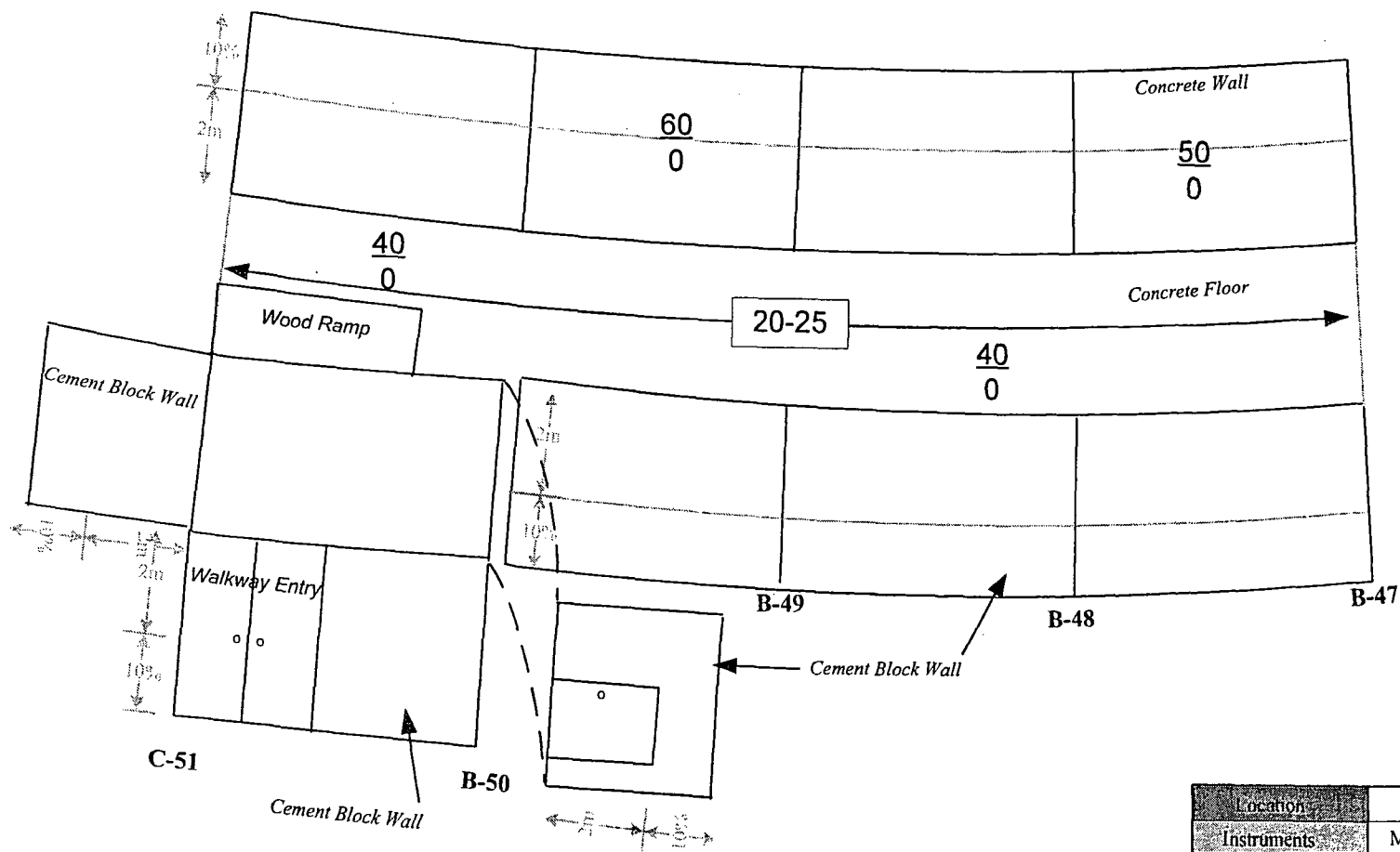
Removable Activity

Fourteen (14) wipe samples were collected in random locations on the first and second levels of section B portion of the Building 2 service corridor. All samples collected were analyzed for Alpha and Beta activity in the Health Physics laboratory. All results were not discernible from natural background activity levels.

Conclusion

All of the Confirmatory Survey results indicated that the activity and radiation levels were all below approved release criteria for the Building 2 Service Corridor, "Section B" and were well in agreement with the results of the Final Survey performed on this site.

Figure 1: Building 2 Service Corridor, Section B, Level 1, Column B-47 to C51, Confirmatory Survey



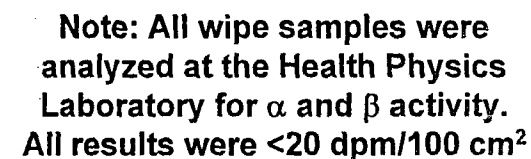
LEGEND

= $\frac{\beta}{\alpha}$ Surface Scans in cpm

[#] = Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

[illegible]

LEGEND

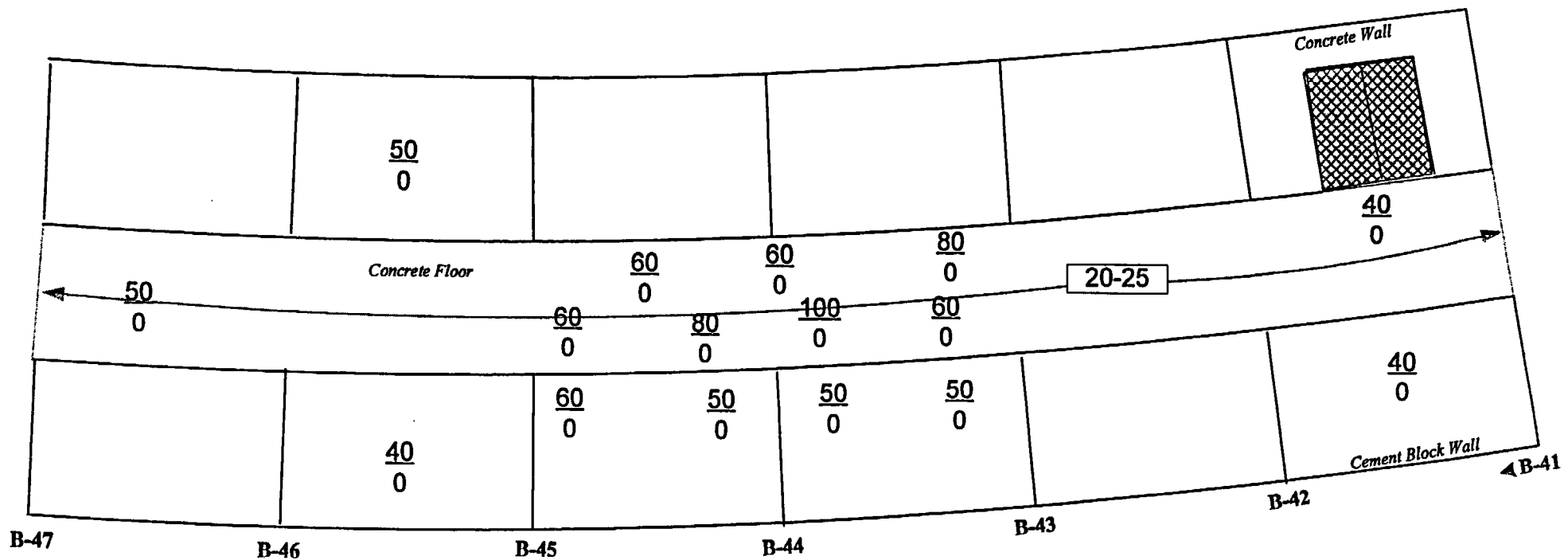
- ###** = β Surface Scan in cpm, 10% of surface
= α Surface Scans in cpm, 10% of surface
= Wipe Sample Locations
= β Fixed measurement in cp2m
= α Fixed measurement in cpm
B# = Column Number

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA In DPM/100 cm ²	312	2285	109	375	287

Surveyors: S. Cowan

Dates: 03-20-06 to 03-23-06

Figure 2: Building 2 Service Corridor, Section B, Level 1, Column B-41 to B-47, Confirmatory Survey



LEGEND

$\frac{##}{\alpha}$ = Surface Scans in cpm

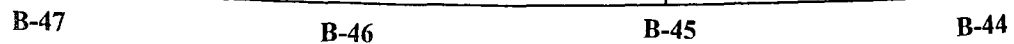
$\frac{\#}{\alpha}$ = Exposure Rate Surface Scan in μ R/hr

B# = Column Number

Note: 100 cpm = 914 dpm/100 cm² which is < MDA

Building 2 Service Corridor			
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm ²	50 cm ²	15 cm ²	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 μ R/hr
MDA in DPM/100 cm ²	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

[REDACTED]



LEGEND

##-## = β Surface Scan in cpm, 10% of surface

= α Surface Scans in cpm, 10% of surface

⑧ = Wipe Sample Locations

= β Fixed measurement in cp2m

α Fixed measurement in cpm

B# = Column Number

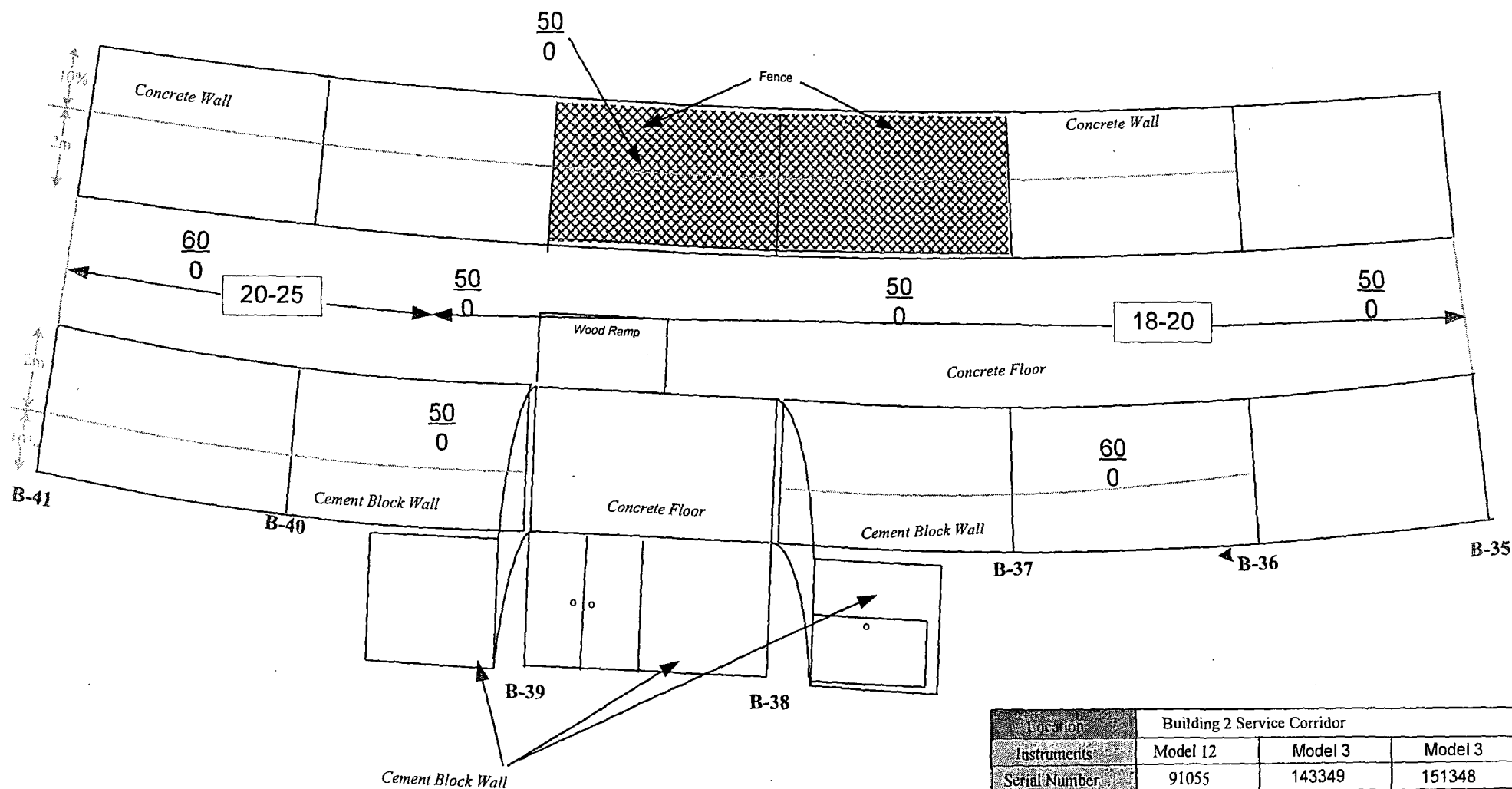
Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287

Surveyors: S. Cowan

Dates: 03-20-06 to 03-23-06

Figure 3: Building 2 Service Corridor, Section B, Level 1, Column B-35 to B-41, Confirmatory Survey



LEGEND

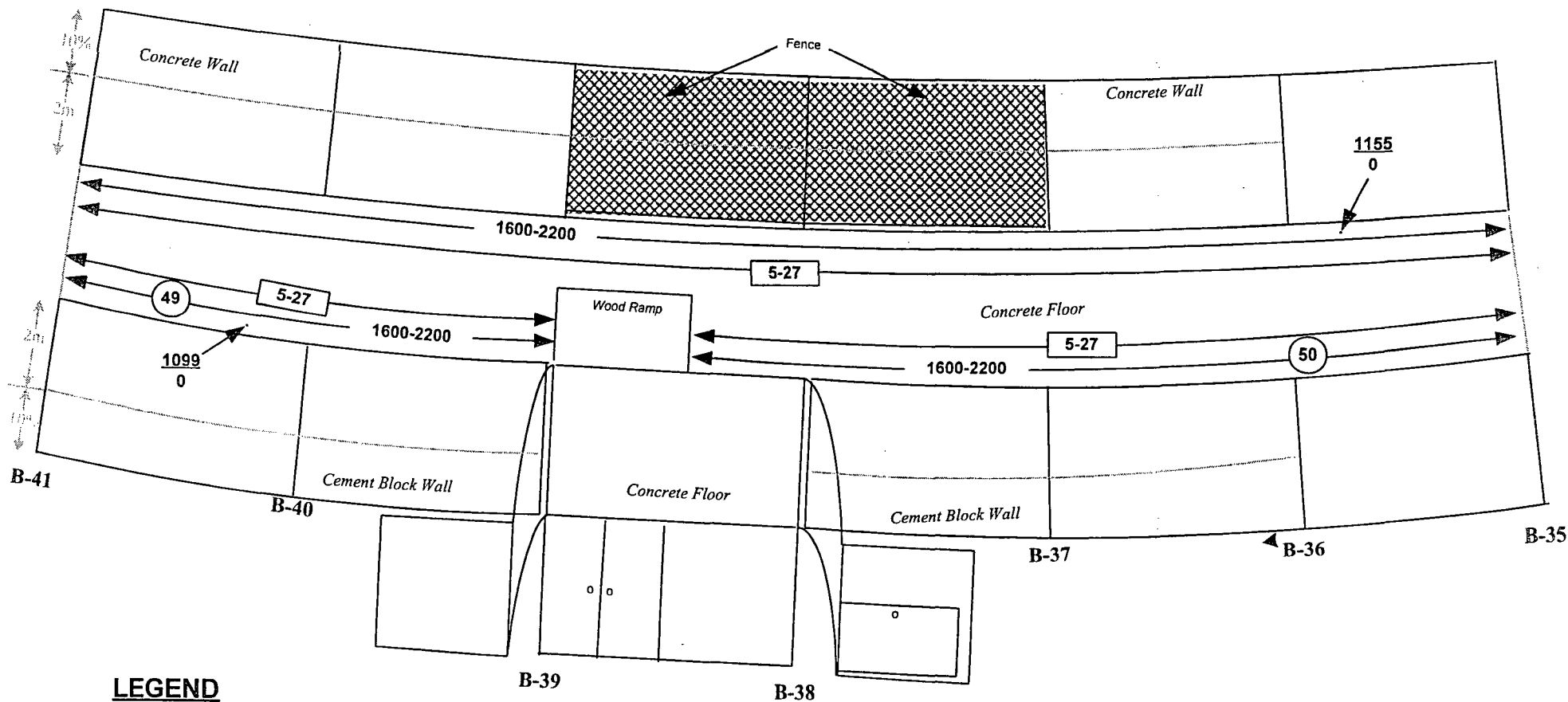
$\frac{\beta}{\alpha}$ = Surface Scans in cpm

[#] = Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 3a: Building 2 Service Corridor, Section B, Level 1, Column B-35 to B-41, Confirmatory Survey



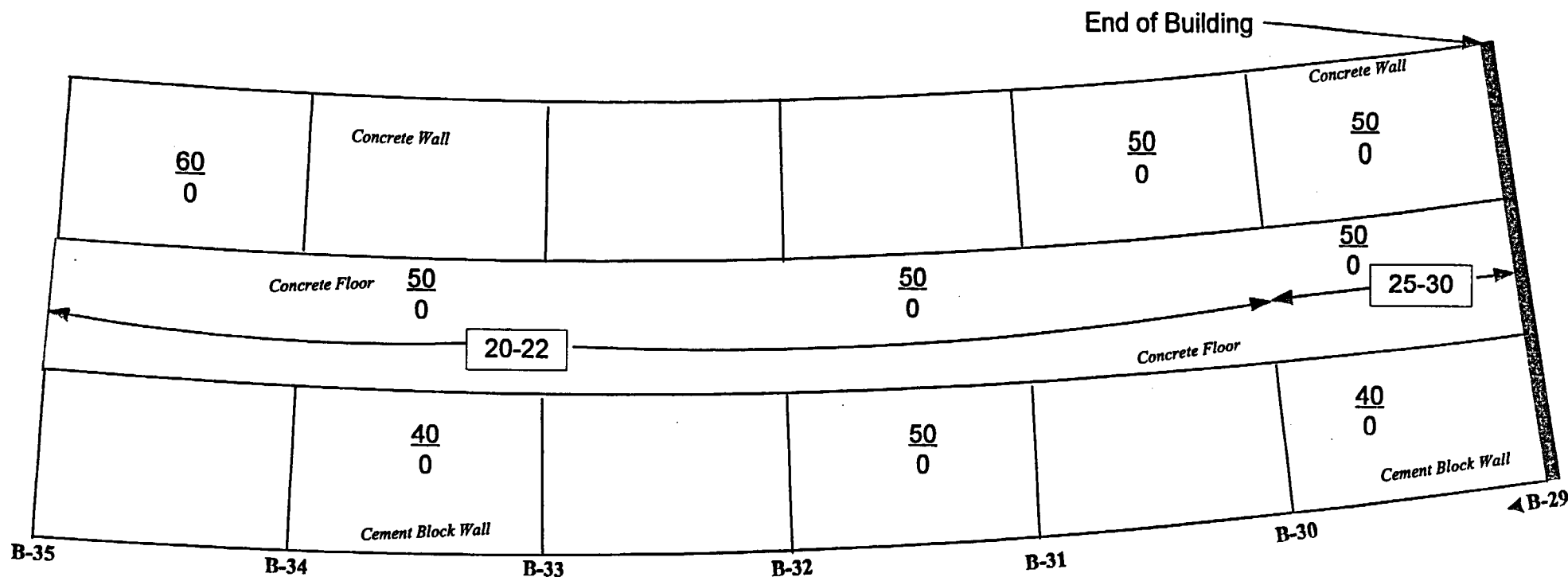
LEGEND

- ### = β Surface Scan in cpm, 10% of surface
 # = α Surface Scans in cpm, 10% of surface
 # = Wipe Sample Locations
 ## = β Fixed measurement in cp2m
 ## = α Fixed measurement in cpm
 B# = Column Number

Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287
Surveyors: S. Cowan			Dates: 03-20-06 to 03-23-06		

Figure 4: Building 2 Service Corridor, Section B, Level 1, Column B-29 to B-35, Confirmatory Survey



LEGEND

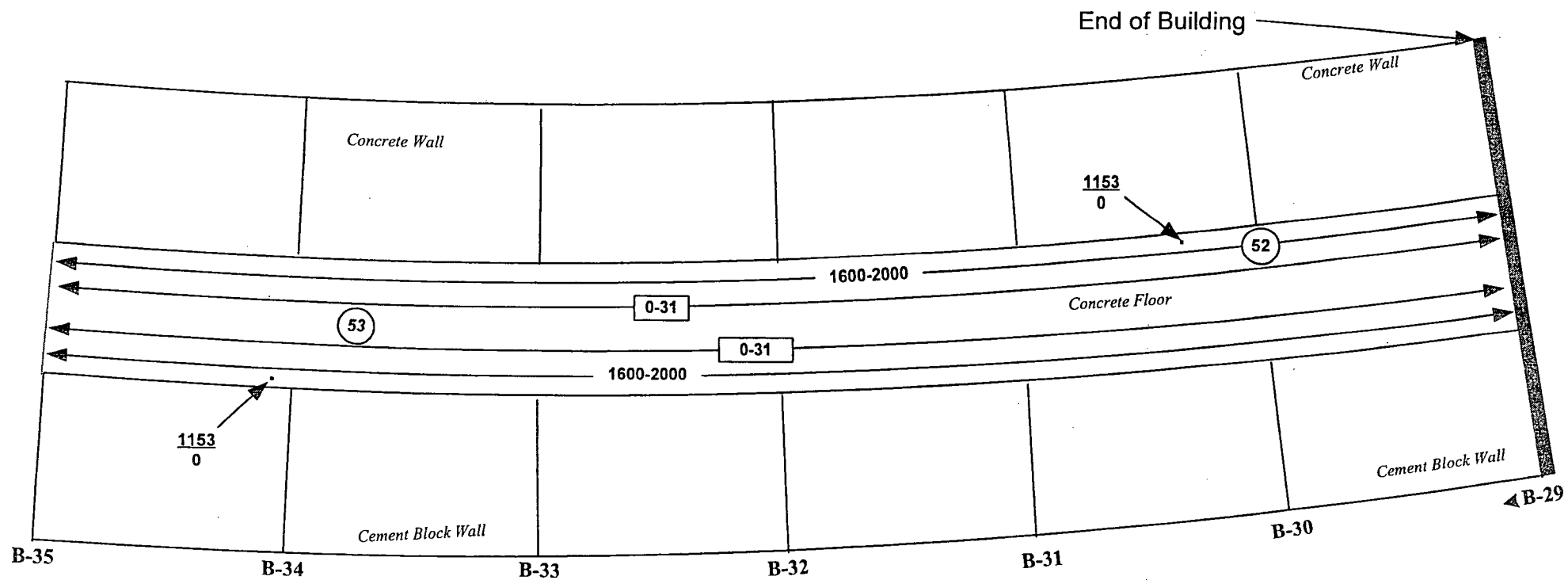
= $\frac{\beta}{\alpha}$ Surface Scans in cpm

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α , β , γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 4a: Building 2 Service Corridor, Section B, Level 1, Column B-29 to B-35, Confirmatory Survey



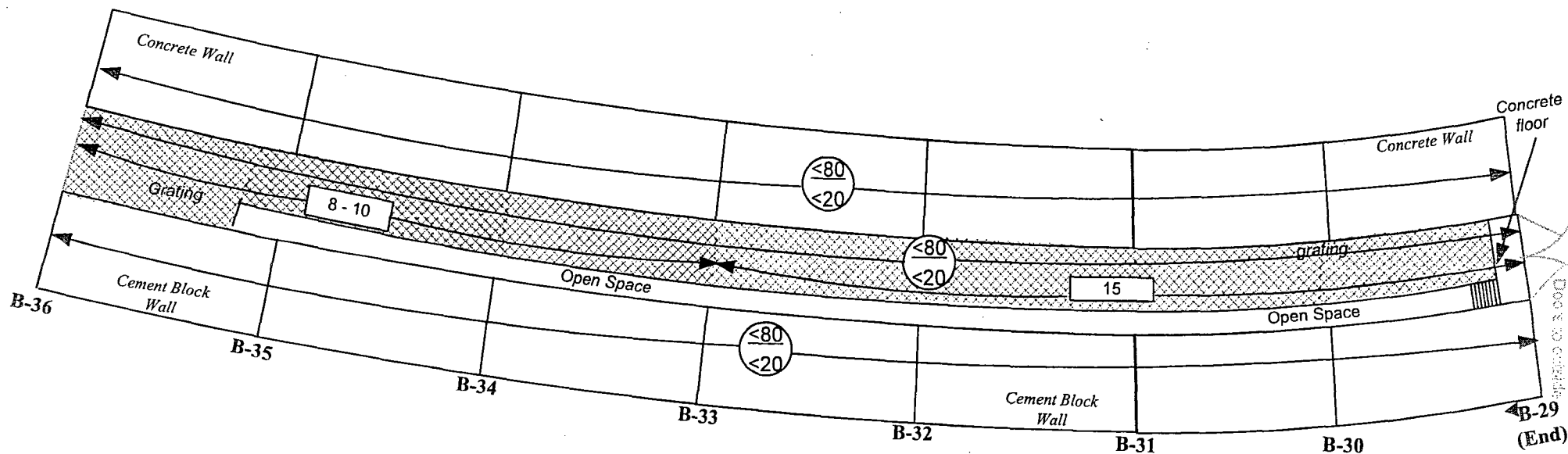
LEGEND

- ##-## = β Surface Scan in cpm, 10% of surface
 # = α Surface Scans in cpm, 10% of surface
 (#) = Wipe Sample Locations
 ## = β Fixed measurement in cp2m
 ## = α Fixed measurement in cpm
 B# = Column Number

Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287
Surveyors: S. Cowan			Dates: 03-20-06 to 03-23-06		

Figure 5: Building 2 Service Corridor, Section B, Level 2, Column B-29 to B-36, Confirmatory Survey



Drawing NOT to Scale

LEGEND

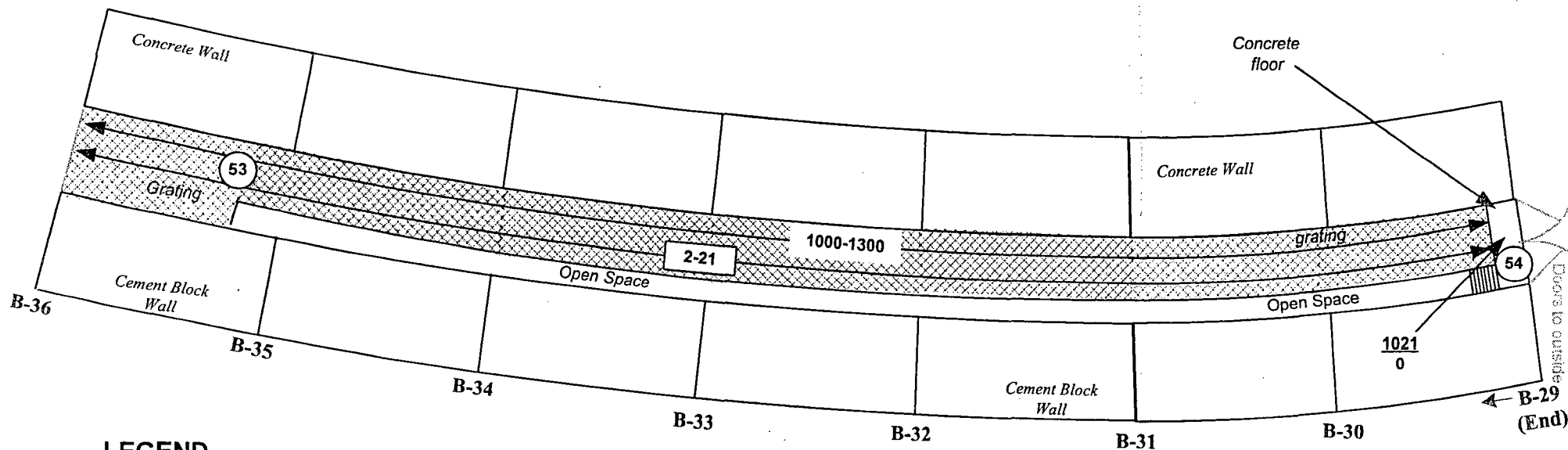
$\frac{\beta}{\alpha}$ = Surface Scans in cpm (10% of surfaces)

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan Dates: 10-08-04 to 11-12-04			

Figure 5a: Building 2 Service Corridor, Section B, Level 2, Column B-29 to B-36, Confirmatory Survey



LEGEND

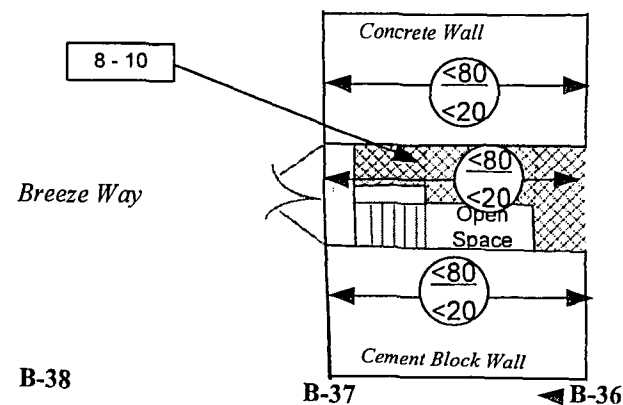
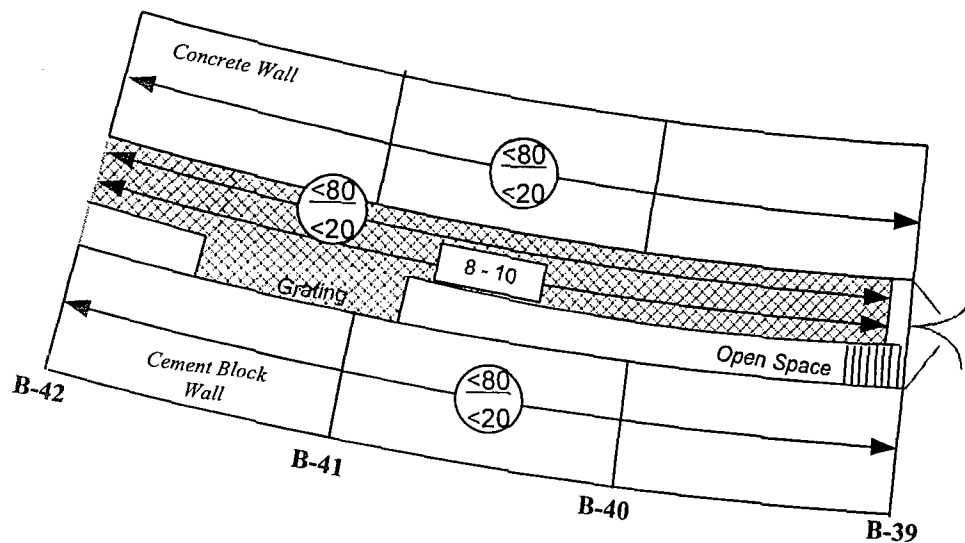
- ## ## = β Surface Scan in cpm, 10% of surface
 # = α Surface Scans in cpm, 10% of surface
 # = Wipe Sample Locations
 ## = β Fixed measurement in cp2m
 ## = α Fixed measurement in cpm
 B# = Column Number

Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Drawing NOT to Scale

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287
Surveyors: S. Cowan					Dates: 03-20-06 to 03-23-06

Figure 6: Building 2 Service Corridor, Section B, Level 2, Column B-36 to B-42, Confirmatory Survey



Drawing NOT to Scale

LEGEND

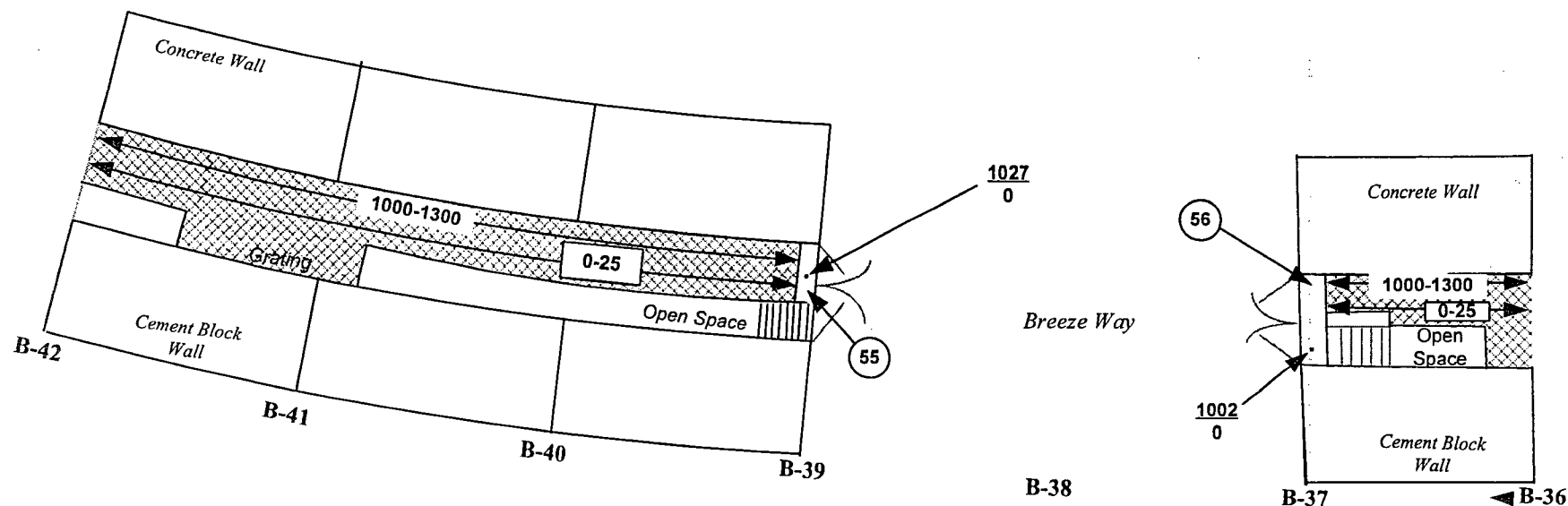
= $\frac{\beta}{\alpha}$ Surface Scans in cpm (10% of surfaces)

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 6a: Building 2 Service Corridor, Section B, Level 2, Column B-36 to B-42, Confirmatory Survey



LEGEND

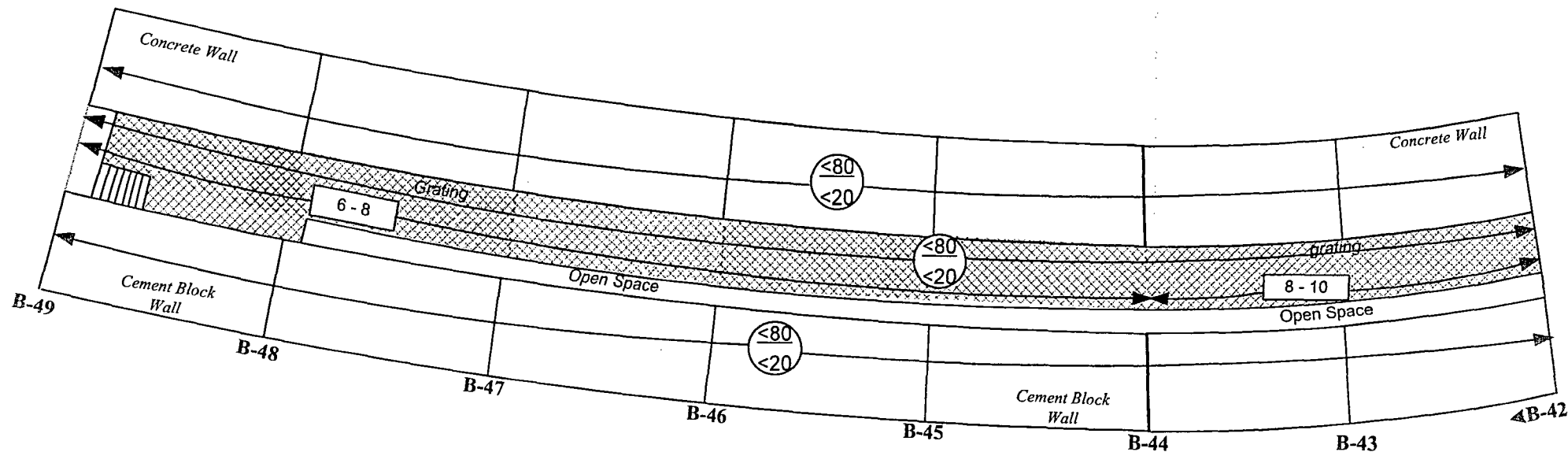
- ## ## = β Surface Scan in cpm, 10% of surface
 # = α Surface Scans in cpm, 10% of surface
 # = Wipe Sample Locations
 ## = β Fixed measurement in cp2m
 ## = α Fixed measurement in cpm
 B# = Column Number

Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Drawing NOT to Scale

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287
Surveyors: S. Cowan			Dates: 03-20-06 to 03-23-06		

Figure 7: Building 2 Service Corridor, Section B, Level 2, Column B-42 to B-49, Confirmatory Survey



Drawing NOT to Scale

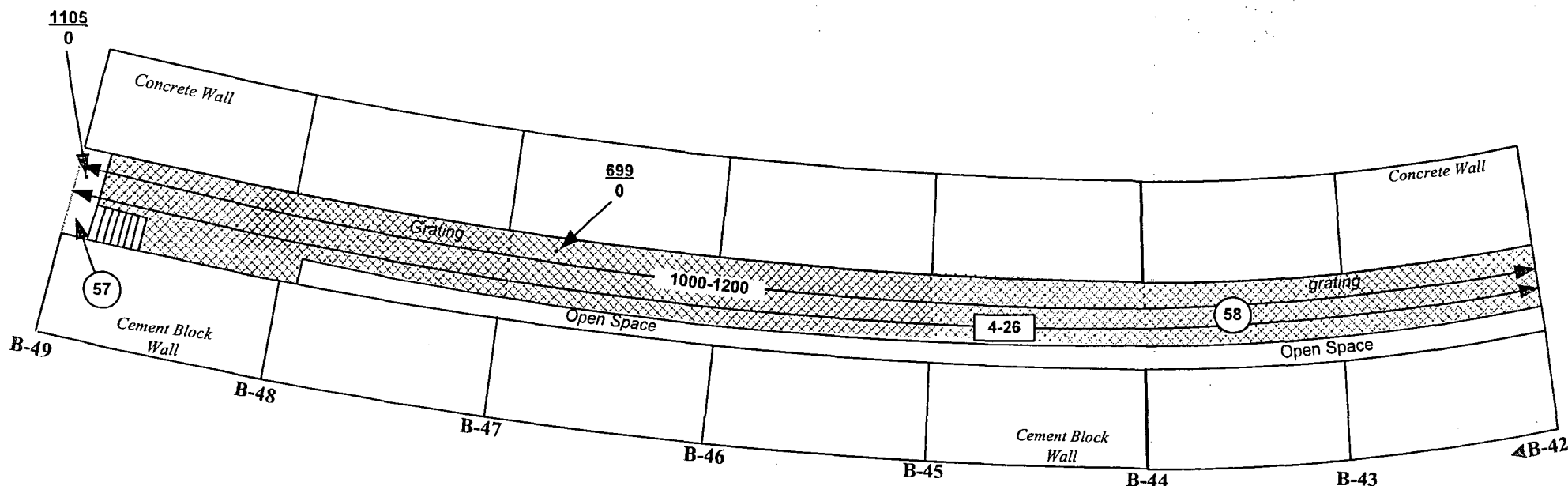
LEGEND

$\frac{\beta}{\alpha}$ = Surface Scans in cpm (10% of surfaces)
 # = Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 7a: Building 2 Service Corridor, Section B, Level 2, Column B-42 to B-49, Confirmatory Survey



LEGEND

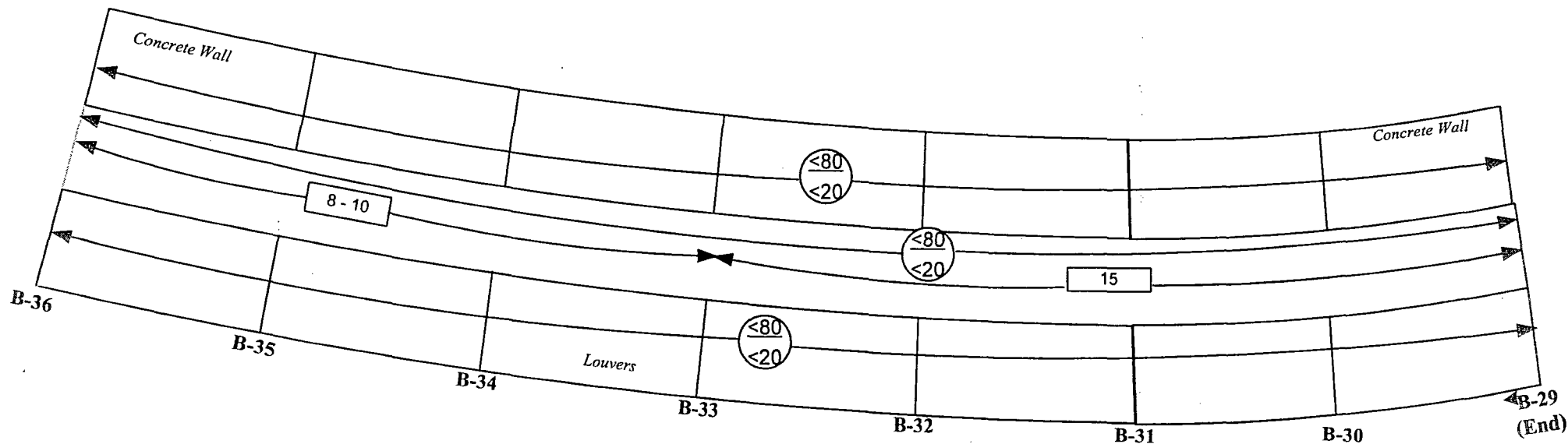
- ## ## = β Surface Scan in cpm, 10% of surface
 # = α Surface Scans in cpm, 10% of surface
 (#) = Wipe Sample Locations
 ## = β Fixed measurement in cp2m
 ## = α Fixed measurement in cpm
 B# = Column Number

Drawing NOT to Scale

Note: All wipe samples were analyzed at the Health Physics Laboratory for α and β activity. All results were <20 dpm/100 cm²

Location	Building 2 Service Corridor				
Instruments	Model 12	Model 3	Model 2221	Model 2221	Model 2221
Serial Number	91055	74220	84459	154202	86802
Calibration Due	09/07/06	04/13/06	05/15/06	09/21/06	05/15/06
	22.19%	27.66%	22.14%	30.39 %	34.36 %
α β γ	α	β	α	β	β
Probe Number	092190	145973	086215	149017	142547
Probe Size cm ²	50 cm ²	15 cm ²	434 cm ²	434 cm ²	100 cm ²
Background	0-20 cpm	40-80 cpm	10-60 cpm	1300-2000 cpm	1026 cp2m
MDA in DPM/100 cm ²	312	2285	109	375	287
Surveyors: S. Cowan					Dates: 03-20-06 to 03-23-06

Figure 8: Building 2 Service Corridor, Section B, Crawl Space, Column B-29 to B-36, Confirmatory Survey



Drawing NOT to Scale

LEGEND

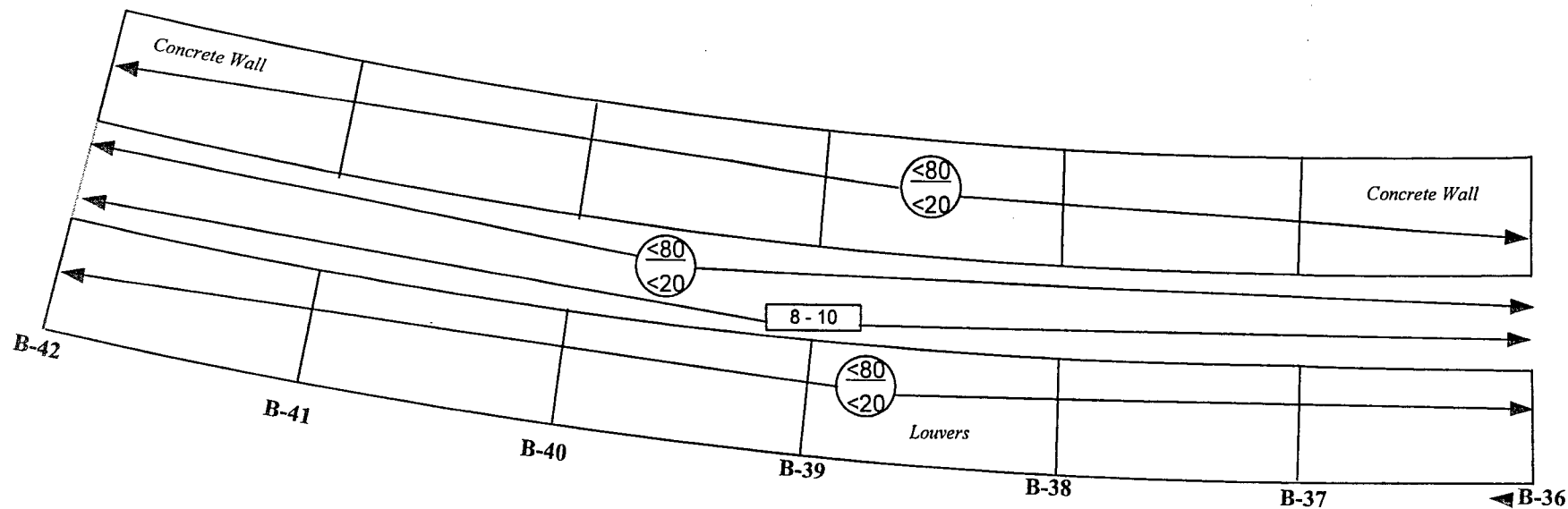
$\frac{\beta}{\alpha}$ = Surface Scans in cpm (10% of surfaces)

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 9: Building 2 Service Corridor, Section B, Crawl Space, Column B-36 to B-42, Confirmatory Survey



Drawing NOT to Scale

LEGEND

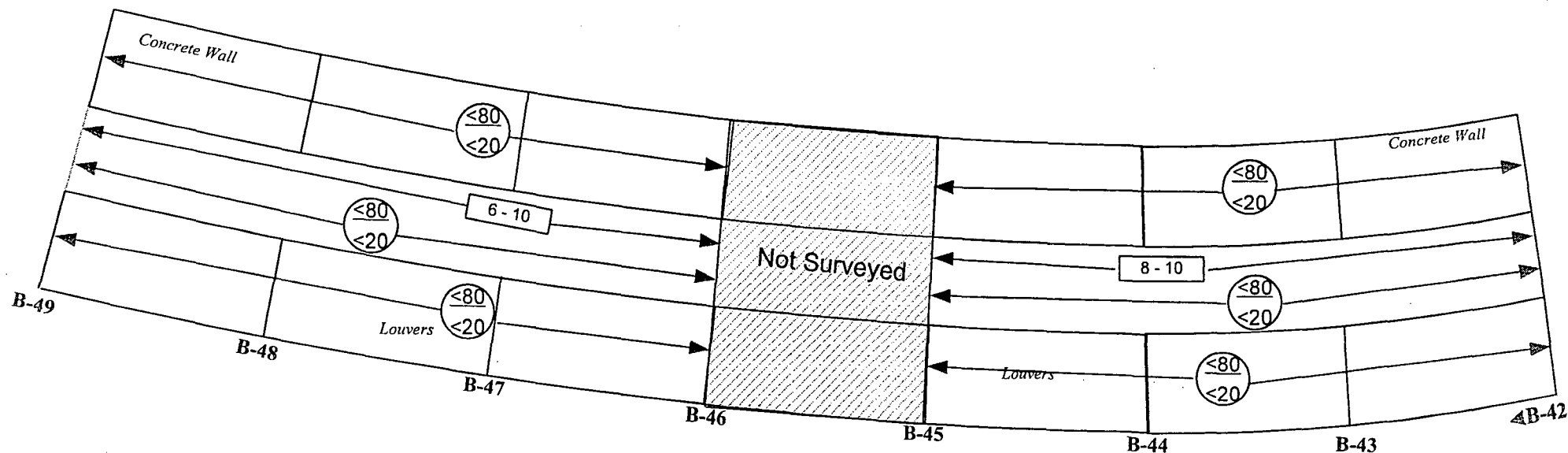
$\frac{\beta}{\alpha}$ = Surface Scans in cpm (10% of surfaces)

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm ²	50 cm ²	15 cm ²	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA in DPM/100 cm ²	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			

Figure 10: Building 2 Service Corridor, Section B, Crawl Space, Column B-42 to B-49, Confirmatory Survey



Drawing NOT to Scale

LEGEND

$\frac{\beta}{\alpha}$ = Surface Scans in cpm (10% of surfaces)

= Exposure Rate Surface Scan in $\mu\text{R/hr}$

B# = Column Number

Location	Building 2 Service Corridor		
Instruments	Model 12	Model 3	Model 3
Serial Number	91055	143349	151348
Calibration Due	03/16/05	11/17/04, 05/19/05	02/05/05
	22.14%	29.18%	NA
α β γ	α	β	γ
Probe Number	092190	145967	163169
Probe Size cm^2	50 cm^2	15 cm^2	2" x 2" NaI (TI)
Background	0-20 cpm	40-80 cpm	20-25 $\mu\text{R/hr}$
MDA In DPM/100 cm^2	312	2285	NA
Surveyors: B. Belcher/ S. Cowan			
Dates: 10-08-04 to 11-12-04			



GENERAL ATOMICS

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