REPORT OF RADIATION SAFETY SURVEILLANCE FOR QUARTER 2, 1997

Submitted to:

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by:

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EXECUTIVE SUMMARY

From April 27, 1997 through May 2, 1997, routine radiation surveillance activities were performed by Integrated Environmental Management, Inc. (IEM) at the Shieldalloy Metallurgical Corporation (SMC) site in Newfield, New Jersey. An IEM employee who was qualified on the basis of training and experience to perform these activities completed the following:

- Collection of breathing zone air (BZA) samples on workers performing ferrocolumbium production operations in building D-111.
- Performance of radiation, contamination, and airborne radioactivity surveys.
- Inspection of the instrument inventory.
- Collection and deployment of environmental and personnel dosimeters.
- Inspection of restricted areas to confirm appropriate signs and labels are in place.
- Performance of an audit of RSP-006, "Training and Qualifications of Radiation Protection Personnel".
- Radiological survey of a furnace chamber in Building D102
- Participation in a scheduled USNRC inspection of the Newfield facility and the SMC Radiation Protection Program.

The results of the ambient gamma surveys in various restricted and unrestricted areas of the plant exhibited exposure rates ranging from background to 980 microR per hour in the immediate vicinity of the CANAL storage location in D-102. Since no area exceeded 5,000 microR per hour, posting as a radiation area pursuant to 10 CFR 20.1902 is not required.

The results of the contamination surveys in various restricted and unrestricted areas of the plant showed removable activity ranging from background to 2,458 disintegrations per minute (alpha) per 100 cm^2 (direct frisk), with the maximum activities noted by the Flex-Kleen baghouse. No other results exceeded the site release criterion of 600 disintegrations per minute (alpha) per 100 cm^2 specified in Radiation Safety Procedure No. RSP-009 (draft), "Contamination Control". The Flex-Kleen baghouse and the AAF baghouse are classified as "Contaminated Areas".

The perimeter exposure rates ranged from background to 0.3 millirem per hour, with the maximum result noted in the immediate vicinity of the Storage Yard. This area does not exceed the 2,000 microR per hour dose rate limit in 10 CFR 20.1301(a)(2). In addition, the likely dose to date incurred by the maximally-exposed member of the general population in the vicinity of the

Newfield plant from all sources is less than the 10 CFR 20.1301(a)(1) limit of 100 millirem for the calendar year.[1]

For calendar year 1997 to date, personnel exposures from external and internal sources were evaluated. In no case has the 5,000 millirem per year (TEDE) dose limit specified in 10 CFR 20.1201(a)(1)(i) been exceeded.

Area air monitoring was performed in D-111 at those locations specified in Radioactive Materials License No. SMB-743. No statistically-positive results were noted.

As of the end of this quarter, the radioactive materials inventory is below the limits for thorium and uranium as specified in Radioactive Materials License No. SMB-743. All storage locations that contain thorium or uranium in excess of the 100 microcurie each, as specified in 10 CFR 20.1902(e), were posted as "Radioactive Materials" areas.

Other activities completed while on the site include the shipment of radiological survey equipment to an off site laboratory for routine calibration, updating the radioactive material inventory, completion of an audit of RSP-006, "Training and Qualifications of Radiation Protection Personnel", completion of an initial radiological survey of a contaminated process chamber in Building D-102, and participation in a USNRC inspection of the SMC Radiation Protection Program. No unusual conditions were noted during performance of any of these activities.

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[1] Eves, C. S., Shieldalloy Metallurgical Corporation, written correspondence to T. T. Martin, U. S. Nuclear Regulatory Commission, March 14, 1995.

INTRODUCTION

Integrated Environmental Management (IEM) was contracted by Shieldalloy Metallurgical Corporation (SMC) to conduct the second quarter 1997 surveillance activities at SMC's Newfield, New Jersey facility. The on-site activities took place between April 27 and May 2, 1997, and were performed by R. Alan Duff, R.R.P.T. A description of Mr. Duff's qualifications is contained in Appendix A. Also included in Appendix A are copies of the Field Activity Daily Logs maintained by Mr. Duff while on-site.

All surveillance activities were performed pursuant to a checklist, the contents of which were approved in advance by the SMC Radiation Safety Officer (RSO). Appendix B contains a copy of the checklist showing the closure status of each item. The following sections of this report contain descriptions of the specific surveillance methodologies, along with a summary of findings, as applicable. The data and records associated with each methodology are contained in the appendices.

AMBIENT GAMMA EXPOSURE RATES

Ambient gamma exposure rates were measured in various restricted and unrestricted areas of the facility. These areas included buildings D111, D102, and G warehouse. A and D warehouses were not surveyed since radioactive materials were not handled in those buildings during this quarter.

The surveys were performed on April 29, 1997. A Victoreen Model 450P gamma scintillation survey meter held at approximately 3' (waist level) from the walking surface in each area, was used to acquire exposure rate information. Results were recorded on survey maps and ancillary forms, copies of which are contained in Appendix C.

Exposure rates in G warehouse were not above background except in the vicinity of pallets of potassium flourotitanate and potassium fluoroborate where levels were measured up to a maximum of 44 microR/hr above background. Exposure rates in D102 ranged from background to 0.98 mR/hr , while in D111, exposure rates ranged from background to 1.1 mR/hr. In both locations, the maximum measured exposure rate was in the immediate vicinity of CANAL storage locations. No unexpected exposure rate measurements were noted at any of the areas surveyed, and results are consistent with those from the previous quarter. Currently, there is no requirement for posting any area at SMC as a Radiation Area.

CONTAMINATION STATUS

A survey for removable and total surface contamination levels was conducted on April 29, 1997. The areas surveyed included buildings D111, D102, D117, D202, D102 lunchroom, and the D111 baghouses.

Total contamination surveys were performed with an Eberline ESP-1 ratemeter with an AC-3 alpha scintillation detector. The instrument was source checked prior to use with a Th-230 source. Background measurements taken adjacent to each measurement location all exhibited zero (0) counts per minute (cpm) alpha. The total contamination survey of each area was conducted by scanning the surfaces with the detector held within 1/8" of the surface being monitored. The detector was moved at a rate of one to two inches per second over the surfaces of the area. Surfaces monitored included floors, desks, equipment, tables, and other accessible horizontal surfaces.

The results of total contamination surveys were recorded on survey maps and ancillary forms, copies of which are contained in Appendix C. The following is a summary of results, which compare favorably with those acquired during the previous quarter:

- D117, D202 lab (upper and lower), D102 lunch room - Not distinguishable from background.
- G-Warehouse - Background to 90 dpm/100 cm^2.
- D111 office and break area - Background to 102 dpm/100 cm^2.
- D111 upper level - Maximum of 260 dpm/100 cm^2.
- D111 lower level - Maximum of 424 dpm/100 cm^2
- AAF dust collector - Maximum of 1864 dpm/100 cm^2, which exceeds the release criterion.
- Flex-Kleen dust collector - Maximum of 2458 dpm/100 cm^2, which exceeds the release criterion.
- D102 - Maximum of 181 dpm/100 cm^2.

Surveys for removable activity were conducted by taking smears of the area being monitored. Samples were taken by wiping cloth smears in an "S"-shaped pattern on the surface being surveyed using moderate pressure. Each smear covered approximately 100 cm^2 (16 in^2) in area. Smears were counted on an Eberline SAC-4 alpha scintillation scaler that was calibrated using a NIST-traceable ^{230}Th source.

The results of removable contamination surveys were recorded on survey maps and ancillary forms, copies of which are contained in Appendix C. The following is a summary of results, which compare favorably with those acquired during the previous quarter:

- G-warehouse, D102, D202 - Not distinguishable from background.
- D111 office and break area - Background to 47 dpm/100 cm^2.
- D111 upper level - Maximum of 41 dpm/100 cm^2.
- D111 lower level - Maximum of 88 dpm/100 cm^2.
- Flex-Kleen dust collector - Maximum of 189 dpm/100 cm^2.
- AAF dust collector- Maximum of 94 dpm/100 cm^2.

The contamination limit for unrestricted areas, from Radiation Safety Procedure No. RSP-009 (draft), "Contamination Control", is 600 dpm α/100 cm^2.

PERSONNEL MONITORING

External (Whole Body) Exposure Monitoring

External exposures of certain SMC personnel are measured using thermoluminescent dosimeters (TLD). On April 28, 1997, dosimeters that had been issued/posted for the previous quarter were collected and returned to the TLD supplier for processing and reporting. Since the results of TLD processing over the past five years confirm that personnel do not have the potential to receive in excess of 500 millirem in a calendar year, individual monitoring pursuant to 10 CFR 20.1502(a) is not required. Therefore, new TLD were not deployed. Appendix D contains the whole body monitoring results from the previous quarter. These results were not distinguishable from background.

External (Extremity) Exposure Monitoring

Extremity exposures of certain SMC personnel are measured using thermoluminescent dosimeters in finger rings. On April 28, 1997, rings that had been issued/posted for the previous quarter were collected and returned to the TLD supplier for processing and reporting. New rings were issued to personnel on March 10 Appendix D contains the extremity monitoring results from the previous quarter. These results were not distinguishable from background.

Internal (Bioassay) Exposure Monitoring

Internal exposure monitoring of certain SMC personnel is performed by collecting and analyzing urine samples as described in RSP-010 (draft), "Exposure Control". Sample collection kits and instruction sheets were staged for distribution by SMC personnel at a later date.

After collection, the samples were forwarded to an analytical laboratory for analysis. Appendix E contains the certificates of analysis and ancillary records for these samples. The results were all negative for the presence of uranium and thorium.[2]

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[2] In the bioassay analyses only produce measured concentrations of uranium in urine. Pursuant to RSP-010 (draft), the uranium results are multiplied by a thorium-to-uranium ratio (i.e., 4.5) in order to obtain the thorium results.

Internal (Air Monitoring) Exposure Monitoring

Personnel air sampling was performed for D-111 personnel during ferrocolumbium processing. Samples were collected on April 27 through May 2, 1997. Operators wore dust masks during the process operations.

Samples were collected by placing Gilian low volume air sampling pumps on the operators. The air samplers operated at approximately two liters per minute (lpm) and were worn throughout the work shift (day shift). Flow rates of the samplers were checked with a Gilibrator air flow calibration kit daily prior to use and at the end of each work shift.

The membrane filters (47 mm) used with the BZA samplers were collected daily at the end of the shift. The filters were counted on May 14, 1997 using a Ludlum Model 2929 dual alpha/beta scintillation detector. The instrument was source checked with a Th-230 alpha source prior to use. All filters were permitted to decay for at least 48 hours prior to counting to prevent radon daughter interference with the air sample analysis.

The analytical results, along with ancillary forms, are contained in Appendix F. No statistically positive results were noted.

For calendar year 1997 to date, the maximum number of hours worked in D-111 by a monitored employee is 120. This exposure duration, in concert with the maximum breathing zone sampling result to date, demonstrates that in no case has the 50,000 millirem per year (CDE) dose limit specified in 20.1201(a)(1)(ii) been exceeded.

AREA AIR MONITORING

Low volume (20 to 40 lpm) general area air samples were collected during D111 operational activities between April 27 through May 2, 1997 using Eberline RAS-1 low volume air sampling pumps equipped with 47 mm diameter membrane filters. The pumps were calibrated using a BIOS International DC-1 flow calibrator (Serial No. 7374) with a Dry Calibration High Flow Cell (Model No. DC-1HC Rev. C, Serial No. 464). All pumps were calibrated on March 11, 1997.

The pumps were placed in those locations of Building D111 that are specified in Radioactive Materials License No. SMB-743, issued in 1980. The location of pump placement is shown in Appendix F.

The filters were counted on May 14, 1997 using a Ludlum Model 2929 alpha/beta scintillation detector. The instrument was source checked with a NIST-traceable ^{230}Th alpha source prior to use. All filters were permitted to decay for at least 48 hours prior to counting to prevent radon daughter interference with the air sample analysis.

The analytical results, along with ancillary forms, are contained in Appendix F. No statistically positive results were noted.

ENVIRONMENTAL MONITORING

Ambient Gamma Exposure Rates

External exposure rates at the perimeter fence of the Newfield facility are measured using thermoluminescent dosimeters (TLD). On April 28, 1997, dosimeters that had been deployed the previous quarter were collected and returned to the TLD supplier for processing and reporting. New TLD were deployed at the same time. The deployment logs for the TLD exchange are contained in Appendix G.

The monitoring results from the previous quarter are also contained in Appendix G. These results demonstrated exposure rates ranging from background to 0.980 millirem per hour. The maximum measured exposure rate was due north of the Storage Yard, approximately 30 feet from the slag piles. However, the closest residence to the Newfield plant is over 750 feet from the slag piles. The ambient gamma exposure rate at this location is not discernible from background.

There are only three potential exposure scenarios for members of the general public. They involve (1) constant and continuous presence 750 feet from the slag piles; (2) periodic presence (e.g., less than one hour per week) at any randomly-selected location around the perimeter fence; or (3) periodic presence (e.g., less than one hour per month) at the aforementioned location of maximum measured exposure.[3] The maximum possible annual exposure to date of a member of the general public for the most limiting of these scenarios is:

$$D_{ytd} = (5.1\ mR) + (0.98\ \frac{mR}{hr} \times 3\ hr) + Q3 + Q4 = 8.04\ mR$$

Exposure Rates from Airborne Emissions

During this quarter, no ferrocolumbium was produced. Therefore, an assessment of exposure rates from airborne emissions of source material was not performed.

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[3] A stay-time of one hour per month at this location is conservative in that there is no physical evidence that individuals frequent this area. Furthermore, monitored Shieldalloy employees who frequent the area for durations greatly in excess of one hour per month, incurred exposures that were only slightly above the nominal detection limits of the dosimetry system (e.g., 10 millirem).

Year-to-date Exposure of the General Public

The maximum year-to-date exposure of a hypothetical member of the general public is determined by:

$$D_{ytd} = \sum_{i=1}^{4} (tD_{D111} + 2190D_{radon} + D_{external})$$

where D_{D111} = the dose rate (microR per hour) from stack emissions during ferrocolumbium production, D_{radon} = the dose rate (microR per hour) from storage yard radon emissions, and $D_{external}$ = the ambient gamma dose rate (microR per quarter as determined above) from the Storage Yard, t = the duration of ferrocolumbium production, 2190 = the number of hours in a calendar quarter, and I = the quarter number for this calendar year.

Since the maximally-exposed individual in the vicinity of the SMC facility may incur a radiation dose of 0.3 microR for each hour of ferrocolumbium production in D111,[4] and since same hypothetical individual may incur a radiation dose of 3.43×10^{-6} microR per hour from radon emissions from the Storage Yard,[5], the year-to-date exposure estimate for a member of the general public is:

$$D_{ytd} = (5{,}100) + (0 + [2190 \times 3.43 \times 10^{-6}] + 2{,}940) + Q3 + Q4 = 8{,}040\ \mu R = 8.0\ mR$$

This value is well-below the regulatory dose limit of 100 mR (TEDE) per calendar year.

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[4] Berger, C.D., Integrated Environmental Management, Inc., written communication to C. S. Eves, Shieldalloy Metallurgical Corporation, March 27, 1997.

[5] Integrated Environmental Management, Inc., "Radiation Dose Estimates from Atmospheric Emissions from the Newfield Facility", Report No. 94005/G-6131, March 11, 1997.

RADIOACTIVE MATERIALS INVENTORY

During this quarter, no source material was received by SMC. Therefore, there was no addition to the radioactive materials inventory. Appendix H shows the inventory status to date. SMC is currently at 96.8% and 87.5% of its license limit for thorium and uranium, respectively.

HEALTH PHYSICS INSTRUMENTS

The SMC instrument inventory was inspected for function and calibration status. The survey instrument inspection log is contained in Appendix I. Included as well in Appendix I are the instrument check forms and calibration certificates for those instruments used to perform the surveillance activities reported herein.

The survey instrument calibration frequency specified in the current Radioactive Materials License No. SMB-743 is once every six (6) months. A total of 4 instruments that were due for calibration prior to the end of the next quarter (i.e., September 30, 1997) were shipped for calibration this quarter. These were returned to the SMC instrument inventory by June 1, 1997.

During the Quarter 1, 1997 surveillance, it was noted that one of the RAS-1 pumps had a missing filter holder. Replacement parts were installed on April 27, 1997 and the pump was returned to service. Two Gilian personnel air samplers were also returned to the manufacturer for repair.

PROGRAM AUDITS

On May 1, 1997, the status of SMC compliance with Radiation Safety Procedure No. RSP-006, "Training and Qualifications of Radiation Protection Personnel" was assessed. This audit was performed as part of SMC's planned and periodic evaluation of its radiation protection program as described in RSP-001 (draft), "Radiation Protection Program Plan", Section 5.16 Quality Assurance in Radiation Protection. A draft audit report was prepared and forwarded to the Radiation Safety Officer for review and comment.

SPECIAL PROJECT SUMMARIES

Project 1 - Radiological Survey of Chamber in Building D-102

Radiological surveys were conducted on April 30, 1997 to determine the radiological status of a chamber located in Building 102 that was used in past operations. The chamber is a candidate for future decontamination/disassembly in order to minimize the amount of contaminated equipment at the facility.

The chamber itself is approximately 15 feet by 15 feet by 20 feet high and is constructed of 1/4 inch carbon steel plate. The chamber at one time had connections to the dust collection, water, and electrical systems for D-102 but is currently disconnected from all utilities. Access doors to the chamber have been tack welded shut to prevent personnel entry into the chamber. Total contamination levels (fixed plus removable) measured on the external surfaces of the chamber reached a maximum of 350 dpm/100 cm^2 while removable levels of contamination were undetectable. Radiation exposure rates on the external external surfaces of the chamber reached a maximum of 105 microR/hr on a duct opening.

Project 2 - Participation in USNRC Inspection of Radiation Protection Program

A representative of IEM, Carol D. Berger, C.H.P., participated in aspects of a USNRC inspection of the SMC Radiation Protection Program. Ms. Berger was present at the Newfield facility on May 20, 1997, and participated by conference call in the May 21, 1997 close-out meeting between the inspectors (Ms. Marie Miller and Ms. Penny Lanzisera) and SMC management.

While on-site, technical input to the SMC population dose assessment program and the bioassay program was provided. In addition, removable contamination surveys were performed in those locations surveyed by the USNRC inspectors. (The results of these surveys are shown in Appendix J.) Splits of all samples collected by the inspectors were obtained by the SMC Alternate Radiation Safety Officer and archived for possible future analysis.

Issues raised during the inspection that demand additional SMC attention were the retention of Warehouse A as a restricted area on the USNRC license in spite of the fact that source material is not stored there routinely, and the means for assessing off-site population doses in the event of a failure in the AAF baghouse during ferrocolumbium production. The inspectors indicated that

the inspection report would be forwarded to SMC shortly after all analytical results are received, which are expected within six (6) months.

EXIT INTERVIEW SUMMARY

The Radiation Surveyor participated in an exit interview with the SMC Radiation Safety Officer on May 1, 1997. The topics discussed included the preliminary findings of the surveillance effort , status of new TLD vendor and posting of new TLDs, instruments forwarded to the calibration laboratory, audit findings, results of the D-102 chamber survey, and the need to perform surveys during the next scheduled surveillance to assist in the development of radiation work permits for routine maintenance activities. No other items or recommendations were discussed.

APPENDICES

Appendix A - Surveyor Qualifications and Field Activity Daily Logs

R. Alan Duff

Professional Qualifications

Mr. Duff has over eighteen years of experience in nuclear and hazardous materials project management, design support, surveillance, operational health physics and decommissioning activities. He has prepared numerous plans, procedures, and license documents for U. S. Department of Energy facilities, U. S. Department of Defense facilities, U. S. Nuclear Regulatory Commission licensees, and commercial client facilities that are regulated by an agreement state. Mr. Duff is well versed in the area of civilian and government radioactive and mixed waste transport and disposal requirements. He is registered by the National Registry of Radiation Protection Technologists (NRRPT).

Education

Advanced Radioactive Material Transportation and Disposal Class, 1989 and 1993
IT Corporation Project Management Course (40 hours), 1992.
40-Hour OSHA HAZWOPER (29 CFR 1910.120) Training, 1987.
Eight-hour Supervisor Training, 1990
Eight-hour OSHA Annual Refresher (29 CFR 1910.120), 1996.
Canberra Multichannel Analyzer Operations Class, 1988.
Operational Water Chemistry and Radiological Controls, U.S. Navy, 1982
Engineering Laboratory Technician School, U.S. Navy, 1980.
Nuclear Power Training Unit (prototype), U.S. Navy, 1980.
Naval Nuclear Power School, U.S. Navy, 1978.

Registrations/Certifications

Registered Technician, National Registry of Radiation Protection Technologists

Experience and Background

1995 - Present ***Project Manager, Integrated Environmental Management, Inc., Knoxville, Tennessee.*** Provides high-quality project management and remediation services to commercial and government clients. As a member of the client's response team, works with clients to: Develop scopes-of-work and bid packages for specialty subcontractors handling highly focussed assignments; identify those subcontractors who will provide the greatest value to the client; manage teams of specialty subcontractors to ensure that the client's goals and expectations (technical, regulatory, and financial) are met from the beginning until project completion; provide insights into future regulatory issues and their impact as input to the client's long-range business planning and cost forecasting process; provide site remediation/decommissioning services for radioactive and hazardous materials; and develop project specific plans and procedures to conduct on site activities.

1994 - 1995 ***Senior Environmental Specialist, AWK Consulting Engineers, Inc., Pittsburgh, Pennsylvania*** While assigned to the Oak Ridge, Tennessee office, was responsible for performing technical and administrative duties required to satisfy customer needs on site characterization and pre-remedial design support projects and for all aspects of D&D projects. Responsible for preparing project plans, project work plans, task specific Health & Safety Plans, and budgets/schedules for these projects. Also responsible for identifying and implementing decommissioning and decontamination methods for these projects.

1987 - 1994 ***Project Manager, Health Physics Supervisor, Nuclear/Mixed Waste Engineering Services, IT Corporation, Knoxville, Tennessee.*** Provided project management and health physics support services for nuclear and mixed waste projects throughout the United States.

1978 - *1987* ***Engineering Laboratory Technician (ELT), Leading Petty Officer, Radiological Controls Shift Supervisor, United States Navy*** Supervised a division of 40 personnel, provided support for nuclear powered submarines, and performed over 250 error-free shipments of radioactive materials. Served as Leading ELT and Engine Room Supervisor on the USS Grayling, SSN 646.

Professional Society Memberships

Health Physics Society
American Nuclear Society
Conference of Radiation Control Program Directors (Advisor to the Radioactive Waste Management Committee E-5 and to the D&D Committee E-24)
International Society of Decontamination and Decommissioning Professionals

Awards

Navy Achievement Medal for conducting the first Trident Class submarine ion exchange resin discharge and solidification.
IT Corporation *Project Management Associate*

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 4/27/97 | Time: 1430 | Job Number: 94005.05

Client Name: Shieldalloy Metallurgical Corp.

Address of Work Site: West Blvd., Newfield, NJ

Type of Work: Preps for processing Cb. oxide, qtrly surveillance

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

1430 Left house for airport

2230 Arrived on site, prepared to issue personnel air samplers for work in D111.

2315 ~~2330~~ Started area air samplers (3) in D111.

2320 Issued BZAs to personnel in D111.

2345 Left Site

No Further Entries

Visitors on Site: None

Changes from Plans and Specifications, and Other Special Orders and Important Decisions: None

Weather Conditions: Cloudy, rain

Important Telephone Calls and Interactions: None

Personnel on Site: Schooley, Foreman, ~~Ettis~~ Jordan, Gomez, Hunter (Working 8pm-8am in D111)

Name Printed: R. A. Duff

Signature: RADuff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 4/28/97 | Time: 0715 | Job Number: 94005.05

Client Name: Shieldalloy Metallurgical Corp.

Address of Work Site: West Blvd, Newfield, NJ

Type of Work: Preps. for processing Cb. Oxide, qtrly. Surveillance.

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

0715 On site, collecting personnel BZA samplers & area air samples. The D111 personnel were not able to do any "runs" due to clumping of materials, other problems. They did do preparation activities in D111. Secured area air samplers @ 0735.

0745 Placed BZAs on chargers.

0805 Met w/RSO to discuss surveillance activities.

0810 Conducted instrument inventory, prepared for instrument shipment for calibration.

0945 Collecting building TLDs, will not reissue new ones in their place

1059 Collected personnel TLDs, will not reissue new ones in their place.

1050 Spoke w/RSO on scaler & Frisker. Both are out of cal. by ~2 wks., requested permission to use instruments beyond 6mo. cal. date.

1300 Meeting w/RSO, ARSO, foreman, on maintenance activities for RWPs, areas needing additional surveys

1350 Toured D102 chamber, CFS Dust Collector, & D106 areas.

1400 Collected old TLDs / posted new ones on perimeter fence.

1600 Left Site

1115 Returned to site, issued BZAs, started area air samplers.

2015 Left site

Visitors on Site: None

Changes from Plans and Specifications, and Other Special Orders and Important Decisions: None

Weather Conditions: Partly cloudy, warm

Important Telephone Calls and Interactions: None

Personnel on Site: Duff, Eves, Valenti, Grabus, Schenley, Foreman, ~~Ellis~~ Jordan, Gomez, Hunter

Name Printed: R.A. Duff

Signature:

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 4/29/97 | Time: 0715 | Job Number: 94005.05

Client Name: SMC.

Address of Work Site: West Blvd., Newfield, NJ.

Type of Work: Preps. For CbO2 processing, qtrly. surveillance

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

0715 On site, at D111, collecting BZA samplers, area air samples.
0800 In lab basement, setting up survey equipment, doing paperwork
1030 Performed instrument source checks/operational checks
1230 Commenced survey of areas listed in RSP-008 for qtrly. surveillance.
1540 Started area air samplers in D111.
1600 Completed RSP-008 rad./contam. surveys. Left site
000 D111 Workers on site, performing columbium oxide runs, started BZA samples

No Further Entries

Visitors on Site: None

Changes from Plans and Specifications, and Other Special Orders and Important Decisions: None

Weather Conditions: Sunny, warm

Important Telephone Calls and Interactions: None

Personnel on Site: Valenti, Schooley, ~~S~~ Foreman, ~~Ellis~~ Jordan, Hunter, Gomez (Working 8pm-8am in D111)

Name Printed: R.A. Duff

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 4/30/97 | Time: 0715 | Job Number: 94005.05

Client Name: Shieldalloy Metallurgical Corp.

Address of Work Site: West Blvd., Newfield, NJ.

Type of Work: Cb Oxide runs, quarterly surveillance

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

0715 On site, collected BZA & area air samples from D111, ~~Bk~~ placed BZAs on charger

0830 Preparing paperwork for bioassay sample collection & setting up scaler for smear counting.

0900 Counting contamination smears in lab basement

1230 Performed radiation & contamination survey around chamber in D102, looked at old D102 baghouse structure.

1400 Spoke w/RSO on scheduled audit of RSP-006, Radiation protection personnel training. Concurred on audit check list, obtained copy of RSP-006.

1500 Left site

1930 On site, issued BZA pumps to workers + started area air samplers in D-111.

2030 Left site

No Further Entries

Visitors on Site: None

Changes from Plans and Specifications, and Other Special Orders and Important Decisions: None

Weather Conditions: Partly cloudy, warm

Important Telephone Calls and Interactions: None

Personnel on Site: Duff, ~~Eaves~~ Eves, Valenti, Schooley, Jordan, Foreman, Gomez, Hunter (D111 workers 8pm-8am)

Name Printed: R.A. Duff

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 5/1/97 | Time: 0700 | Job Number: 94005.05

Client Name: Shieldalloy Metallurgical Corp.

Address of Work Site: West Blvd., Newfield, NJ.

Type of Work: Columbium oxide heats,

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

0730 Onsite, collected air samples, BZA pumps from DIII.

0830 Packaged instruments for ~~ship~~ shipment to calibration facility. Packaged used TLDs for return shipment to Landauer.

1000 Dropped off packages at FedEx.

1030 Conducted audit of RSP-006

00 Completed paperwork for bioassay samples

1500 Debriefed RSO on activities performed during the Q2 Surveillance, surveys performed, audit preliminary results,

1530 Left site

900 Returned to site, issued BZA pumps to DIII personnel, started DIII area air samplers.

150 Left site

NO FURTHER ENTRIES

Visitors on Site:	Changes from Plans and Specifications, and Other Special Orders and Important Decisions:
None	None
Weather Conditions: Partly cloudy, warm	Important Telephone Calls and Interactions: None

Personnel on Site: Duff, Eves, Valenti, Schooley, Jordan, Foreman, Gomez, Hunter (DIII workers 8pm-8am)

Name Printed: R.A. Duff | Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
FIELD ACTIVITY DAILY LOG

Facility: SMC Newfield

Date: 5/2/97 | Time: 0700 | Job Number: 94005.05

Client Name: Shieldalloy Metallurgical Corp.

Address of Work Site: West Blvd., Newfield, NJ

Type of Work

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS

0700 On site, collecting air samples & BZA pumps from Dill, placed low-vol samplers in storage in the cave.

0800 Notified RSO that work on site was complete, left site

No Further Entries

Visitors on Site: None

Changes from Plans and Specifications, and Other Special Orders and Important Decisions: None

Weather Conditions: Partly cloudy, warm

Important Telephone Calls and Interactions: None

Personnel on Site: Duff, Eves, Foreman, Schooley, Jordan, Foreman, Gomez, Hunter. (Dill workers, off @ 0800)

Name Printed: Pat Duff

Signature: Pat Duff

Appendix B - Surveillance Checklist

ACTIVITIES CHECKLIST FOR QUARTERLY SURVEILLANCE
QUARTER 2, 1997

Activity	Frequency	Instructions	Surveyor Initials	Date/Time Completed	Comments
Schedule on-site work with RSO and obtain final approval on checklist contents.	Once - prior to 4/11/97		RAD	4/23/97 1600	
Determine whether there will be special projects (e.g., baghouse maintenance, CANAL crushing, contractor surveillance, training, etc.) performed during this quarter.	Once - prior to 4/11/97		RAD	4/24/97 1400	
Confirm SMC has discontinued its contract with Landauer for extremity, whole body and environmental dosimeters	Once prior to 4/11/97	If not, the following HP Northwest Orders should be changed to: Landauer, Inc. 2 Science Road Glenwood, IL 60425 708-755-7000	RAD	4/28/97 1400	
Order whole body, extremity, and environmental dosimeters for Quarter 2 (see IEM RSP-029 for order form)	As soon as on-site date is scheduled	Health Physics Northwest, Inc. 11535 S.W. 67th Ave. Tigard, OR 97223 (503) 620-6617	RAD	4/25/97 1400	
Confirm receipt of extremity and environmental dosimeters, and prepare deployment logs (see IEM RSP-029 for example deployment log)	Once - one week prior to on-site work	Health Physics Northwest, Inc. Unused TLD will be shipped to IEM who will transport the TLD to Newfield.	RAD	4/28/97 1000	
Order fifteen (15) urine bioassay collection bottles and cooler. Give advanced notice to laboratory of impending sample shipment.	Once - one month prior to on-site work.	Ron Eidson Outreach Laboratory 311 North Aspen Broken Arrow, OK 74012 (918) 251-2515	RAD	4/23/97 1430	
Contact instrument calibration facility and alert them of pending shipment.	Once - two weeks prior to on-site work.	Ludlum Measurements 501 Oak Street Sweetwater, TX 17556 800-622-0828	RAD	4/23/97 1430	
Confirm availability of disk smears, air filters, forms, instruments and other equipment/supplies.	Once - two weeks prior to on-site work	Contact RSO to determine availability of SMC equipment.	RAD	4/23/97 1530	
Obtain names of participants and prepare urine bioassay collection forms, instruction sheets, chain-of-custody forms and labels/seals.	Once - two weeks prior to on-site work	Contact RSO to determine names of participants.	RAD	4/28/97 0830	

Activity	Frequency	Instructions	Surveyor Initials	Date/Time Completed	Comments
Confirm source material receipt since 4/1/97 & alert laboratory of pending sample shipment.	Once - two weeks prior to on-site work	Address: General Activation Analysis, Inc 11575 Sorrento Valley Road #214 San Diego, California 92121 (800)367-0526 Attn: Lawrence Kovar	RAD	4/28/97 0830	None received
Perform source and background check of all portable instrumentation used to perform surveys, as required.	Daily - Start of Shift	Document results and maintain as a project record.	RAD	4/29/97 1600	
Obtain background and efficiency data for smear counter.	Daily - Start of Shift during Smear Counting	Document results and maintain as a project record.	RAD	4/29/97 1000	
Meet with each employee on the urine bioassay participants list and instruct them where to pick up collection kits, instructions, and paperwork; date sample collection should begin; where to return the samples after collection; and how to secure the lids on the sample bottles.	Once - On last day of on-site activities.	Check with RSO to verify he concurs with sample dates.	RAD	5/1/97 1900	
Obtain copies of completed chain of custody forms and instruction sheets from bioassay samples.	Once - after receipt of analytical results from laboratory	Obtain copies from RSO or ARSO, or instruct them to attach copies to the chain of custody form prior to sending it to the laboratory.	RAD	6/18/97 1000	
Obtain the "Dosimeter Deployment Record" completed during the Quarter 1, 1997 surveillance.	One time		RAD	4/24/97 1000	
Collect "used" and deploy "unused" TLD in three storage warehouses, two process buildings and the byproduct storage yard. Place new markers at TLD stations that have missing or broken markers.	One time	Note physical status and other observations on Deployment Record and maintain as a project record.	RAD	4/29/97 0900	
Collect "used" and deploy "unused" extremity TLD to monitored individuals.	One time	Note physical status and other observations on Deployment Record and maintain as a project record.	RAD	4/28/97 1600	
Package "used" TLD, transit dosimeters and deployment dosimeters. Ship dosimeters using overnight mail.	One time	Maintain airbill as a project record. Ship TLD to Health Physics Northwest, Inc.	RAD	4/30/97 1600	
Obtain a listing (mass) of source material received at the Newfield facility since April 1, 1997.	One time		RAD	4/28/97 0830	None received

Activity	Frequency	Instructions	Surveyor Initials	Date/Time Completed	Comments
Examine and document the physical condition, battery status, and calibration status of health physics instruments. Instruments that are damaged or due for calibration within three months of the date of the inspection should be packaged and shipped pursuant to the instructions of the RSO.	One time	The majority of the inventory should be stored in a single location (basement of the laboratory) Complete Instrument Inventory Form. Maintain documentation and airbill for shipped instruments as project records. Provide list of instruments sent for calibration to RSO.	RAD	4/28/97 1130	
Perform and document a visual inspection of the controlled and restricted areas to ensure proper storage and control of licensed material pursuant to 10 CFR 20 posting requirements in light of survey findings.	One time	Note findings on FADL and maintain as a project record. Relay recommendations (if any) to RSO during close-out meeting.	RAD	4/29/97 1600	
Perform and document an IEM quality assurance audit of RSP-006 (Training and Qualifications of Radiation Protection Personnel) and transmit to the RSO.	One time	Audit to be performed per IEM procedure RSP-028.	RAD	5/1/97 1030	
Check flow rates and battery strengths for all Breathing Zone Samplers prior to use. Load membrane filters into the BZA filter holders. Note: If possible, do not use glass fiber filters.	Three (3) sampling periods per employee.	RSO provides pumps, filters, and cartridges and calibrator. Document results and maintain documentation as a project record.	RAD	5/1/97 1900	
Collect Breathing Zone samples for employees designated by the RSO, if appropriate. At the end of the collection period, remove and label filters, hold for at least 48 hours, count filters, and record results. (Count sufficient background filters as well.)	Three (3) sampling periods per employee in D.111.	Employees should be those who participate in the urine bioassay program. Maintain documentation as a project record.	RAD	5/14/97 1200 (counted)	
Ensure that Lo-Vol air samplers are operational at the locations shown on the map (Attachment 8), or as designated by the RSO. Install membrane filters into each sampler. Start sampler. At the end of the collection period, remove and label filters, hold for 48 hours, count filters, and record results. Note the type of operations (FeCb production using columbium oxide as raw material, CANAL packaging, maintenance, or none) being performed during the sampling periods. Note: If possible, do not use glass fiber filters.	Three (3) sampling periods per location in D.111.	RSO provides pumps, filters and cartridges. Coordinate collection times with Steve Danilak Collection locations are as shown in RSP-008. Document results and MDA calculation. Maintain documentation as a project record.	RAD	5/14/97 1200 (counted)	
Enter area air sample results into a spreadsheet for trending and enter into draft report.	One time		--	--	

Activity	Frequency	Instructions	Surveyor Initials	Date/Time Completed	Comments
Perform and document ambient gamma surveys and contamination surveys at locations shown in RSP-008 and those selected through good health physics judgment. Count smears for gross alpha activity.	One time in each location.	Collection locations are as shown in RSP-008. Document results and MDA calculation. Maintain documentation as a project record.	RAD	4/30/97 1000	
Enter ambient gamma survey and contamination survey results into a spreadsheet for trending and enter into draft report.	One time		--	--	
Obtain work hours with source material for D111 employees for Quarter 1, 1997	One time	Get information from Russ Hunter	RAD	7/2/97 1100	
Maintain daily log of activities.	Daily	Record on FADL and maintain as a project record.	RAD	5/2/97 0800	
Ensure completeness of all documentation prepared during on-site activities.	One time		RAD	6/26/97 0730	
Hold a close-out meeting with the RSO or RSC to discuss observations and findings.	One time on the last day of on-site work.	Document subjects discussed and action plan (if any) on FADL and maintain as a project record.	RAD	5/1/97 1300	
Obtain results of TLD processing.	One time - two weeks after on-site work	Results should be sent to IEM by Landauer.	RAD	6/18/97 1000	
Enter area and perimeter TLD results into a spreadsheet for trending and enter into draft report.	One time		--	--	
Obtain results of feed material sample analysis.	One time - within five days after on-site work.	Results should be sent to IEM by GAA.		Not Applicable	
Obtain bioassay results	One time-within 10 days after samples are submitted to lab.	Results should be sent to IEM by Outreach. Confirm receipt of collection forms and chain of custody records.	CDB	6/6/97	
Enter bioassay results into a spreadsheet for trending and enter into draft report.	One time.		--	--	
Confirm return of instruments sent off-site for calibration and enter dates into draft report.	One time	Verify instrument return with RSO.	RAD	6/18/97 1100	
Update source material inventory for Quarter 2, 1997 using feed material analysis and incoming inventory.	One time	Confirm that no off-site shipments have occurred during Quarter 2.	CDB	7/9/97 1100	
Check closure status of previous audit findings and enter into draft report.	One time			Not Applicable	
Document special project activities (if any) in draft report.	One time		RAD CDB	6/26/97 1000	

Activity	Frequency	Instructions	Surveyor Initials	Date/Time Completed	Comments
Prepare draft report for Quarter 2.	One time	Follow specific outline and forward to Carol Berger for review.	RAD	6/26/97 1400	
Submit one copy of draft report for Quarter 2 to the RSO. Note: Covers/bindings for draft reports are not necessary.	One time	David Smith Shieldalloy P.O. Box 768 Newfield, NJ 08344	CDB	7/10/97	
Contact RSO to resolve outstanding comments and finalize both reports.	Two weeks after receipt of draft report.	David Smith 609-697-4200 Shieldalloy P.O. Box 768 Newfield, NJ 08344	CDB	3/6/98	
Forward one (1) unbound and two (2) bound copies of final report for Quarter 2 to the RSO.	10 business days after resolution of comments	David Smith Shieldalloy P.O. Box 768 Newfield, NJ 08344	CDB	3/9/98	

Appendix C - Ambient Gamma and Contamination Survey Records

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
RADIOLOGICAL SURVEY FORM

S vey Number SMC-042997 Date of Survey 4/29/97

Survey Description: Quarterly airborne, contamination, & radiation surveys in areas listed in RSP-008.

Survey Performed by:

Signature

R. A. DUFF

Print Name

Drawing Attached ☒ Yes ☐ No

Instrument (1)	Instrument (2)	Instrument (3)
odel: Eberline ESP-1 / AC-3	Model: Eberline SAC-4	Model: Victoreen 450P
Serial No.: 03047 / 407083-37	Serial No.: 868	Serial No.: 195
alibration Due: 4/7/97*	Calibration Due: 4/7/97*	Calibration Due: 6/23/96
Efficiency: 17.7%	Efficiency: 31.4%	Efficiency: N/A
IDA 26 dpm/100cm² CF 9.58 BKG 0 cpm	MDA 20.1 dpm/100cm² CE 3.18 BKG 0.6 cpm	MDA N/A CF N/A BKG 6 uR/hr in lab background

* RSO permission to use past cal date (had cal. sticker good for 6 more months.)

urvey Point	Smearable Contamination		Radiation Levels (including fixed contamination)	Instrument Used	Comments and Additional Information
	Beta/gamma (dpm/100 cm²)	Alpha (dpm/100 cm²)	Ambient (microrem/hour)		
			MDA- ESP-1/AC-3 =		$\frac{2.71+4.65\sqrt{t \times b}}{t \times \text{eff.} \times 59/100}$
					$= \frac{2.71+4.65\sqrt{1 \times 0}}{1 \times 0.177 \times 59/100}$
					= 26 dpm/100cm²
					Correction Factor ~~= cpm × 1/0.177cpm × 59cm²/dpm × 1/100cm²~~ = cpm × 1dpm/0.177cpm × 100cm²/59cm² = 9.58
			MDA SAC-4 =		$\frac{2.71+4.65\sqrt{t \times b}}{t \times \text{eff.}}$
					$= \frac{2.71+4.65\sqrt{1 \times 0.6}}{1 \times 0.314}$
					= 20.1 dpm/100cm²

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
SAMPLE COUNT RECORD

$MDA = \frac{2.71 + 4.65\sqrt{t \times bkgd}}{eff \times t} = \frac{2.71 + 4.65\sqrt{1 \times 0.6}}{0.318 \times 1} = 19.8$ (6.3 cpm)

Sample No.	Date/Time	Hour of Count	Inst. Model and Serial No.	Inst. Efficiency (c/d)	(1) Bkg	(2) Bkg count time (min)	(3) Bkg count rate (1/2) cpm	(4) Sample counts	(5) Sample count time (min)	(6) Sample count rate (4/5) cpm	(7) Net sample count rate (6-3)	(8) dpm (7/Eff)
1 Dill Upper Level	4/29/97	4/30/97 0900	Eberline SAC-4 # 868	31.8%	30	50	0.6	11	1	11	10	31
2								5		5	4	<20
3								4		4	3	<20
4								1		1	0	<20
5								2		2	1	<20
6								0		0	0	<20
7								14		14	13	41
8 Dill Lower Level								2		2	1	<20
9								13		13	12	38
10								0		0	0	<20
11								5		5	4	<20
12								4		4	3	<20
13								1		1	0	<20
14								3		3	2	<20
15								5		5	4	<20
16								3		3	~~28~~ 2	<20
17								9		9	8	25
18								29		29	28	88
19								18		18	17	53
20								8		8	7	22

Printed Name: R.A. DuFF

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
SAMPLE COUNT RECORD

Sample No.	Date/Time	Hour of Count	Inst. Model and Serial No.	Inst. Efficiency (c/d)	(1) Bkg	(2) Bkg count time (min)	(3) Bkg count rate (1/2) cpm	(4) Sample counts	(5) Sample count time (min)	(6) Sample count rate (4/5) cpm	(7) Net sample count rate (6-3)	(8) dpm (7/Eff)
21 D111 Office	4/29/97	4/30/97 0930	Eberline SAC-4 #868	31.8%	30	50	0.6	0	1	0	0	<20
22								0		0	0	<20
23								2		2	1	<20
24								12		12	11	35
25								16		16	15	47
26								0		0	0	<20
27								1		1	0	<20
28								2		2	1	<20
29 AAF								31		31	30	94
30								6		6	5	<20
31								2		2	1	<20
32 Flex Kleen								6		6	5	<20
33								23		23	22	69
34								61		61	60	189
35 G Warehouse								2		2	1	<20
36								0		0	0	<20
37								1		1	0	<20
38								1		1	0	<20
39 D102								2		2	1	<20
40								5		5	4	<20

Printed Name: R. A. Duff

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
SAMPLE COUNT RECORD

Sample No.	Date/Time	Hour of Count	Inst. Model and Serial No.	Inst. Efficiency (c/d)	(1) Bkg	(2) Bkg count time (min)	(3) Bkg count rate (1/2) cpm	(4) Sample counts	(5) Sample count time (min)	(6) Sample count rate (4/5) cpm	(7) Net sample count rate (6-3)	(8) dpm (7/Eff)
41 D102	4/29/97	4/30/97 1000	Eberline SAC-4 #868	31.8%	30	50	0.6	4	1	4	3	<20
42								3		3	2	<20
43								2		2	1	<20
44								4		4	3	<20
45								7		7	6	<20
46								5		5	4	<20
47								5		5	4	<20
48 Lab Bkgd.								4		4	3	<20
49								3		3	2	<20
50								2		2	1	<20

Printed Name: R.A. DUFF

Signature: [signature]

I[illegible]EC[illegible]AT[illegible] E[illegible]/IF[illegible]NM[illegible]NT[illegible] M[illegible]NA[illegible]EM[illegible]IT, [illegible]IC
INSTRUMENT FIELD CHECK FORM

Site: SMC Newfield	Probe Type: AC-3 # 407083-37	Probe Number 407083-37
Meter Number: ESP-1 # 03047	Suggested Operating Voltage: N/A	Check Source Number: Th-230 # 3786 (5300dpm 9/18/91)

Number	Date	Location	Battery OK	Operating Voltage	Background cpm	Check Source cpm	Name	Remarks
1	4/29	Lab Basement	✓	794	0	937	R.A. Duff	α eff = 17.7%
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

I[illegible]EC[illegible]AT[illegible] E[illegible]VIR[illegible]NM[illegible]NT [illegible]M[illegible]NA[illegible]EM[illegible]T, [illegible]IC
INSTRUMENT FIELD CHECK FORM

Site: SMC New Field	Probe Type: N/A	Probe Number N/A
Meter Number: Eberline SAC-4 #868	Suggested Operating Voltage: 750	Check Source Number: Th-230 # 3785 6500dpm (9/18/91)

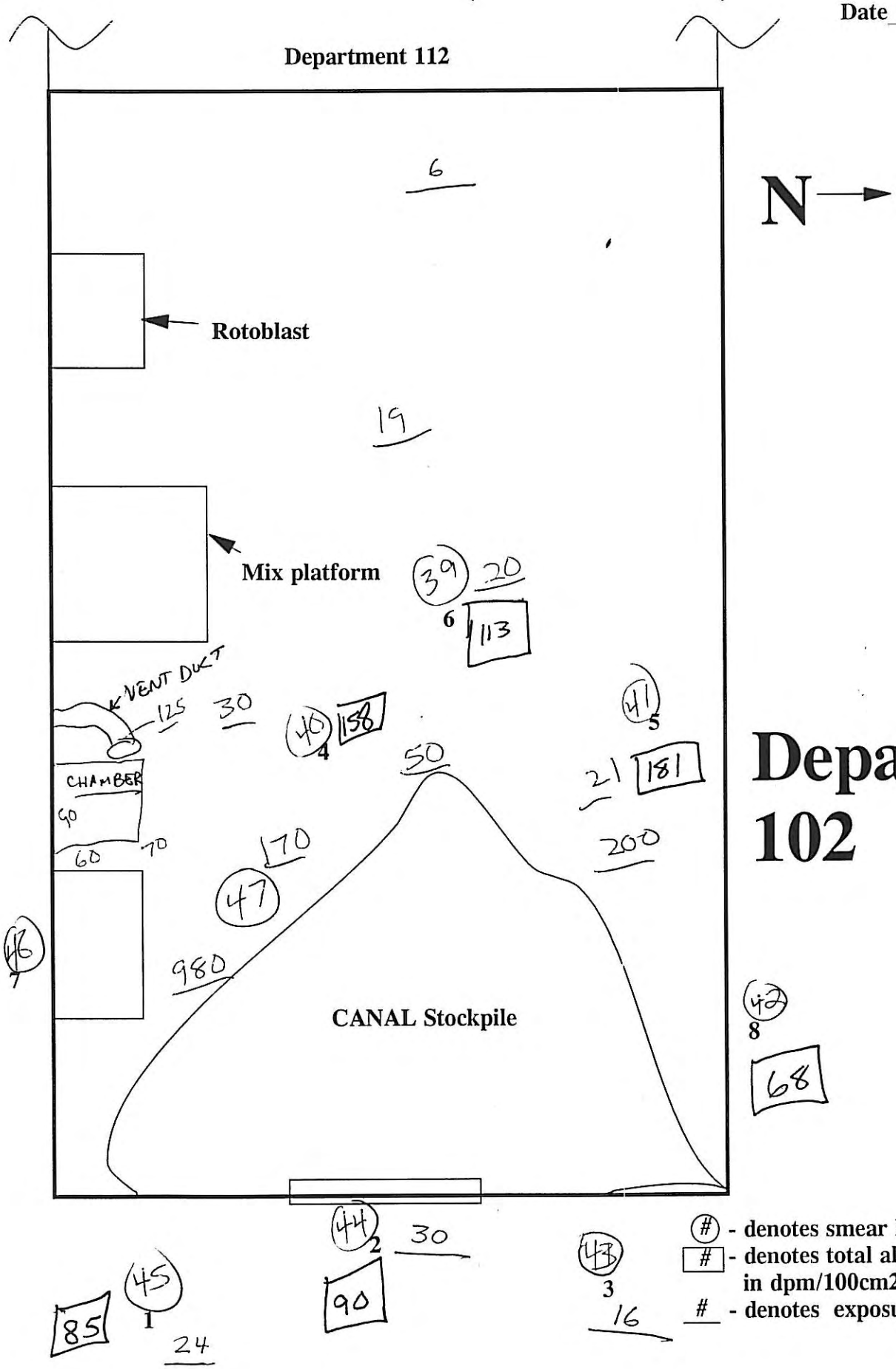
Number	Date	Location	Battery OK	Operating Voltage	Background cpm	Check Source cpm	Name	Remarks
1	4/29/97	Lab Basement	N/A	~~750~~ N/A	0.6	2042	R.A. Duff	α eff = 31.4 %
2	4/30/97	Lab Basement	N/A	N/A	0.6	2066	R.A. Duff	α eff = 31.8 %
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
INSTRUMENT FIELD CHECK FORM

Site: SMC Newfield	Probe Type: N/A	Probe Number N/A
Meter Number: Victoreen Model 450P #195	Suggested Operating Voltage: N/A	Check Source Number: Cs-137 #3788 (1.24 uC: 9/12/91)

Number	Date	Location	Battery OK	Operating Voltage	Background ~~cpm~~ uR/hr	Check Source ~~cpm~~ uR/hr	Name	Remarks
1	4/29	Lab. Basement	✓	N/A	~~10~~ 6	80	R.A.Duff	
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

Date 4/29/97



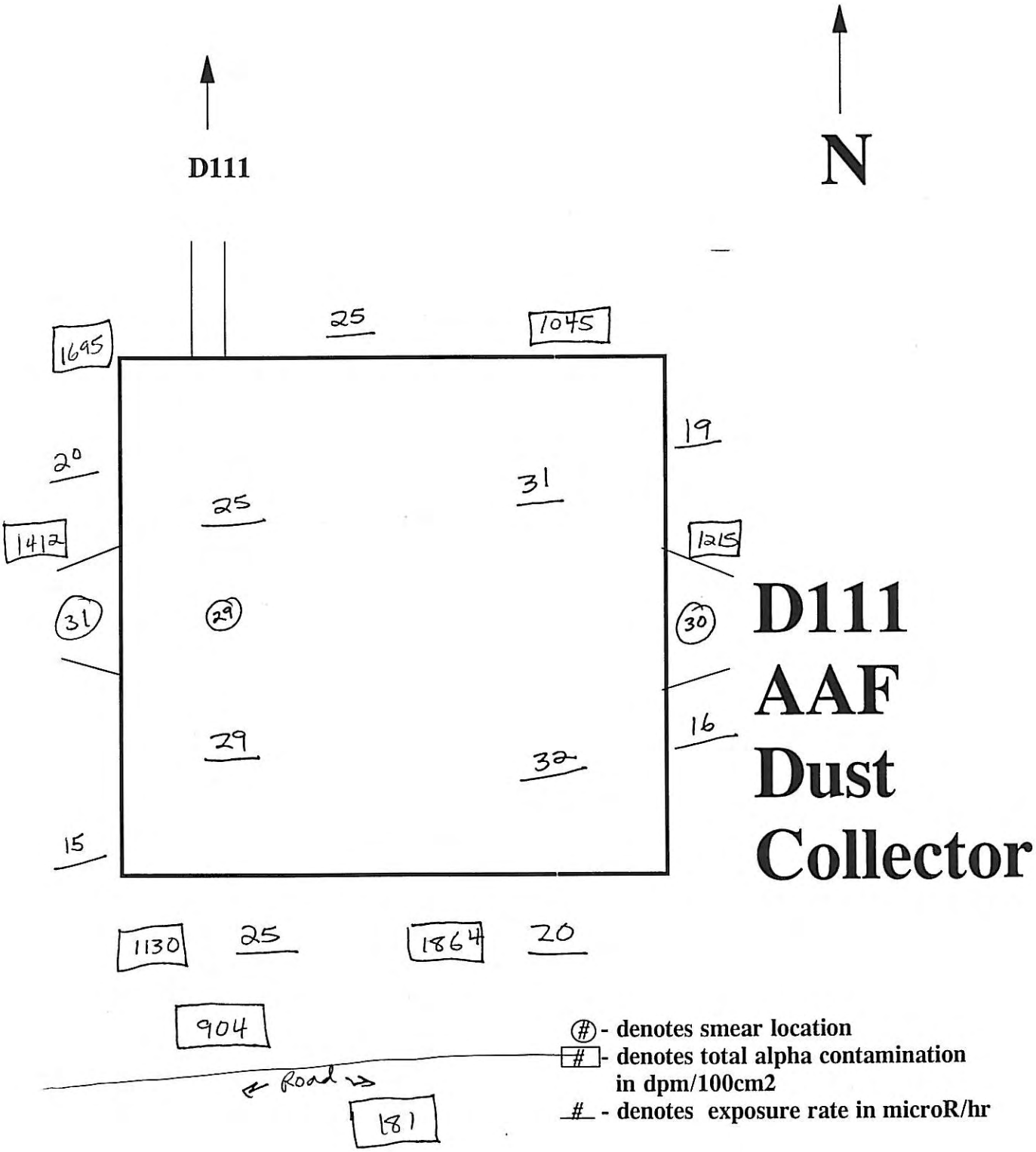
Department 102

(#) - denotes smear location

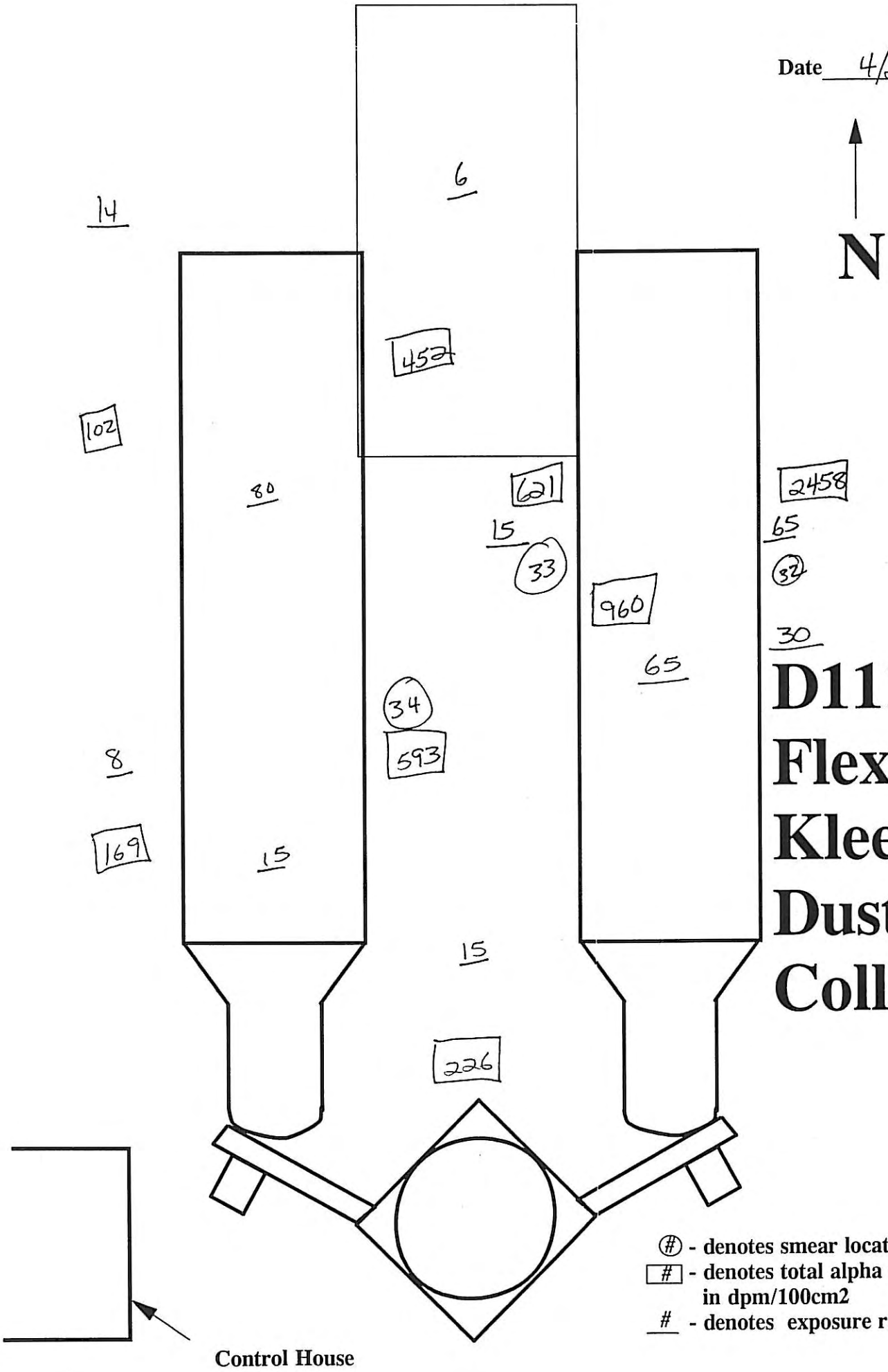
[#] - denotes total alpha contamination in dpm/100cm2

- denotes exposure rate in microR/hr

Date 4/29/97
1415



Date 4/29/97
1430

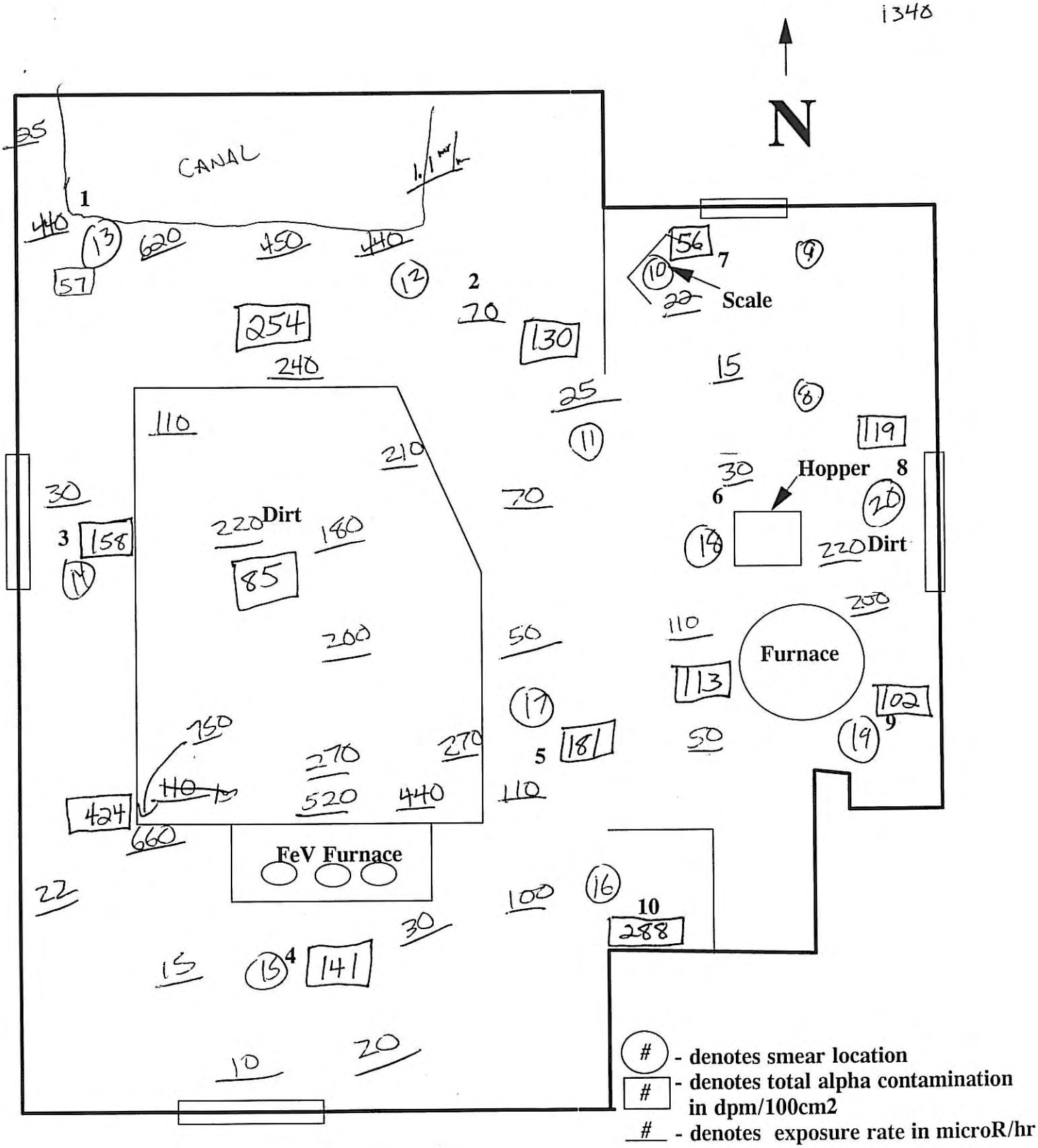


D111 Flex-Kleen Dust Collector

(#) - denotes smear location
[#] - denotes total alpha contamination in dpm/100cm2
- denotes exposure rate in microR/hr

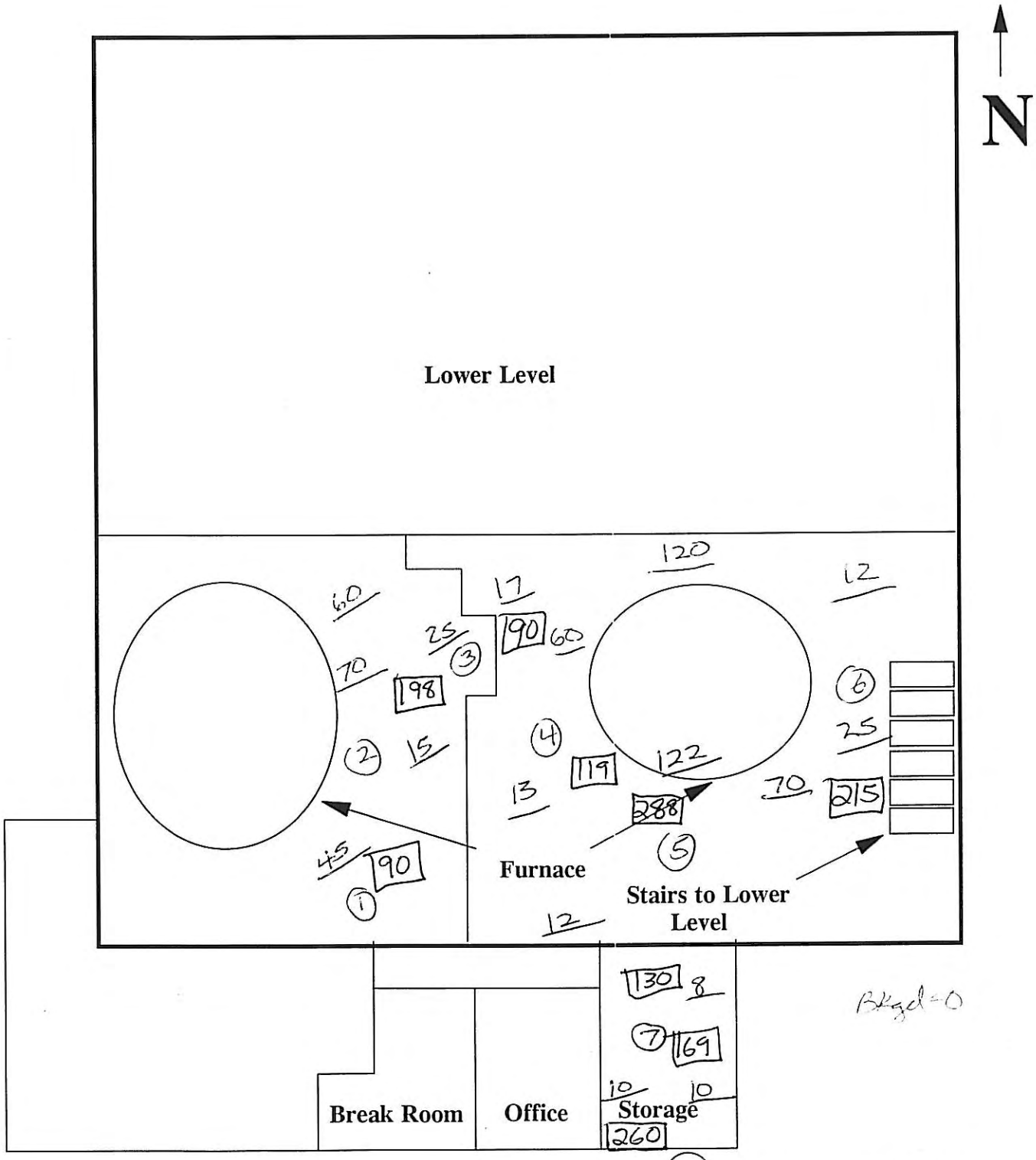
Date 4/29/97

1340



D111 - Lower Level

Date 4/29/97



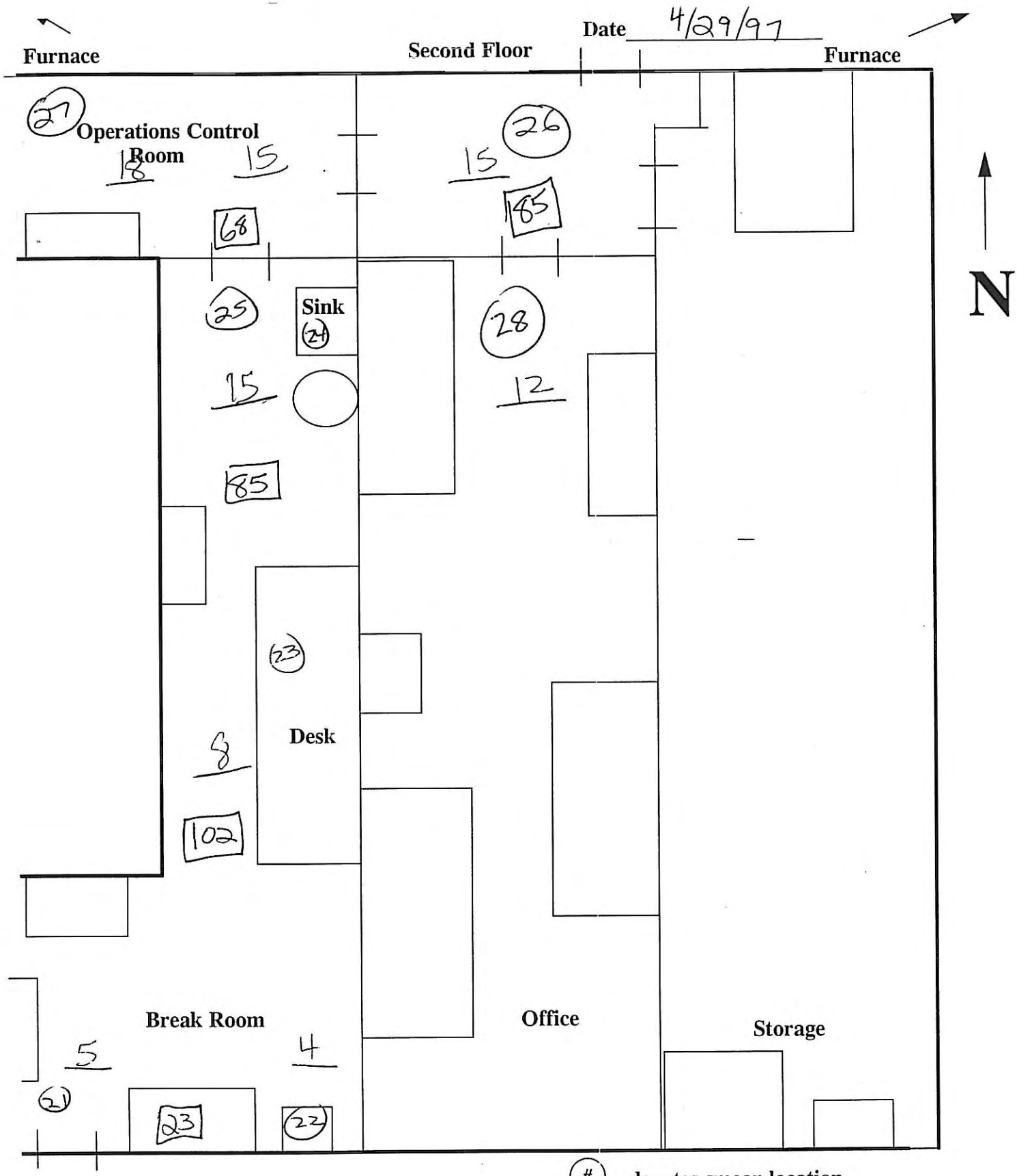
Bkgd = 0

(#) - denotes smear location

[#] - denotes total alpha contamination in dpm/100cm2

_#_ - denotes exposure rate in microR/hr

D111 - Upper Level



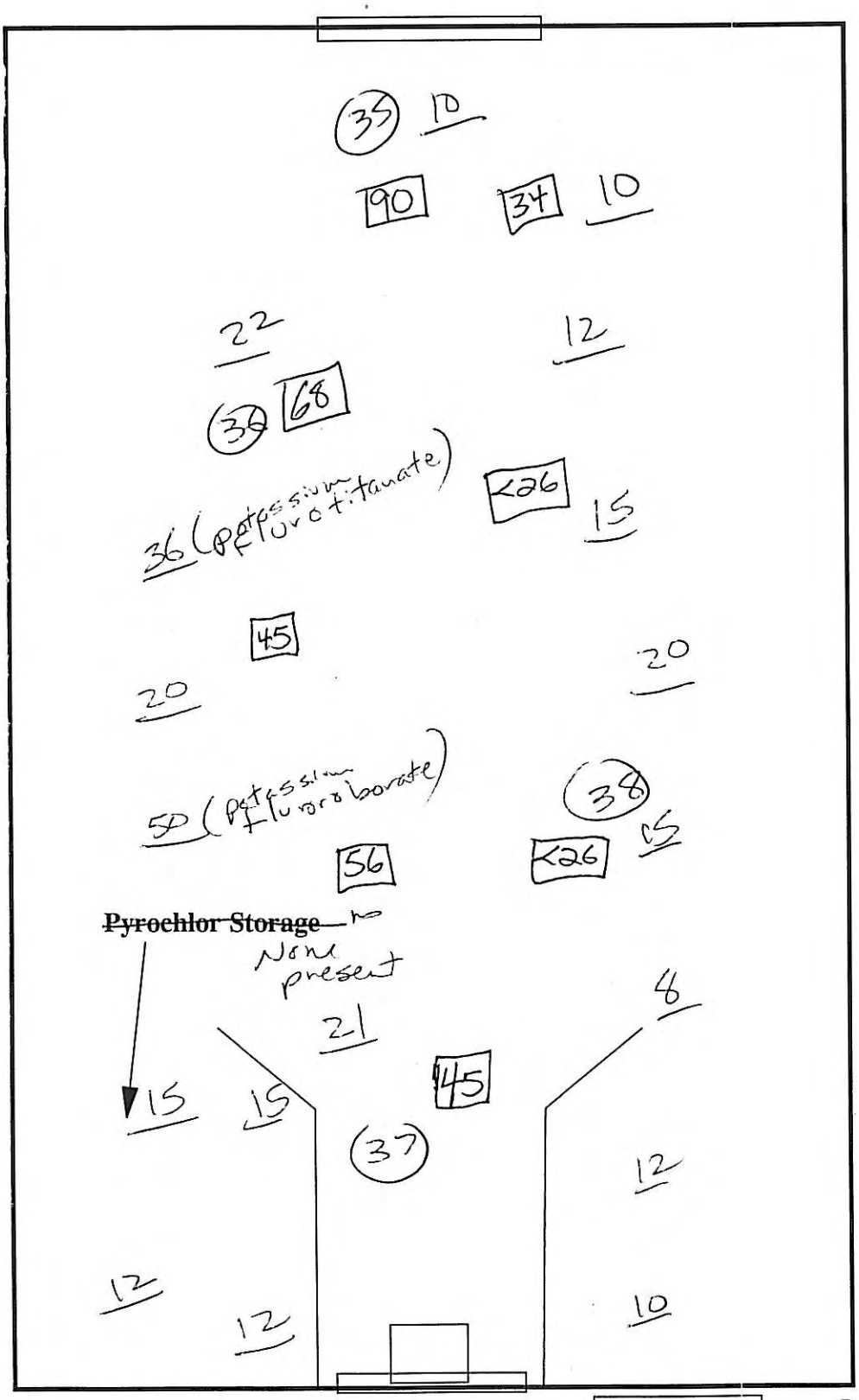
(#) - denotes smear location

[#] - denotes total alpha contamination in dpm/100cm2

_#_ - denotes exposure rate in microR/hr

D111 - Office and Break Room

Date 4/29/97
1440



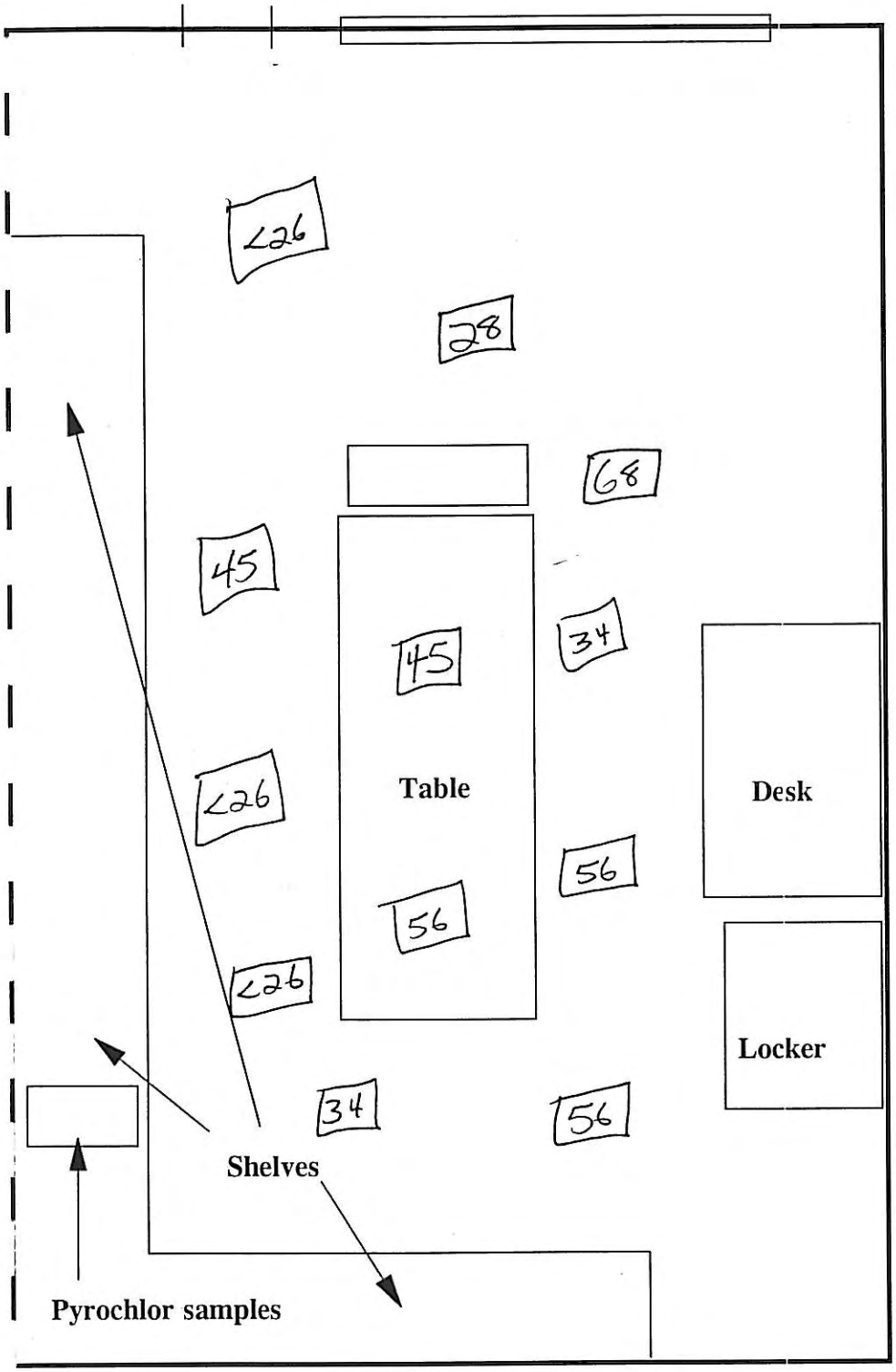
N

"G" Warehouse

Trailer

(#) - denotes smear location
[#] - denotes total alpha contamination in dpm/100cm2
_#_ - denotes exposure rate in microR/hr

Date 4/29/97



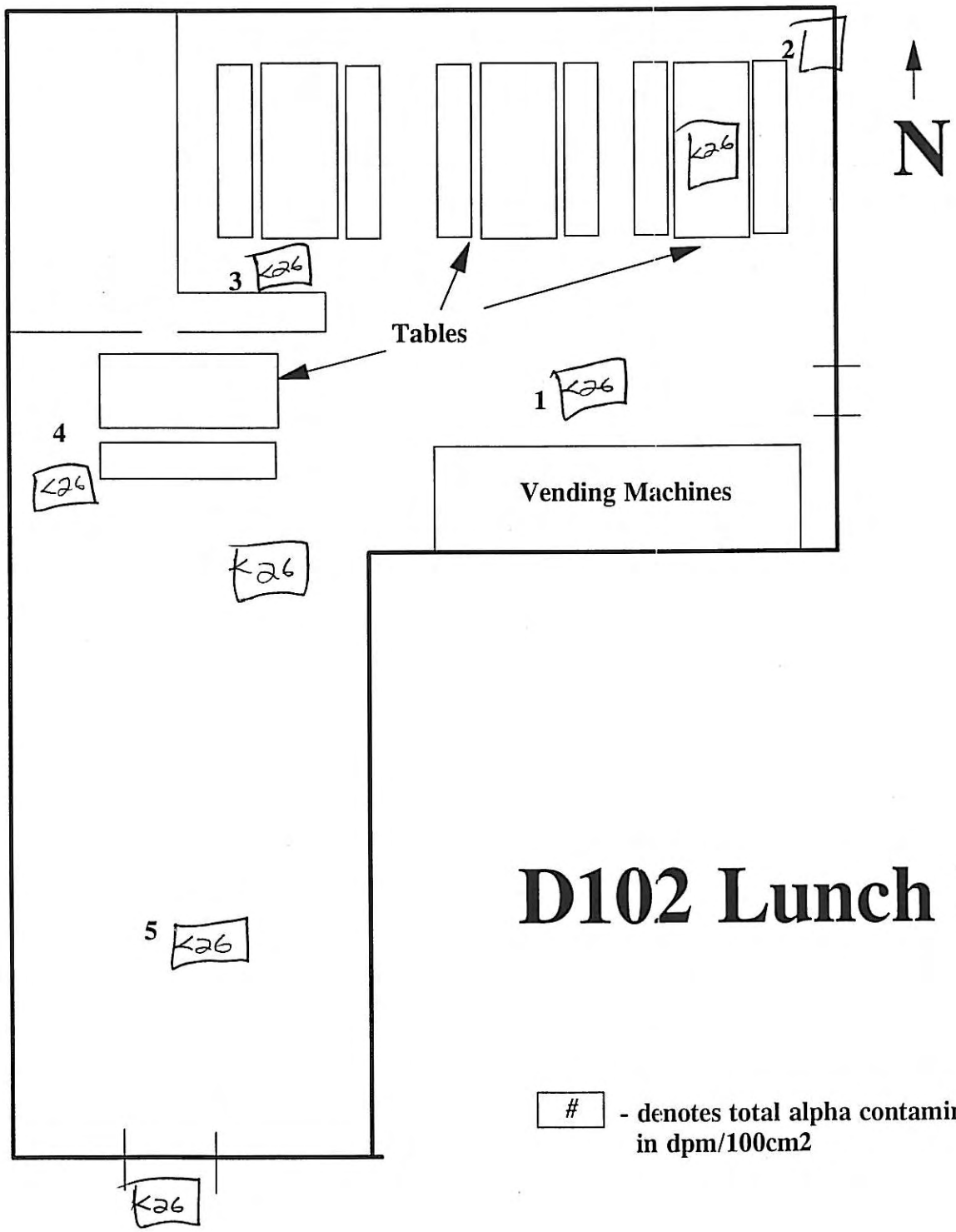
N

D117
The Cave

Bkgd=0 cpm

[#] - denotes total alpha contamination in dpm/100cm2

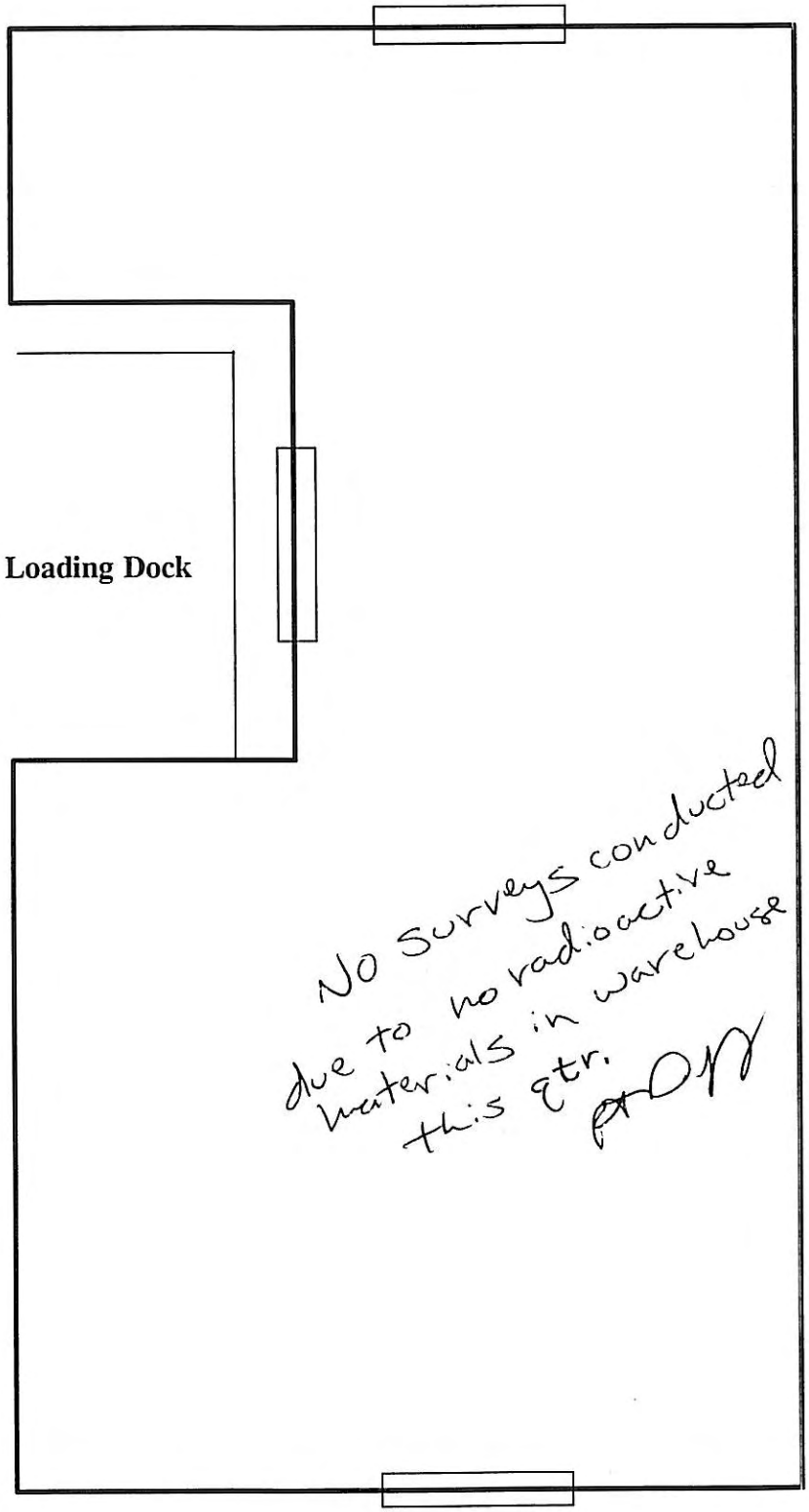
Date 4/29/97



D102 Lunch Room

[#] - denotes total alpha contamination in dpm/100cm2

Date 4/29/97

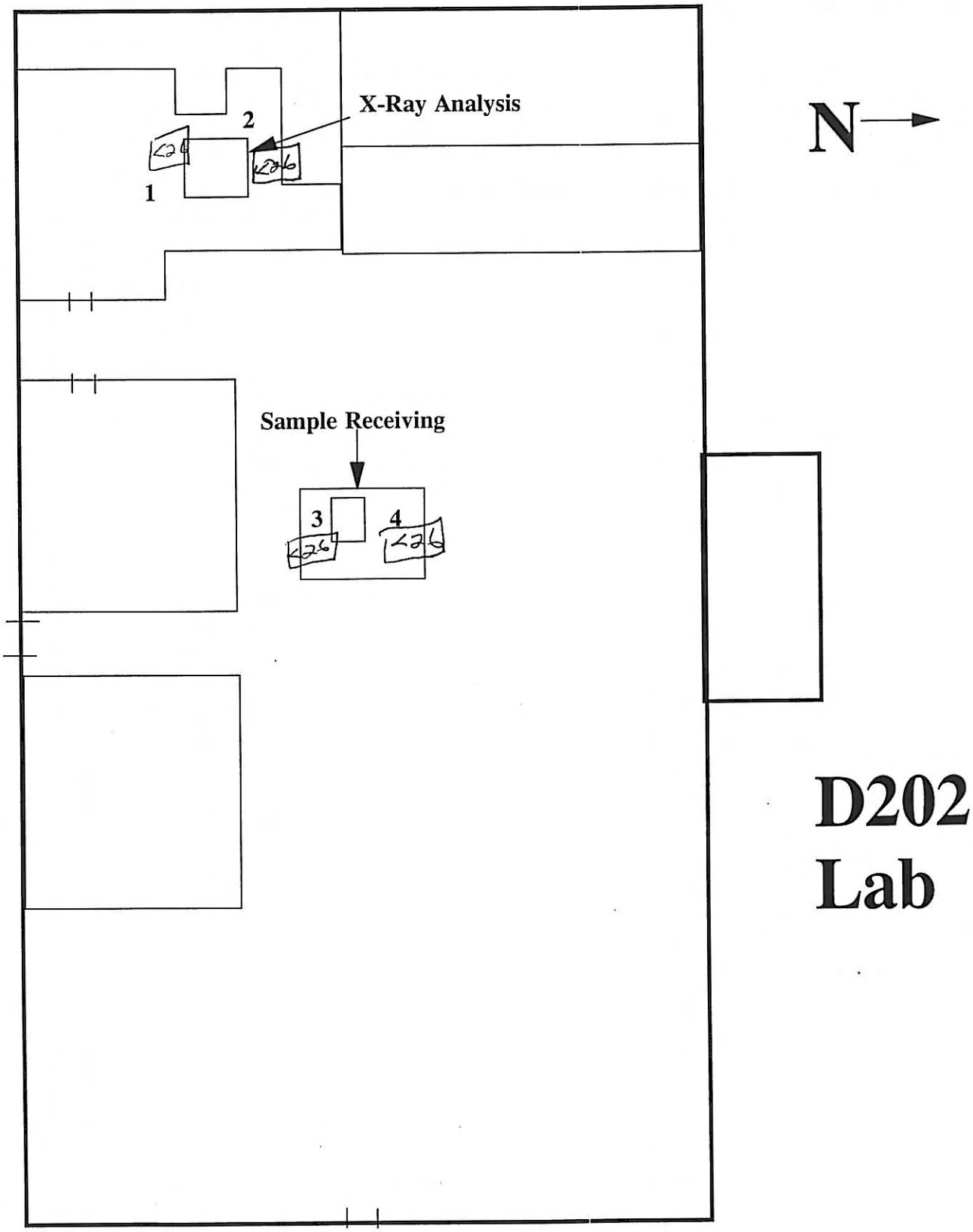


N →

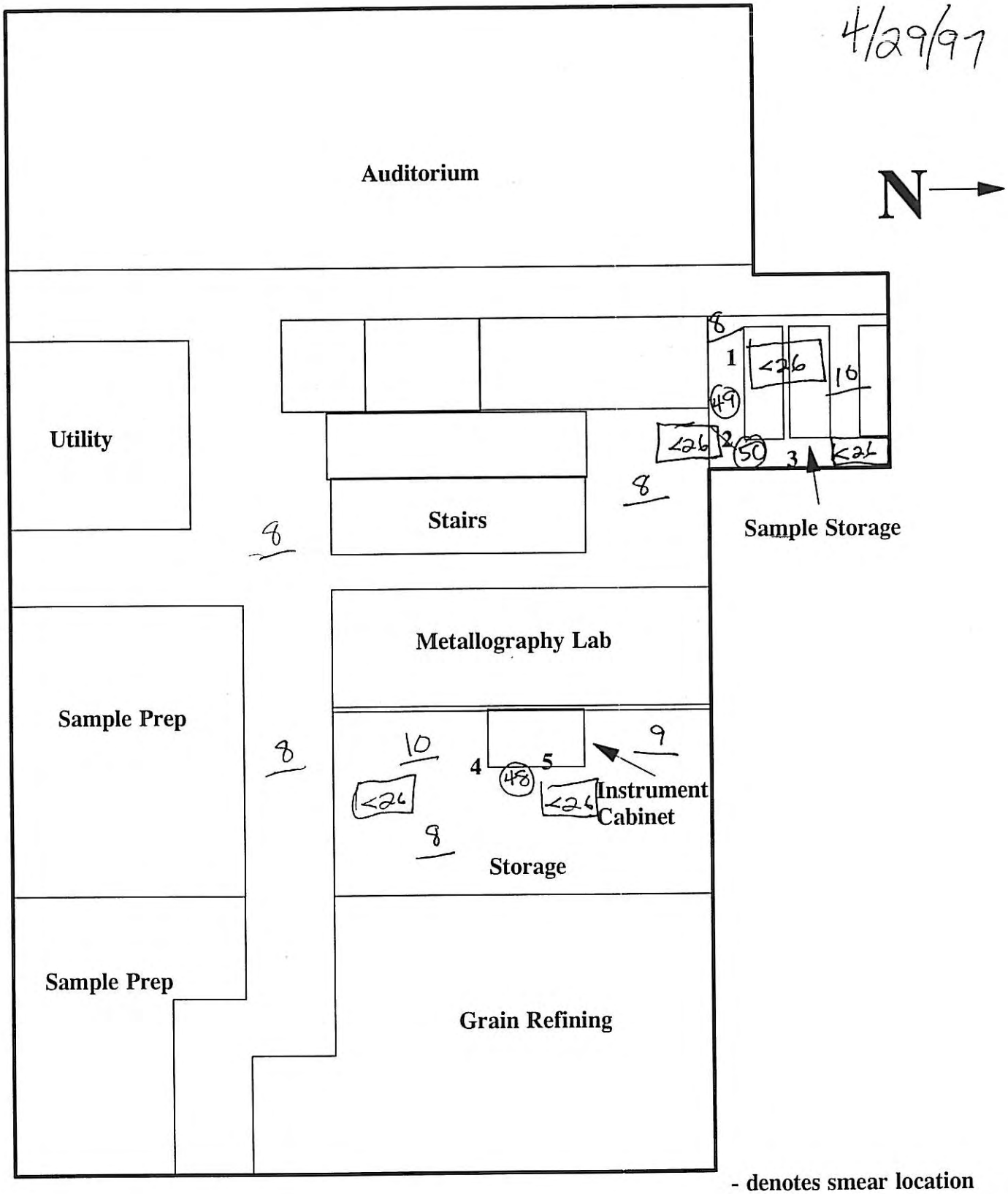
"D" Warehouse

Surveys to be conducted as needed based on whether radioactive materials have been handled in the area

4/29/97



4/29/97



- denotes smear location
- deontes total alpha contamination in dpm/100cm2
- denotes exposure rate in microR/hr

D202 Lab - Lower Level

Appendix D - External Personnel Monitoring Records

PERSONNEL TLD FIELD LOG
Shieldalloy Metallurgical Corporation
Newfield, NJ

Badge Number	Location	Start Date	Start Time	End Date	End Time	Remarks
01	D111	3/10/97	15:37	4/28/97	1000	Carl Durham
02				4/28/97	1000	Jose Medina
03				4/28/97	1000	Joseph Moore
04				4/28/97	1000	Jimmy Ellis
05				4/28/97	1000	Rafael Gomez
06				4/28/97	1000	Schooley
07				4/28/97	1000	Donald Foreman
08						Steve Demilak
09						Eddie Jordan
10						Rob. Dagvenge
11						F. Rodriguez
12						(spare)
13						(spare)
14	D 202	3/10/97	15:14	4/28/97	1100	Finger Ring Rich Davis
15						Finger Ring (spare)
16						Finger Ring Rich Davis (#2)
17						Finger Ring George P (#4)
18						Finger Ring (~~spare~~) Glenn Lucas (#6)
						Jack Bryant (#3)

145 Spares

0000 Control

SHIELDALLOY METALLURGI
CORPORATION
PO BOX 768, 12 WEST BLV
ATTN MR SCOTT EYES
NEWFIELD NJ 08344

ACCOUNT NO.	SERIES CODE
149270	

PROCESS NO.	REPORT DATE	DOSIMETER RECEIVED	REPORT TIME IN WORK DAYS	PAGE NO.
EQ413	5/15/97	5/05/97	8	2

QUALITY CONTROL RELEASE
CJD

** LAST PAGE **

LANDAUER®

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586
Telephone: (708)755-7000 Facsimile: (708)755-7016

Accredited by the National Institute of Standards and Technology through NVLAP*

RADIATION DOSIMETRY REPORT

NAME	PARTICIPANT NUMBER	TYPE OF RECORD	DOSIMETER TYPE OR SOURCE	NOTES	RADIATION QUALITY	DOSE EQUIVALENT (MREM) FOR PERIODS SHOWN BELOW: DEEP DDE	EYE LDE	SHALLOW SDE	ACCUMULATED DOSE EQUIVALENT (MREM): DEEP DDE	EYE LDE	SHALLOW SDE	ACCUMULATED DOSE EQUIVALENT (MREM): DEEP DDE	EYE LDE	SHALLOW SDE	INCEPTION DATE MO/YR	LAST AMENDMENT	RECORDS FOR YEAR	ID NUMBER	SEX	BIRTH DATE MO/DA/YR
FOR MONITORING PERIOD						04/01/97 - 06/30/97				QTR 2			1997							
															4/96		2			
CONTROL		CONTROL	K			M	M	N							4/96					
CONTROL		CONTROL	U					N												
DURHAM CARL	00001	WHL BODY	K			M	M	N	M	M	M	M	M	M	4/96		2			
MEDINA JOSE	00002	WHL BODY	K			M	M	N	N	M	M	M	M	M						
MOORE JOSEPH	00003	WHL BODY	K			M	M	N	M	M	M	M	M	M	4/96		2			
ELLIS JIMMY	00004	WHL BODY	K			M	M	N	N	M	M	M	M	M						
GOMEZ RAFAEL	00005	WHL BODY	K			M	M	N	M	M	M	M	M	M	4/96		2			
SCHOOLEY FRANCIS	00006	WHL BODY	K			M	M	N	N	M	M	M	M	M						
FOREMAN DONALD	00007	WHL BODY	K			M	M	N	M	M	M	M	M	M	4/96		2			
DANILAK STEVE	00008	WHL BODY	K			M	M	N	N	M	M	M	M	M						
JORDAN EDDIE	00009	WHL BODY	K			M	M	N	M	M	M	10	10	10	4/96		2			
DEGRANGE ROBERT	00010	WHL BODY	K			M	M	N	N	M	M	M	M	M						
RODRIGUEZ F	00011	WHL BODY	K			M	M	N	M	M	M	M	M	M	4/96		2			
SPARE	00012	WHL BODY	K			N	M	N	N	M	M	M	M	M						
SPARE	00013	WHL BODY	K			M	M	N	M	M	M	M	M	30	4/96		2			
	00014	R FINGER	U					N												
	00015	R FINGER	U					N							4/96		2			
	00016	R FINGER	U					N												
	00017	R FINGER	U					N							4/96		2			
SPARE	00018	R FINGER	U					N												

Appendix E - Bioassay Records

OUTREACH LABORATORY

ANALYTICAL REPORT

Project No.:	970417
Client:	I.E.M.
Date Submitted:	29-May-97
Date Reported:	9-Jun-97
IEM Project#:	94005.05

Sample ID	Date	Total Volume (l)	Matrix	Method	MDA pCi/sample	U-238 pCi/sample
R Hunter	5/3/97	1.6	urine	ASTM 5174M	0.1	BDL
R Gomez	4/12/97	2.35	urine	ASTM 5174M	0.1	BDL
JR Hunter	4/26/97	1.2	urine	ASTM 5174M	0.1	BDL
E Jordan	5/9/97	2.5	urine	ASTM 5174M	0.1	BDL

MDL - Minimum Detection Limit
BDL - Below Detection Limit

LABORATORY APPROVALS:

Rounal R. Eidson, Laboratory Director

QUALITY CONTROL

	RESULT	% REC	RPD
METHOD BLANK	BDL		
LABORATORY CONTROL STANDARD (LCS)	20.1	101%	
MATRIX SPIKE (MS)	10.9	109%	
MATRIX SPIKE DUPLICATE (MSD)	10.6	106%	2.8%

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SHIELDALLOY METALLURGICAL CORPORATION
P.O. BOX 768, 12 WEST BOULEVARD
NEWFIELD, N.J. 08344 (609)692-4200

ANALYSES

Project No. IEM 94005.01

Purchase Order N/A

Sampler: (Print Name) Russell Hunter

Chain of Custody Tape No. N/A

Sample No./ Identification	Collection Date	Collection Time	Preserv.	Lab Sample Number	Sample Matrix (Liquid, Sludge, etc.)							Number of Containers/ REMARKS
R. Hunter	5/3/97		None		Urine							

Relinquished by: *(Signature)*	Date	Time	Received by: *(Signature)*	Date	Time
1. Russell Hunter	5-6-97	710 pm	Doug Kwon	5-6-97	0706
2. Doug Kwon	5-28-97	13:49	J. P. Valenti	5/28/97	1349
3. J. P. Valenti	5/28/97	1500		5/29/97	1100
4.					
5.					

Sample Disposal Method	Disposed of by: *(Signature)*	Date	Time

SAMPLE COLLECTOR/WITNESS *(Signature)*

ANALYTICAL LABOARATORY AND CONTACT
OUTREACH / R. ELDSON

Page 1 of 1

№ 001991

970417-1

SHIELDALLOY METALLURGICAL CORPORATION

P.O. BOX 768, 12 WEST BOULEVARD
NEWFIELD, N.J. 08344 (609)692-4200

ANALYSES

Project No. 94005.01

Purchase Order

Sampler: (Print Name) RAFAEL GOMEZ

Chain of Custody Tape No.

Sample No./ Identification	Collection Date	Collection Time	Preserv.	Lab Sample Number	Sample Matrix (Liquid, Sludge, etc.)							Number of Containers/ REMARKS
GOMEZ	4/12				URINE							

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1. R.E. Gomez	4-18-97	13:35	Doug Kuon	4-18-97	13:35
2. Doug Kuon	5-28-97	13:49	J. Nolenti	5/28/97	13:49
3. J. Nolenti	5/28/97	1500	[illegible]	5/20/97	1100
4.					
5.					

Sample Disposal Method

Disposed of by: (Signature) | Date | Time

SAMPLE COLLECTOR/WITNESS (Signature)

ANALYTICAL LABOARATORY AND CONTACT
OUTREACH / R. EIDSON

Page 1 of 1

№ 001927

970417-2

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SHIELDALLOY METALLURGICAL CORPORATION
P.O. BOX 768, 12 WEST BOULEVARD
NEWFIELD, N.J. 08344 (609)692-4200

ANALYSES

Project No. 94005.01

Purchase Order

Sampler: (Print Name) J. RUSSELL HUNTER

Chain of Custody Tape No.

Sample No./ Identification	Collection Date	Collection Time	Preserv.	Lab Sample Number	Sample Matrix (Liquid, Sludge, etc.)							Number of Containers/ REMARKS
HUNTER	4/26				URINE							DO NOT ANALYZE UNTIL RESULTS FROM 5/3/97 SAMPLE ARE REPORTED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1. J. Russell Hunter	4/29/97	06:25	Doug Knorr	4-29-97	06:25
2. Doug Knorr	5-28-97	13:49	J. P. Valenti	5/28/97	1349
3. J. P. Valenti	5/28/97	1500	[illegible]	5/29/97	1100
4.					
5.					

Sample Disposal Method

Disposed of by: (Signature) | Date | Time

SAMPLE COLLECTOR/WITNESS (Signature)

ANALYTICAL LABOARATORY AND CONTACT
OUTREACH / R. EIXON

Page 1 of 1

№ 001925

970417-3

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SHIELDALLOY METALLURGICAL CORPORATION
P.O. BOX 768, 12 WEST BOULEVARD
NEWFIELD, N.J. 08344 (609)692-4200

ANALYSES

Project No. 94005.01

Purchase Order N/A

Sampler: (Print Name) Eddie L. Jordan, Sr.

Chain of Custody Tape No. N/A

Sample No./ Identification	Collection Date	Collection Time	Preserv.	Lab Sample Number	Sample Matrix (Liquid, Sludge, etc.)							Number of Containers/ REMARKS
E. Jordan	5/9/97		None		Urine							

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1. Eddie L. Jordan Sr.	5/13/97	16:15	[illegible]	5/13/97	16:15
2. Doug Kwon	5-28-97	13:49	[illegible]	5/28/97	13:49
3. [illegible]	5/28/97	1500	[illegible]	5/29/97	1100
4.					
5.					

Sample Disposal Method	Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR/WITNESS (Signature)

ANALYTICAL LABORATORY AND CONTACT
ONTREACH / R. ELDJAN

Page 1 of 1

№ 001987

970417-4

INSTRUCTIONS FOR COLLECTING A URINE SAMPLE

Name: Russell Hunter

Signature: Russell Hunter

Social Security No.: 171-58-2700

You have been given a urine sample collection kit for your use as a participant in a bioassay monitoring program. ***Do not transfer this kit to any other individual.*** This kit contains an orange plastic bottle, a white bottle cap, a Chain of Custody Form, a sample label, and a Custody Seal. The following are the instructions for use of this kit:

1. Wash your hands carefully prior to voiding. Use the disposable collection container when you void. Select the date you wish to begin your collection. (It is frequently more convenient to begin the collection on a Saturday.)

2. On the morning of your first collection date(e.g., Saturday morning), collect your first void of the day (immediately upon arising) in the orange container. Write your collection date and time here:

5-3-97 — Date (month/day/year)

6:30 — Time (a.m.)

3. On the evening of your first collection date (e.g., Saturday evening), collect your last void of the day (immediately before going to bed) in the orange container. Write your collection date and time here:

5-3-97 — Date (month/day/year)

10:40 — Time (p.m.)

4. On the morning of your second collection date (e.g., Sunday morning), collect your first void of the day in the orange container. Write your collection date and time here:

5-4-97 — Date (month/day/year)

8:00 — Time (a.m.)

5. On the evening of your second collection date (e.g., Sunday evening), collect your last void of the day in the orange container. Write your collection date and time here:

5-4-97 — Date (month/day/year)

9:45 — Time (p.m.)

6. On the morning of your third collection date (e.g., Monday morning), collect your first void of the day in the orange container. Write your collection date and time here:

5-5-97 — Date (month/day/year)

5:15 — Time (a.m.)

7. On the evening of your third collection date (e.g., Monday evening), collect your last void of the day in the orange container. Write your collection date and time here:

5-5-97 _____ 9 PM _____

Date (month/day/year) Time (p.m.)

8 On the day after your third collection date (e.g., Tuesday morning), confirm that the sample container is tightly sealed. Complete the "Custody Seal" as follows and affix it over both the lid and the container:

Person Collecting Sample: Insert your signature.
Sample No: Print your name.
Date Collected: Insert the date recorded in Item 2, above.
Time Collected: Leave Blank

9. Complete the sample label as follows and affix it to the plastic bottle:

SAMPLE ID: Insert your name
DATE COLLECTED: Insert the date recorded in Item 2, above.
TIME COLLECTED: Leave Blank
COMPANY: Insert "IEM"
PROJECT No: Insert "94005.01"
TEST REQUIRED: Leave Blank
COMMENTS: Leave Blank

10. Keep the sample in a cool location until you are ready to return to work. At that time, be sure to bring the collection bottle, this sheet, and the chain of custody form with you.

11. Immediately upon your arrival at the Newfield plant, drop the collection bottle, this sheet, and the chain of custody form off at the Guard Office. *Be sure to "relinquish custody" of the sample by signing the chain of custody form in the presence of the Guard. At that time, the Guard will "accept custody" of the sample by also signing the chain of custody form.*

12. If you have any questions or if there are items missing from your kit, please contact the Shieldalloy Radiation Safety Officer, Mr. Scott Eves.

PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!

INSTRUCTIONS FOR COLLECTING A URINE SAMPLE

Name: Russell Hunter

Signature: Russell Hunter

Social Security No.: 171-38-2700

You have been given a urine sample collection kit for your use as a participant in a bioassay monitoring program. ***Do not transfer this kit to any other individual.*** This kit contains an orange plastic bottle, a white bottle cap, a Chain of Custody Form, a sample label, and a Custody Seal. The following are the instructions for use of this kit:

1. Wash your hands carefully prior to voiding. Use the disposable collection container when you void. Select the date you wish to begin your collection. (It is frequently more convenient to begin the collection on a Saturday.)

2. On the morning of your first collection date(e.g., Saturday morning), collect your first void of the day (immediately upon arising) in the orange container. Write your collection date and time here:

5-3-97 — Date (month/day/year)

6:30 — Time (a.m.)

3. On the evening of your first collection date (e.g., Saturday evening), collect your last void of the day (immediately before going to bed) in the orange container. Write your collection date and time here:

5-3-97 — Date (month/day/year)

10:40 — Time (p.m.)

4. On the morning of your second collection date (e.g., Sunday morning), collect your first void of the day in the orange container. Write your collection date and time here:

5-4-97 — Date (month/day/year)

8:00 — Time (a.m.)

5. On the evening of your second collection date (e.g., Sunday evening), collect your last void of the day in the orange container. Write your collection date and time here:

5-4-97 — Date (month/day/year)

9:45 — Time (p.m.)

6. On the morning of your third collection date (e.g., Monday morning), collect your first void of the day in the orange container. Write your collection date and time here:

5-5-97 — Date (month/day/year)

5:15 — Time (a.m.)

7. On the evening of your third collection date (e.g., Monday evening), collect your last void of the day in the orange container. Write your collection date and time here:

5-5-97 _____ Date (month/day/year)

9 50 _____ Time (p.m.)

8. On the day after your third collection date (e.g., Tuesday morning), confirm that the sample container is tightly sealed. Complete the "Custody Seal" as follows and affix it over both the lid and the container:

Person Collecting Sample: Insert your signature.
Sample No: Print your name.
Date Collected: Insert the date recorded in Item 2, above.
Time Collected: Leave Blank

9. Complete the sample label as follows and affix it to the plastic bottle:

SAMPLE ID: Insert your name
DATE COLLECTED: Insert the date recorded in Item 2, above.
TIME COLLECTED: Leave Blank
COMPANY: Insert "IEM"
PROJECT No: Insert "94005.01"
TEST REQUIRED: Leave Blank
COMMENTS: Leave Blank

10. Keep the sample in a cool location until you are ready to return to work. At that time, be sure to bring the collection bottle, this sheet, and the chain of custody form with you.

11. Immediately upon your arrival at the Newfield plant, drop the collection bottle, this sheet, and the chain of custody form off at the Guard Office. *Be sure to "relinquish custody" of the sample by signing the chain of custody form in the presence of the Guard. At that time, the Guard will "accept custody" of the sample by also signing the chain of custody form.*

12. If you have any questions or if there are items missing from your kit, please contact the Shieldalloy Radiation Safety Officer, Mr. Scott Eves.

PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!

INSTRUCTIONS FOR COLLECTING A URINE SAMPLE

Name: Eddie L. Jordan, Sr.

Signature: Eddie L. Jordan Sr.

Social Security No.: 136-36-6141

You have been given a urine sample collection kit for your use as a participant in a bioassay monitoring program. ***Do not transfer this kit to any other individual.*** This kit contains an orange plastic bottle, a white bottle cap, a Chain of Custody Form, a sample label, and a Custody Seal. The following are the instructions for use of this kit:

1. Wash your hands carefully prior to voiding. Use the disposable collection container when you void. Select the date you wish to begin your collection. (It is frequently more convenient to begin the collection on a Saturday.)

2. On the morning of your first collection date(e.g., Saturday morning), collect your first void of the day (immediately upon arising) in the orange container. Write your collection date and time here:

Friday 5-9-97 — Date (month/day/year)

AM — Time (a.m.)

3. On the evening of your first collection date (e.g., Saturday evening), collect your last void of the day (immediately before going to bed) in the orange container. Write your collection date and time here:

Saturday 5-10-97 — Date (month/day/year)

PM — Time (p.m.)

4. On the morning of your second collection date (e.g., Sunday morning), collect your first void of the day in the orange container. Write your collection date and time here:

Sunday 5-11-97 — Date (month/day/year)

AM — Time (a.m.)

5. On the evening of your second collection date (e.g., Sunday evening), collect your last void of the day in the orange container. Write your collection date and time here:

Date (month/day/year) _____ Time (p.m.) _____

6. On the morning of your third collection date (e.g., Monday morning), collect your first void of the day in the orange container. Write your collection date and time here:

Date (month/day/year) _____ Time (a.m.) _____

7. On the evening of your third collection date (e.g., Monday evening), collect your last void of the day in the orange container. Write your collection date and time here:

_____ _____

Date (month/day/year) Time (p.m.)

8 On the day after your third collection date (e.g., Tuesday morning), confirm that the sample container is tightly sealed. Complete the "Custody Seal" as follows and affix it over both the lid and the container:

Person Collecting Sample: Insert your signature.
Sample No: Print your name.
Date Collected: Insert the date recorded in Item 2, above.
Time Collected: Leave Blank

9. Complete the sample label as follows and affix it to the plastic bottle:

SAMPLE ID: Insert your name
DATE COLLECTED: Insert the date recorded in Item 2, above.
TIME COLLECTED: Leave Blank
COMPANY: Insert "IEM"
PROJECT No: Insert "94005.01"
TEST REQUIRED: Leave Blank
COMMENTS: Leave Blank

10. Keep the sample in a cool location until you are ready to return to work. At that time, be sure to bring the collection bottle, this sheet, and the chain of custody form with you.

11. Immediately upon your arrival at the Newfield plant, drop the collection bottle, this sheet, and the chain of custody form off at the Guard Office. ***Be sure to "relinquish custody" of the sample by signing the chain of custody form in the presence of the Guard. At that time, the Guard will "accept custody" of the sample by also signing the chain of custody form.***

12. If you have any questions or if there are items missing from your kit, please contact the Shieldalloy Radiation Safety Officer, Mr. Scott Eves.

PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!

INSTRUCTIONS FOR COLLECTING A URINE SAMPLE

Name: RAFAEL E. Gomez

Signature: R. E. Gomez

Social Security No.: 513-50-4762

You have been given a urine sample collection kit for your use as a participant in a bioassay monitoring program. ***Do not transfer this kit to any other individual.*** This kit contains an orange plastic bottle, a white bottle cap, a Chain of Custody Form, a sample label, and a Custody Seal. The following are the instructions for use of this kit:

1. Wash your hands carefully prior to voiding. Use the disposable collection container when you void. Select the date you wish to begin your collection. (It is frequently more convenient to begin the collection on a Saturday.)

2. On the morning of your first collection date(e.g., Saturday morning), collect your first void of the day (immediately upon arising) in the orange container. Write your collection date and time here:

4/12/97 — Date (month/day/year)

6:00 AM — Time (a.m.)

3. On the evening of your first collection date (e.g., Saturday evening), collect your last void of the day (immediately before going to bed) in the orange container. Write your collection date and time here:

4/13/97 — Date (month/day/year)

11:00 Pm — Time (p.m.)

4. On the morning of your second collection date (e.g., Sunday morning), collect your first void of the day in the orange container. Write your collection date and time here:

4/13/97 — Date (month/day/year)

6:00 Am — Time (a.m.)

5. On the evening of your second collection date (e.g., Sunday evening), collect your last void of the day in the orange container. Write your collection date and time here:

4/13/97 — Date (month/day/year)

11:00 Pm — Time (p.m.)

6. On the morning of your third collection date (e.g., Monday morning), collect your first void of the day in the orange container. Write your collection date and time here:

4/14/97 _____ Date (month/day/year)

[illegible] Am _____ Time (a.m.)

7. On the evening of your third collection date (e.g., Monday evening), collect your last void of the day in the orange container. Write your collection date and time here:

4/14/97 _____ Date (month/day/year)

11:00 Pm _____ Time (p.m.)

8 On the day after your third collection date (e.g., Tuesday morning), confirm that the sample container is tightly sealed. Complete the "Custody Seal" as follows and affix it over both the lid and the container:

Person Collecting Sample: Insert your signature.
Sample No: Print your name.
Date Collected: Insert the date recorded in Item 2, above.
Time Collected: Leave Blank

9. Complete the sample label as follows and affix it to the plastic bottle:

SAMPLE ID: Insert your name
DATE COLLECTED: Insert the date recorded in Item 2, above.
TIME COLLECTED: Leave Blank
COMPANY: Insert "IEM"
PROJECT No: Insert "94005.01"
TEST REQUIRED: Leave Blank
COMMENTS: Leave Blank

10. Keep the sample in a cool location until you are ready to return to work. At that time, be sure to bring the collection bottle, this sheet, and the chain of custody form with you.

11. Immediately upon your arrival at the Newfield plant, drop the collection bottle, this sheet, and the chain of custody form off at the Guard Office. ***Be sure to "relinquish custody" of the sample by signing the chain of custody form in the presence of the Guard. At that time, the Guard will "accept custody" of the sample by also signing the chain of custody form.***

12. If you have any questions or if there are items missing from your kit, please contact the Shieldalloy Radiation Safety Officer, Mr. Scott Eves.

PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!

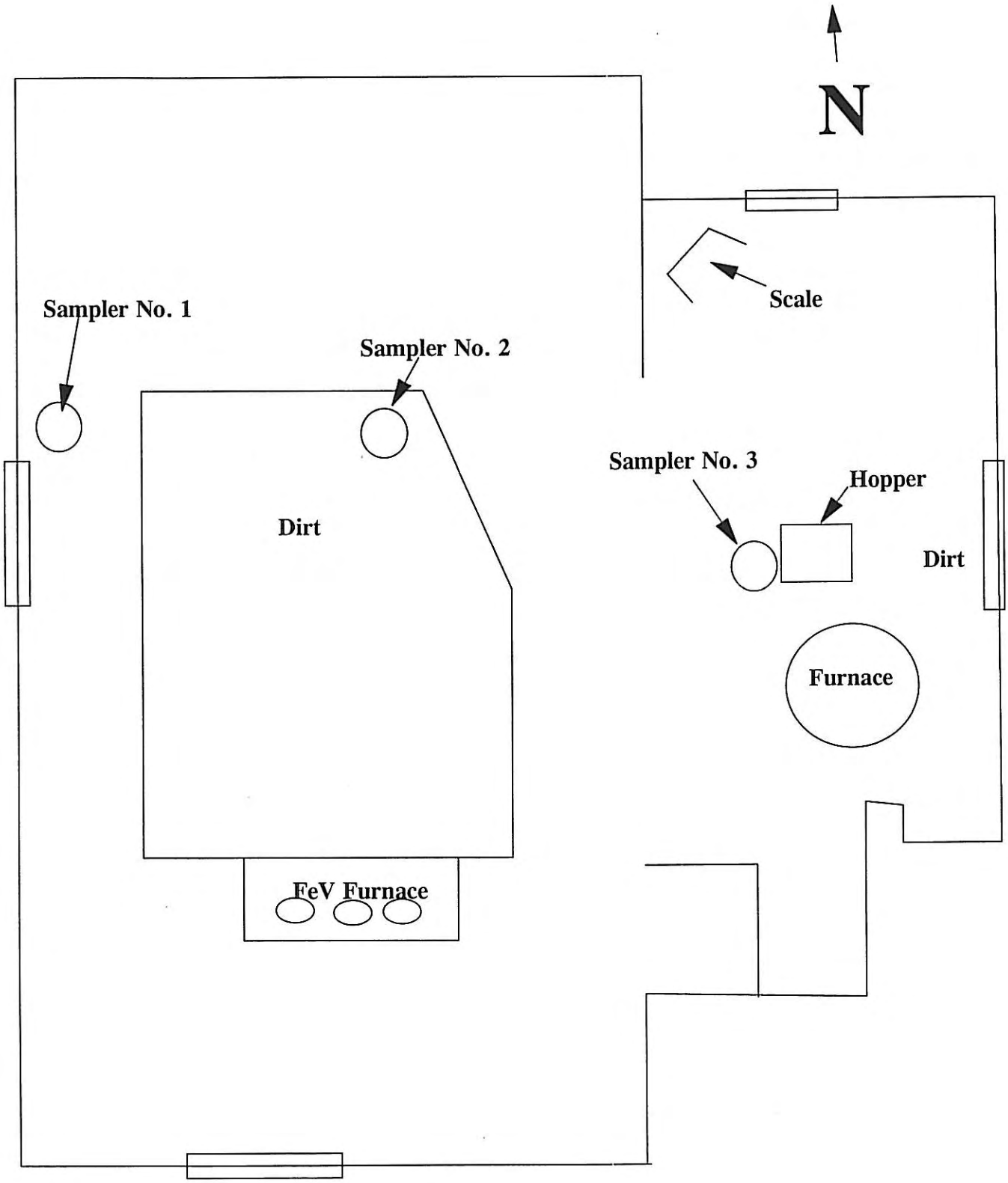
Appendix F - Air Monitoring Records

Results of Air Sample Analyses

Sample No.	Sample Date	Area/Person Monitored	Pump Type/No.	Sample Volume (ml)	Sample Activity (μCi/ml)
1	4/27/97	Bldg. D111, by West end of Bldg by overhead door	Eberline RAS-1/pump 1	18,850,000	<2.1E-12
2	4/27/97	Bldg. D111, south of CANAL storage	Eberline RAS-1/pump 2	15,300,000	<2.6E-12
3	4/27/97	Bldg. D111, East end of bldg by bagging hopper	Eberline RAS-1/pump 3	17,750,000	<2.3E-12
4	4/27/97	E. Jordan	Gilian BZA/8240	1,023,120	<3.9E-11
5	4/27/97	D. Foreman	Gilian BZA/8241	1,276,450	<3.2E-11
6	4/27/97	R. Gomez	Gilian BZA/8242	976,340	<4.2E-11
7	4/27/97	F. Schooley	Gilian BZA/8243	1,059,380	<3.8E-11
8	4/27/97	R. Hunter	Gilian BZA/8244	1,093,680	<3.7E-11
9	4/28/97	Bldg. D111, by West end of Bldg by overhead door	Eberline RAS-1/pump 1	27,332,500	<1.5E-12
10	4/28/97	Bldg. D111, south of CANAL storage	Eberline RAS-1/pump 2	24,070,000	<1.7E-12
11	4/28/97	Bldg. D111, East end of bldg by bagging hopper	Eberline RAS-1/pump 3	25,737,500	<1.6E-12
12	4/28/97	R. Hunter	Gilian BZA/8240	1,389,180	<2.9E-11
13	4/28/97	E. Jordan	Gilian BZA/8241	1,735,105	<2.30E-11
14	4/28/97	D. Foreman	Gilian BZA/8242	1,347,395	<3.0E-11
15	4/28/97	F. Schooley	Gilian BZA/8243	1,426,170	<2.8E-11
16	4/28/97	R. Gomez	Gilian BZA/8244	1,482,340	<2.7E-11
17	4/29/97	Bldg. D111, by West end of Bldg by overhead door	Eberline RAS-1/pump 1	33,027,000	<1.2E-12
18	4/29/97	Bldg. D111, south of CANAL storage	Eberline RAS-1/pump 2	31,108,000	<1.3E-12
19	4/29/97	Bldg. D111, East end of bldg by bagging hopper	Eberline RAS-1/pump 3	33,229,000	<1.2E-12
20	4/29/97	R. Hunter	Gilian BZA/8240	1,408,290	<2.9E-11
21	4/29/97	E. Jordan	Gilian BZA/8241	1,764,330	<2.3E-11

22	4/29/97	D. Foreman	Gilian BZA/8242	1,359,990	<3.0E-11
23	4/29/97	F. Schooley	Gilian BZA/8243	1,437,960	<2.8E-11
24	4/29/97	R. Gomez	Gilian BZA/8244	1,501,440	<2.7E-11
25	4/30/97	Bldg. D111, by West end of Bldg by overhead door	Eberline RAS-1/pump 1	23,053,500	<1.8E-12
26	4/29/97	Bldg. D111, south of CANAL storage	Eberline RAS-1/pump 2	21,714,000	<1.9E-12
27	4/29/97	Bldg. D111, East end of bldg by bagging hopper	Eberline RAS-1/pump 3	23,194,500	<1.7E-12
28	4/29/97	R. Hunter	Gilian BZA/8240	1,476,720	<2.7E-11
29	4/29/97	E. Jordan	Gilian BZA/8241	1,822,320	<2.2E-11
30	4/29/97	D. Foreman	Gilian BZA/8242	1,415,520	<2.9E-11
31	4/29/97	F. Schooley	Gilian BZA/8243	1,489,680	<2.7E-11
32	4/29/97	R. Gomez	Gilian BZA/8244	1,546,560	<2.6E-11
33	5/1/97	Bldg. D111, by West end of Bldg by overhead door	Eberline RAS-1/pump 1	25,056,000	<1.6E-12
34	5/1/97	Bldg. D111, south of CANAL storage	Eberline RAS-1/pump 2	23,094,000	<1.7E-12
35	5/1/97	Bldg. D111, East end of bldg by bagging hopper	Eberline RAS-1/pump 3	23,688,000	<1.7E-12
36	5/1/97	R. Hunter	Gilian BZA/8240	1,482,480	<2.7E-11
37	5/1/97	E. Jordan	Gilian BZA/8241	1,822,320	<2.2E-11
38	5/1/97	D. Foreman	Gilian BZA/8242	1,418,400	<2.8E-1
39	5/1/97	F. Schooley	Gilian BZA/8243	1,481,760	<2.7E-11
40	5/1/97	R. Gomez	Gilian BZA/8244	1,546,560	<2.6E-11

Date_____



D111 - Lower Level
Area Air Sampler Locations

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
RADIOLOGICAL SURVEY FORM

Survey Number SMC-051497 Date of Survey 5/14/97

Survey Description:	Survey Performed by:
Counting of air samples obtained during 2ND Qtr. surveillance	Signature: R.A. Duff
	Print Name: R.A. Duff
Drawing Attached ☐ Yes ☒ No	

Instrument (1)	Instrument (2)	Instrument (3)
Model: Ludlum Model 2929 w/43-10-1	Model:	Model:
Serial No.: 126126 / 132238	Serial No.:	Serial No.:
Calibration Due: 4/4/98	Calibration Due:	Calibration Due:
Efficiency: 31 %	Efficiency:	Efficiency:
MDA 18.2 dpm CF N/A BKG 0.4 cpm α	MDA CF BKG	MDA CF BKG

Survey Point	Smearable Contamination		Radiation Levels (including fixed contamination)	Instrument Used	Comments and Additional Information
	Beta/gamma (dpm/100 cm²)	Alpha (dpm/100 cm²)	Ambient (microrem/hour)		
			MDA =	$\frac{2.71 + 4.65\sqrt{bkgd \times t}}{t \times eff.}$	
				$\frac{2.71 + 4.65\sqrt{0.4 \times 1}}{1 \times 0.31}$	
			=		
			=	18.2 dpm (5.7cpm)	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLE COUNT RECORD

Sample No.	Date/time of Sample	Date/Time of count	Inst. Model and Serial No.	Inst. Efficiency (c/d)	(1) Bkg counts	(2) Bkg count time (min)	(3) Bkg count rate (1/2) (cpm)	(4) Sample counts	(5) Sample count time (min)	(6) Sample count rate (4/5) (cpm)	(7) Net sample count rate (6-3) (cpm)	(8) Sample volume (ml)	(9)Airborne radioactivity ((7/eff x2.22E-6)/8)(uCi/ml)
1	4/27/97 2315	5/14/97-1200 1000	Ludlum Model 2929 #126126	0.31	24	60	0.4	0	1	0	0	18,850,000	$< 2.1 \times 10^{-12}$
2	2315							0		0	0	15,300,000	$< 2.6 \times 10^{-12}$
3	2315							0		0	0	17,750,000	$< 2.3 \times 10^{-12}$
4	2320							0		0	0	1,023,120	$< 3.9 \times 10^{-11}$
5								0		0	0	1,276,450	$< 3.2 \times 10^{-11}$
6								0		0	0	963,340	$< 4.2 \times 10^{-11}$
7								0		0	0	1,059,380	$< 3.8 \times 10^{-11}$
8								0		0	0	1,093,680	$< 3.7 \times 10^{-11}$
9	4/28/97 1955							1		1	1	27,332,500	$< 1.5 \times 10^{-12}$
10	1955							1		1	1	24,070,000	$< 1.7 \times 10^{-12}$
11	1955							0		0	0	25,737,500	$< 1.6 \times 10^{-12}$
12	2015							2		2	2	1,389,180	$< 2.9 \times 10^{-11}$
13								0		0	0	1,735,105	$< 2.3 \times 10^{-11}$
14								1		1	1	1,347,395	$< 3.0 \times 10^{-11}$
15								1		1	1	1,426,170	$< 2.8 \times 10^{-11}$
16								1		1	1	1,482,340	$< 2.7 \times 10^{-11}$
17	4/29/97 1540							1		1	1	33,027,000	$< 1.2 \times 10^{-12}$
18	1540							0		0	0	31,108,000	$< 1.3 \times 10^{-12}$
19	1540							0		0	0	33,229,000	$< 1.2 \times 10^{-12}$
20	2000							0		0	0	1,408,290	$< 2.9 \times 10^{-11}$

Printed Name: R.A. DuFF

Signature: [illegible]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLE COUNT RECORD

Sample No.	Date/time of Sample	Date/Time of count	Inst. Model and Serial No.	Inst. Efficiency (c/d)	(1) Bkg counts	(2) Bkg count time (min)	(3) Bkg count rate (1/2) (cpm)	(4) Sample counts	(5) Sample count time (min)	(6) Sample count rate (4/5) (cpm)	(7) Net sample count rate (6-3) (cpm)	(8) Sample volume (ml)	(9)Airborne radioactivity ((7/eff x2.22E-6)/8)(uCi/ml)
21	4/29/97 2000	5/14/97 1000 -1200	Ludlum Model 2929 #126126	0.31	24	60	0.4	1	1	1	1	1,764,330	$<2.3 \times 10^{-11}$
22								2		2	2	1,359,990	$<3.0 \times 10^{-11}$
23								2		2	2	1,437,960	$<2.8 \times 10^{-11}$
24								0		0	0	1,501,440	$<2.7 \times 10^{-11}$
25	4/30/97 1945							0		0	0	23,053,500	$<1.8 \times 10^{-12}$
26	1945							0		0	0	21,714,000	$<1.9 \times 10^{-12}$
27	1945							0		0	0	23,194,500	$<1.7 \times 10^{-12}$
28	1950							0		0	0	1,476,720	$<2.7 \times 10^{-11}$
29								0		0	0	1,822,320	$<2.2 \times 10^{-11}$
30								1		1	1	1,415,520	$<2.9 \times 10^{-11}$
31								1		1	1	1,489,680	$<2.7 \times 10^{-11}$
32								2		2	2	1,546,560	$<2.6 \times 10^{-11}$
33	5/1/97 1930							1		1	1	25,056,000	$<1.6 \times 10^{-12}$
34								3		3	3	23,904,000	$<1.7 \times 10^{-12}$
35								0		0	0	23,688,000	$<1.7 \times 10^{-12}$
36								0		0	0	1,482,480	$<2.7 \times 10^{-11}$
37								0		0	0	1,822,320	$<2.2 \times 10^{-11}$
38								1		1	1	1,418,400	$<2.8 \times 10^{-11}$
39								4		4	4	1,481,760	$<2.7 \times 10^{-11}$
40								1		1	1	1,546,560	$<2.6 \times 10^{-11}$

Printed Name: R.A. DUFF

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

SAMPLE #1

Date: 4/27/97

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #1	Calibration Due: 3/11/98	
Filter Type: F&J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2315	Flow Rate (lpm): 41.8
Sample End Date: 4/28/97	Time: 0735	Flow Rate (lpm) 33.6
Total Sample Time (T) in minutes: 500		
Average Flow Rate (F) in liters per minute: 37.7		
Sample Volume (V) = T 500 (min) x F 37.7 (lpm) x 1000 = 18,850,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, west end of bldg. by ~~roots~~ roll up door.
Type of Work Performed: N	
Work Permit No.: A	
General Area and Specific Work Location:	Type of Operation/Equipment in Area: Preps. for columbium heats.
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Gomez, Jordan, Hunter

Monitoring Conducted by: R.A. Duff

Signature: RA Duff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #2

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #2	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2315	Flow Rate (lpm): 33.2
Sample End Date: 4/28/97	Time: 0735	Flow Rate (lpm) 27.9
Total Sample Time (T) in minutes: 500		
Average Flow Rate (F) in liters per minute: 30.6		
Sample Volume (V) = T 500 (min) x F 30.6 (lpm) x 1000 = 15,300,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, middle of bldg., by CANAL Storage & Furnace.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Preps. for columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Gomez, Jordan, Hunter.
Monitoring Conducted by: R.A. DUFF	
Signature:	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #3

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #3	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47 (membrane)	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2315	Flow Rate (lpm): 37.4
Sample End Date: 4/28/97	Time: 0735	Flow Rate (lpm) 33.5
Total Sample Time (T) in minutes: 500		
Average Flow Rate (F) in liters per minute: 35.5		
Sample Volume (V) = T 500 (min) x F 35.5 (lpm) x 1000 = 17,750,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, East end of bldg., beside bag hopper.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Preps. for columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Hunter, Foreman, Jordan, Gomez.

Monitoring Conducted by: R.A. DUFF

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #4

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8240	Calibration Due: Daily	
Filter Type: F+J #CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2320	Flow Rate (lpm): 2.091
Sample End Date: 4/28/97	Time: 0730	Flow Rate (lpm) 2.085
Total Sample Time (T) in minutes: 490		
Average Flow Rate (F) in liters per minute: 2.088		
Sample Volume (V) = T 490 (min) x F 2.088 (lpm) x 1000 = 1,023,120 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Eddie Jordan	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R. A. DuFF	
Signature: RADuff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #5

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8241	Calibration Due: Daily	
Filter Type: F&J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2320	Flow Rate (lpm): 2.595
Sample End Date: 4/28/97	Time: 0730	Flow Rate (lpm) 2.614
Total Sample Time (T) in minutes: 490		
Average Flow Rate (F) in liters per minute: 2.605		
Sample Volume (V) = T 490 (min) x F 2.605 (lpm) x 1000 = 1,276,450 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Donald Foreman	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: N/A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RAD	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #6

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8242	Calibration Due: Daily	
Filter Type: F&J #CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2320	Flow Rate (lpm): 1.982
Sample End Date: 4/28/97	Time: 0730	Flow Rate (lpm) 1.950
Total Sample Time (T) in minutes: 490		
Average Flow Rate (F) in liters per minute: 1.966		
Sample Volume (V) = T 490 (min) x F 1.966 (lpm) x 1000 = 963,340 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Raphael Gomez	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #7

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8243	Calibration Due: Daily	
Filter Type: ~~FJ~~ #CPH-47 (membrane)	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2320	Flow Rate (lpm): 2.166
Sample End Date: 4/28/97	Time: 0730	Flow Rate (lpm) 2.158
Total Sample Time (T) in minutes: 490		
Average Flow Rate (F) in liters per minute: 2.162		
Sample Volume (V) = T 490 (min) x F 2.162 (lpm) x 1000 = 1,059,380 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Frank Schooley	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	N
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/27/97

SAMPLE #8

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8244	Calibration Due: Daily	
Filter Type: ~~FJ~~ #CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/27/97	Time: 2320	Flow Rate (lpm): 2.198
Sample End Date: 4/28/97	Time: 0730	Flow Rate (lpm) 2.265
Total Sample Time (T) in minutes: 490		
Average Flow Rate (F) in liters per minute: 2.232		
Sample Volume (V) = T 490 (min) x F 2.232 (lpm) x 1000 = 1,093,680 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Russ Hunter	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

N

A

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #9

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #1	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47 (membrane	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 1955	Flow Rate (lpm): 41.8
Sample End Date: 4/29/97	Time: 0800	Flow Rate (lpm) 33.6
Total Sample Time (T) in minutes: 725		
Average Flow Rate (F) in liters per minute: 37.7		
Sample Volume (V) = T 725 (min) x F 37.7 (lpm) x 1000 = 27,332,500 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, west end of bldg. by roll up door.
Type of Work Performed:	
Work Permit No.: N A	
General Area and Specific Work Location:	Type of Operation/Equipment in Area: Preps. for columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust masks	Names of Workers in Area: Schooley, Foreman, Gomez, Jordan, Hunter
Monitoring Conducted by: R.A. DUFF	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #10

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #2	Calibration Due: 3/11/98	
Filter Type: F&J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 1955	Flow Rate (lpm): 38.4
Sample End Date: 4/29/97	Time: 0800	Flow Rate (lpm) 27.9
Total Sample Time (T) in minutes: 725		
Average Flow Rate (F) in liters per minute: 33.2		
Sample Volume (V) = T 725 (min) x F 33.2 (lpm) x 1000 = 24,070,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, middle of bldg. by CANAL storage and Furnace.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Preps. for Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Gomez, Jordan, Hunter.

Monitoring Conducted by: R.A. Duff

Signature: RA Duff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #11

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #3	Calibration Due: 3/11/98	
Filter Type: F+J #CPH-47 (membrane)	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 1955	Flow Rate (lpm): 37.4
Sample End Date: 4/29/97	Time: ~~2600~~ 0800	Flow Rate (lpm) 33.5
Total Sample Time (T) in minutes: 725		
Average Flow Rate (F) in liters per minute: 35.5		
Sample Volume (V) = T 725 (min) x F 35.5 (lpm) x 1000 = 25,737,500 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, East end of ~~blg.~~ bldg. beside bag hopper.
Type of Work Performed:	
Work Permit No.: N/A	
General Area and Specific Work Location:	Type of Operation/Equipment in Area: Preps. for Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Hunter, Jordan, Gomez.
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #12

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8240	Calibration Due: Daily	
Filter Type: F&J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 2015	Flow Rate (lpm): 2020
Sample End Date: 4/29/97	Time: 0750	Flow Rate (lpm) 2036
Total Sample Time (T) in minutes: 685		
Average Flow Rate (F) in liters per minute: 2.028		
Sample Volume (V) = T 685 (min) x F 2.028 (lpm) x 1000 = 1,389,180 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Russ Hunter	General Area and Specific Location: N
Type of Work Performed: Preps for ~~cement~~ colum bium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area: Schooley, Foreman, Hunter, Jordan, Gomez
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #13

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8241	Calibration Due: Daily	
Filter Type: F&J #CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 2015	Flow Rate (lpm): 2.552
Sample End Date: 4/29/97	Time: 0750	Flow Rate (lpm) 2.514
Total Sample Time (T) in minutes: 685		
Average Flow Rate (F) in liters per minute: 2.533		
Sample Volume (V) = T 685 (min) x F 2.533 (lpm) x 1000 = 1,735,105 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Eddie Jordan	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: N/A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RADuff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #14

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8242	Calibration Due: Daily	
Filter Type: F+J #CPH-47 (membrane)	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 2015	Flow Rate (lpm): 1.974
Sample End Date: 4/29/97	Time: 0750	Flow Rate (lpm) 1.960
Total Sample Time (T) in minutes: 685		
Average Flow Rate (F) in liters per minute: 1.967		
Sample Volume (V) = T 685 (min) x F 1.967 (lpm) x 1000 = 1,347,395 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Donald Foreman	General Area and Specific Location:
Type of Work Performed: Preps. for columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/28/97

SAMPLE #15

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8243	Calibration Due: Daily	
Filter Type: F&J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/28/97	Time: 2015	Flow Rate (lpm): 2.074
Sample End Date: 4/29/97	Time: 0750	Flow Rate (lpm) 2.089
Total Sample Time (T) in minutes: 685		
Average Flow Rate (F) in liters per minute: 2.082		
Sample Volume (V) = T 685 (min) x F 2.082 (lpm) x 1000 = 1,426,170 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Frank Schooley	General Area and Specific Location:
Type of Work Performed: Preps for columbium heats	
Work Permit No.: N/A	N
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #17

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #1	Calibration Due: 3/11/98	
Filter Type: F+J # CPH-47 (membrane)	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 1540	Flow Rate (lpm): 37.7
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 27.7
Total Sample Time (T) in minutes: 1010		
Average Flow Rate (F) in liters per minute: 32.7		
Sample Volume (V) = T 1010 (min) x F 32.7 (lpm) x 1000 = 33,027,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, west end of bldg. by roll up door
Type of Work Performed: N	
Work Permit No.:	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium Heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Hunter, Gomez, Jordan

Monitoring Conducted by: R.A. Duff

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #18

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #2	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 1540	Flow Rate (lpm): 38.4
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 23.2
Total Sample Time (T) in minutes: 1010		
Average Flow Rate (F) in liters per minute: 30.8		
Sample Volume (V) = T 1010 (min) x F 30.8 (lpm) x 1000 = 31,108,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, center of bldg.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Hunter, Gomez, Jordan

Monitoring Conducted by: R.A. Duff

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #19

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #3	Calibration Due: 3/11/98	
Filter Type: F+J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 1540	Flow Rate (lpm): 37.4
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 28.4
Total Sample Time (T) in minutes: 1010		
Average Flow Rate (F) in liters per minute: 32.9		
Sample Volume (V) = T 1010 (min) x F 32.9 (lpm) x 1000 = 33,229,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: BLDG. D111, East end of bldg., by bag hopper.
Type of Work Performed: N	
Work Permit No.:	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Hunter, Gomez, Jordan

Monitoring Conducted by: R.A. Duff

Signature: RADuff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #20

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8240	Calibration Due: Daily	
Filter Type: F+J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 2000	Flow Rate (lpm): 2.057
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 2.024
Total Sample Time (T) in minutes: 690		
Average Flow Rate (F) in liters per minute: 2.041		
Sample Volume (V) = T 690 (min) x F 2.041 (lpm) x 1000 = 1,408,290 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Russ Hunter	General Area and Specific Location:
Type of Work Performed: Columbium heats	
Work Permit No.: N/A	N
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #21

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8241	Calibration Due: Daily	
Filter Type: F+J #CPH-47	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 2000	Flow Rate (lpm): 2.556
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 2.557
Total Sample Time (T) in minutes: 690		
Average Flow Rate (F) in liters per minute: 2.557		
Sample Volume (V) = T 690 (min) x F 2.557 (lpm) x 1000 = 1,764,330 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Eddie Jordan	General Area and Specific Location: N
Type of Work Performed: Columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #22

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8242	Calibration Due: Daily	
Filter Type: FAJ #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 2000	Flow Rate (lpm): 1.987
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 1.954
Total Sample Time (T) in minutes: 690		
Average Flow Rate (F) in liters per minute: 1.971		
Sample Volume (V) = T 690 (min) x F 1.971 (lpm) x 1000 = 1,359,990 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Donald Foreman	General Area and Specific Location:
Type of Work Performed: Columbium heats	N
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #23

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8243	Calibration Due: Daily	
Filter Type: F&J # CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 2000	Flow Rate (lpm): 2.095
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 2.073
Total Sample Time (T) in minutes: 690		
Average Flow Rate (F) in liters per minute: 2.084		
Sample Volume (V) = T 690 (min) x F 2.084 (lpm) x 1000 = 1,437,960 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Frank Schooley	General Area and Specific Location:
Type of Work Performed: Columbium heats	
Work Permit No.: N/A	N
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RADuff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/29/97

SAMPLE #24

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8244	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/29/97	Time: 2000	Flow Rate (lpm): 2.177
Sample End Date: 4/30/97	Time: 0730	Flow Rate (lpm) 2.175
Total Sample Time (T) in minutes: 690		
Average Flow Rate (F) in liters per minute: 2.176		
Sample Volume (V) = T 690 (min) x F 2.176 (lpm) x 1000 = 1,501,440 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: R. Gomez	General Area and Specific Location:
Type of Work Performed: Columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature:	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #25

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #1	Calibration Due: 3/11/98	
Filter Type: F+J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1945	Flow Rate (lpm): 37.7.
Sample End Date: 5/1/97	Time: 0800	Flow Rate (lpm) 27.7
Total Sample Time (T) in minutes: 705		
Average Flow Rate (F) in liters per minute: 32.7		
Sample Volume (V) = T 705 (min) x F 32.7 (lpm) x 1000 = 23,053,500 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, west end of bldg. by roll up door
Type of Work Performed: N	
Work Permit No.:	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium/~~Pyrochlore~~ Vanadium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Hunter, Jordan, Gomez

Monitoring Conducted by: R.A. DuFF

Signature: [signature]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #26

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #2	Calibration Due: 3/11/98	
Filter Type: F&J #CRH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1945	Flow Rate (lpm): 38.4
Sample End Date: 5/1/97	Time: 0800	Flow Rate (lpm) 23.2
Total Sample Time (T) in minutes: 705		
Average Flow Rate (F) in liters per minute: 30.8		
Sample Volume (V) = T 705 (min) x F 30.8 (lpm) x 1000 = 21,714,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: N/A	General Area and Specific Location: Bldg. D111, middle of bldg.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium/Vanadium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Hunter, Foreman, Jordan, Gomez

Monitoring Conducted by: R.A. DUFF

Signature: RA Duff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #27

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #3	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1945	Flow Rate (lpm): 37.4
Sample End Date: 5/1/97	Time: 0800	Flow Rate (lpm) 28.4
Total Sample Time (T) in minutes: 705		
Average Flow Rate (F) in liters per minute: 32.9		
Sample Volume (V) = T 705 (min) x F 32.9 (lpm) x 1000 = 23,194,500 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, East end of bldg. by bagging hopper.
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Columbium/Vanadium Heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Foreman, Jordan, Hunter, Gomez

Monitoring Conducted by: R.A. Duff

Signature: RA Duff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #28

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8240	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1950	Flow Rate (lpm): 2.056
Sample End Date: 5/1/97	Time: 0750	Flow Rate (lpm) 2.045
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.051		
Sample Volume (V) = T 720 (min) x F 2.051 (lpm) x 1000 = 1,476,720 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Russ Hunter	General Area and Specific Location: N
Type of Work Performed: Columbium/Vanadium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #29

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8241	Calibration Due: Daily	
Filter Type: FdJ #CPH-47	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1950	Flow Rate (lpm): 2.553
Sample End Date: 5/1/97	Time: 0750	Flow Rate (lpm) 2.508
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.531		
Sample Volume (V) = T 720 (min) x F 2.531 (lpm) x 1000 = 1,822,320 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Eddie Jordan	General Area and Specific Location: N
Type of Work Performed: Columbium/Vanadium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, Various locations	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #30

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8242	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1950	Flow Rate (lpm): 1.970
Sample End Date: 5/1/97	Time: 0750	Flow Rate (lpm) 1.961
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 1.966		
Sample Volume (V) = T 720 (min) x F 1.966 (lpm) x 1000 = 1,415,520 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Donald Foreman	General Area and Specific Location:
Type of Work Performed: Columbium/Vanadium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. DuFF	
Signature:	

N/A

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #31

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8243	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1950	Flow Rate (lpm): 2.089
Sample End Date: 5/1/97	Time: 0750	Flow Rate (lpm) 2.049
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.069		
Sample Volume (V) = T 720 (min) x F 2.069 (lpm) x 1000 = ~~1,896~~ 1,489,680 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Frank Schooley	General Area and Specific Location:
Type of Work Performed: Vanadium/Columbium heats	
Work Permit No.: N/A	N
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 4/30/97

SAMPLE #32

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8244	Calibration Due: Daily	
Filter Type: F+J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 4/30/97	Time: 1950	Flow Rate (lpm): 2.146
Sample End Date: 5/1/97	Time: 0750	Flow Rate (lpm) 2.150
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.148		
Sample Volume (V) = T 720 (min) x F 2.148 (lpm) x 1000 = 1,546,560 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: R. Gomez	General Area and Specific Location:
Type of Work Performed: Vanadium/Columbium heats	N
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. DuFF	
Signature: RADuff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #33

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #1	Calibration Due: 3/11/98	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 41.8
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 27.7
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 34.8		
Sample Volume (V) = T 720 (min) x F 34.8 (lpm) x 1000 = 25,056,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, west end of bldg. by roll up door.
Type of Work Performed: N	
Work Permit No.:	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Vanadium/Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Hunter, Jordan, Foreman, Gomez
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #34

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #2	Calibration Due: 3/11/98	
Filter Type: F&J # CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 38.4
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 27.9
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 33.2		
Sample Volume (V) = T 720 (min) x F 33.2 (lpm) x 1000 = 23,904,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, middle of bldg. between stored CANAL & Furnace.
Type of Work Performed:	
Work Permit No.:	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Vanadium/Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Hunter, Jordan, Foreman, Gomez
Monitoring Conducted by: R.A. DUFF	
Signature:	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #35

AIR SAMPLING EQUIPMENT

Pump Type: ☐ Breathing Zone ☒ Low Volume General Air ☐ High Volume General Air		
Serial No: RAS-1 #3	Calibration Due: 3/11/98	
Filter Type: F&J CPH-47	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 37.4
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 28.4
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 32.9		
Sample Volume (V) = T 720 (min) x F 32.9 (lpm) x 1000 = 23,688,000 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored:	General Area and Specific Location: Bldg. D111, East end of bldg. by bag hopper
Type of Work Performed:	
Work Permit No.: N	
General Area and Specific Work Location: A	Type of Operation/Equipment in Area: Vanadium/Columbium heats
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☐ Other	Names of Workers in Area: Schooley, Hunter, Gomez, Foreman, Jordan

Monitoring Conducted by: R.A. Duff

Signature: RA Duff

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #36

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8240	Calibration Due: Daily	
Filter Type: F+J #CPH-47	Filter Size: 47 mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 2.062
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 2.055
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.059		
Sample Volume (V) = T 720 (min) x F 2.059 (lpm) x 1000 = 1,482,480 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Russ Hunter	General Area and Specific Location:
Type of Work Performed: Vanadium / Columbium heats	
Work Permit No.: N/A	N/A
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Masks	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #37

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8241	Calibration Due: Daily	
Filter Type: ~~FAS~~ #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 2.552
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 2.509
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.531		
Sample Volume (V) = T 720 (min) x F 2.531 (lpm) x 1000 = 1,822,320 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Eddie Jordan	General Area and Specific Location:
Type of Work Performed: Vanadium/Columbium heats.	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [signature]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #38

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8242	Calibration Due: Daily	
Filter Type: FOJ # CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 1.975
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 1.964
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 1.970		
Sample Volume (V) = T 720 (min) x F 1.970 (lpm) x 1000 = 1,418,400 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Donald Foreman	General Area and Specific Location:
Type of Work Performed: Vanadium/Columbium heats	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various locations	Type of Operation/Equipment in Area:
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: [illegible]	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #39

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8243	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 2.078
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 2.038
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.058		
Sample Volume (V) = T 720 (min) x F 2.058 (lpm) x 1000 = 1,481,760 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Frank Schooley	General Area and Specific Location:
Type of Work Performed: Vanadium/Columbium heats	
Work Permit No.: N/A	N
General Area and Specific Work Location: Bldg. D111, various	Type of Operation/Equipment in Area:
	A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other	Names of Workers in Area:

Monitoring Conducted by: R.A. Duff

Signature: [illegible]

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
AIR SAMPLING DATA SHEET

Date: 5/1/97

SAMPLE #40

AIR SAMPLING EQUIPMENT

Pump Type: ☒ Breathing Zone ☐ Low Volume General Air ☐ High Volume General Air		
Serial No: 8244	Calibration Due: Daily	
Filter Type: F&J #CPH-47	Filter Size: 47mm	Filter Lot No. N/A

SAMPLING PARAMETERS

Sample Start Date: 5/1/97	Time: 1930	Flow Rate (lpm): 2.155
Sample End Date: 5/2/97	Time: 0730	Flow Rate (lpm) 2.141
Total Sample Time (T) in minutes: 720		
Average Flow Rate (F) in liters per minute: 2.148		
Sample Volume (V) = T 720 (min) x F 2.148 (lpm) x 1000 = 1,546,560 milliliters		

WORKER/WORKPLACE DATA

BREATHING ZONE	GENERAL AIR
Name of Worker Monitored: Raphael Gomez ~~Ross Hunter~~	General Area and Specific Location: N
Type of Work Performed: Vanadium/Columbium hents	
Work Permit No.: N/A	
General Area and Specific Work Location: Bldg. D111, various	Type of Operation/Equipment in Area: A
Respiratory Protection Used: ☐ None ☐ Full Face ☐ Half Face ☒ Other Dust Mask	Names of Workers in Area:
Monitoring Conducted by: R.A. Duff	
Signature: RA Duff	

Appendix G - Environmental Monitoring Records

ENVIRONMENTAL TLD FIELD LOG
Shieldalloy Metallurgical Corporation
Newfield, NJ

Station	Badge Number	Location	Start Date	Start Time	End Date	End Time	Remarks
2	46	Fenceline	3/10/97	15:03	4/28/97	1500	
3	47			15:00		1505	
4	3			14:55		1511	
5	14			1453		1513	
6	15			14:50		1519	
7	24			14:48		1522	
8	29			14:46		1526	
9	11			14:44		1529	
10	13			14:43		1534	
11	12			14:40		1539	
12	10			14:36		1544	
13	9			14:32		1547	
14	8			14:27		1549	
15	4			14:12		1552	
16	42	monitoring well	3/10/97	16:55		1610	
17	16	JPV House	3/11/97	13:00	4/29/97	0730	
18	30	D111	3/10/97	15:34	4/28/97	1007	
19	35			15:33		1007	
20	18			15:46		1006	
21	34			15:44		1017	
22	31			15:32		1008	
23	25			15:49		1009	
24	41			15:47		1008	
25	43			15:52		1010	
26	1?19			15:55		1010	
27	22			15:57		1012	
28	7	D111 AAF	3/10/97	14:21	4/28/97	1025	
29	45	D111 AAF	3/10/97	14:22	4/28/97	1025	
30	37	D102	3/10/97	15:16	4/28/97	1030	
31	20			15:28		1030	
32	33?28			15:18		1030	

ENVIRONMENTAL TLD FIELD LOG
Shieldalloy Metallurgical Corporation
Newfield, NJ

Station	Badge Number	Location	Start Date	Start Time	End Date	End Time	Remarks
33	17	D102	3/10/97	13:25	4/28/97	1030	
34	21			13:23	4/28/97	1028	
35	44			13:21		1028	
36	39	D 203A	3/10/97	15:07		1035	
37	49			15:08		1035	
38	48			15:10		1035	
39	27			15:09		1036	
40	32			15:11		1036	
41	2	D 203G	3/10/97	14:19	4/28/97	0951	
42	5			14:14		0951	
43	6			14:18		0951	
44	23			14:17		0951	
45	26	D 202	3/10/97	14:15	4/28/97	1052	
NA	Deploy Control ~~0~~	NOT USED	3/11/97	09:40			
	Transit Control ~~39~~						
	36						
	38						
	40						
	50						
	51						

LANDAUER

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586 Telephone: (708) 755-7000 Facsimile: (708) 755-7016

ENVIRONMENTAL / LOW LEVEL DOSIMETRY REPORT

RECEIVED
MAY 20 1997
ENVIRONMENTAL

ADDRESS

SHIELDALLOY METALLURGIC
CORPORATION
ATTN : MR SCOTT EVES
PO BOX 768
12 WEST BLV
NEWFIELD, NJ 08344

ACCOUNT NO. 290744

SERIES CODE

FOR EXPOSURE PERIOD 01/01/97 TO 03/31/97

LOCATION ID NUMBER	IDENTIFIER (CLIENT SUPPLIED)	NOTE CODE	EXPOSURE OF DOSIMETER (MILLIREMS AMBIENT DOSE EQUIVALENT) GROSS	NET	NET CUMULATIVE TOTALS (MILLIREMS) CALENDAR QUARTER	YEAR TO DATE	PERMANENT	ADJUST-MENTS	NUMBER OF DOSIMETERS REPORTED	INCEPTION DATE OF PERM. TOTAL
00000	TRANSIT CONTROL		23.3	0.2						
000X9	DEPLOY CONTROL		23.1	0.0						
00001			371.2	348.1	348.1	348.1	458.6		2	04/01/96
00002			34.6	11.5	11.5	11.5	16.4		2	04/01/96
00003			27.0	3.9	3.9	3.9	39.1		2	04/01/96
00004			7.4	-15.7	-15.7	-15.7	1.1		2	04/01/96
00005			24.1	1.0	1.0	1.0	514.0		2	04/01/96
00006		A					12.6		1	04/01/96
00007			46.9	23.8	23.8	23.8	95.4		2	04/01/96
00008			20.6	-2.5	-2.5	-2.5	2.2		2	04/01/96
00009			11.6	-11.5	-11.5	-11.5	-10.5		2	04/01/96
00011			73.3	50.2	50.2	50.2	50.0		2	04/01/96
00012			63.4	40.2	40.2	40.2	90.4		2	04/01/96
00013			49.7	26.6	26.6	26.6	85.5		2	04/01/96
00014			138.7	115.6	115.6	115.6	2050.3		2	04/01/96
00015			336.6	313.5	313.5	313.5	313.0		2	04/01/96
00016			9.0	-14.1	-14.1	-14.1	-12.8		2	04/01/96
00017			33.5	10.4	10.4	10.4	11.8		2	04/01/96

NOTES (COLUMN 3) : A Absent

Q.C. Release	Process No.	Reported Date	Date Processed	Date Received	Minimum Detectable Dose In This Process, Millirems Ambient Dose Equivalent	PAGE
LD	EQ443A	09-May-97	08-May-97	05-May-97	0.02	1

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ENVIRONMENTAL / LOW LEVEL DOSIMETRY REPORT

ADDRESS

SHIELDALLOY METALLURGIC
CORPORATION
ATTN : MR SCOTT EVES
PO BOX 768
12 WEST BLV
NEWFIELD, NJ 08344

ACCOUNT NO. 290744

SERIES CODE

FOR EXPOSURE PERIOD 01/01/97 TO 03/31/97

LOCATION ID NUMBER	IDENTIFIER (CLIENT SUPPLIED)	NOTE CODE	EXPOSURE OF DOSIMETER (MILLIREMS AMBIENT DOSE EQUIVALENT) GROSS	NET	NET CUMULATIVE TOTALS (MILLIREMS) CALENDAR QUARTER	YEAR TO DATE	PERMANENT	ADJUST-MENTS	NUMBER OF DOSIMETERS REPORTED	INCEPTION DATE OF PERM. TOTAL
00006		A					12.6		1	04/01/96
00010		NC	62.8				109.1		1	04/01/96
00030		NC	60.9				-0.7		1	04/01/96

NOTES (COLUMN 3) : A Absent
NC Returned Separately From The Deployment Control

G.C. Release	Process No.	Reported Date	Date Processed	Date Received	Minimum Detectable Dose In This Process, Millirems Ambient Dose Equivalent	ONLY PAGE
LD	EQ444A	09-May-97	08-May-97	06-May-97	0.02	1

LANDAUER

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ENVIRONMENTAL / LOW LEVEL DOSIMETRY REPORT

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NEWFIELD, NJ 08344

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SERIES CODE

FOR EXPOSURE PERIOD 01/01/97 TO 03/31/97

LOCATION ID NUMBER	IDENTIFIER (CLIENT SUPPLIED)	NOTE CODE	EXPOSURE OF DOSIMETER (MILLIREMS AMBIENT DOSE EQUIVALENT) GROSS	NET	NET CUMULATIVE TOTALS (MILLIREMS) CALENDAR QUARTER	YEAR TO DATE	PERMANENT	ADJUST-MENTS	NUMBER OF DOSIMETERS REPORTED	INCEPTION DATE OF PERM. TOTAL
00038		LP	26.1	3.0	3.0	3.0	209.8		2	04/01/96
00039			24.0	0.9	0.9	0.9	14.0		2	04/01/96
00040			24.3	1.2	1.2	1.2	31.3		2	04/01/96
00041			95.1	72.0	72.0	72.0	74.2		2	04/01/96
00042			18.7	-4.4	-4.4	-4.4	13.0		2	04/01/96
00043			74.1	50.9	50.9	50.9	126.1		2	04/01/96
00044			27.0	3.9	3.9	3.9	7.0		2	04/01/96
00045			62.1	39.0	39.0	39.0	96.4		2	04/01/96
00046	SPARE		24.5	1.4	1.4	1.4	42.3		2	04/01/96
00047	SPARE		126.5	103.4	103.4	103.4	105.8		2	04/01/96
00048	SPARE		28.1	5.0	5.0	5.0	21.1		2	04/01/96
00049	SPARE		20.9	-2.2	-2.2	-2.2	10.4		2	04/01/96
00050	SPARE		21.9	-1.2	-1.2	-1.2	0.8		2	04/01/96
00051	SPARE		23.6	0.5	0.5	0.5	-0.1		2	04/01/96

NOTES (COLUMN 3) : LP Low Energy Photon (< 100 keV effective)

Q.C. Release	Process No.	Reported Date	Date Processed	Date Received	Minimum Detectable Dose In This Process, Millirems Ambient Dose Equivalent	LAST PAGE
LD	EQ443A	09-May-97	08-May-97	05-May-97	0.02	3

LANDAUER

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MAY 20 1997
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ENVIRONMENTAL / LOW LEVEL DOSIMETRY REPORT

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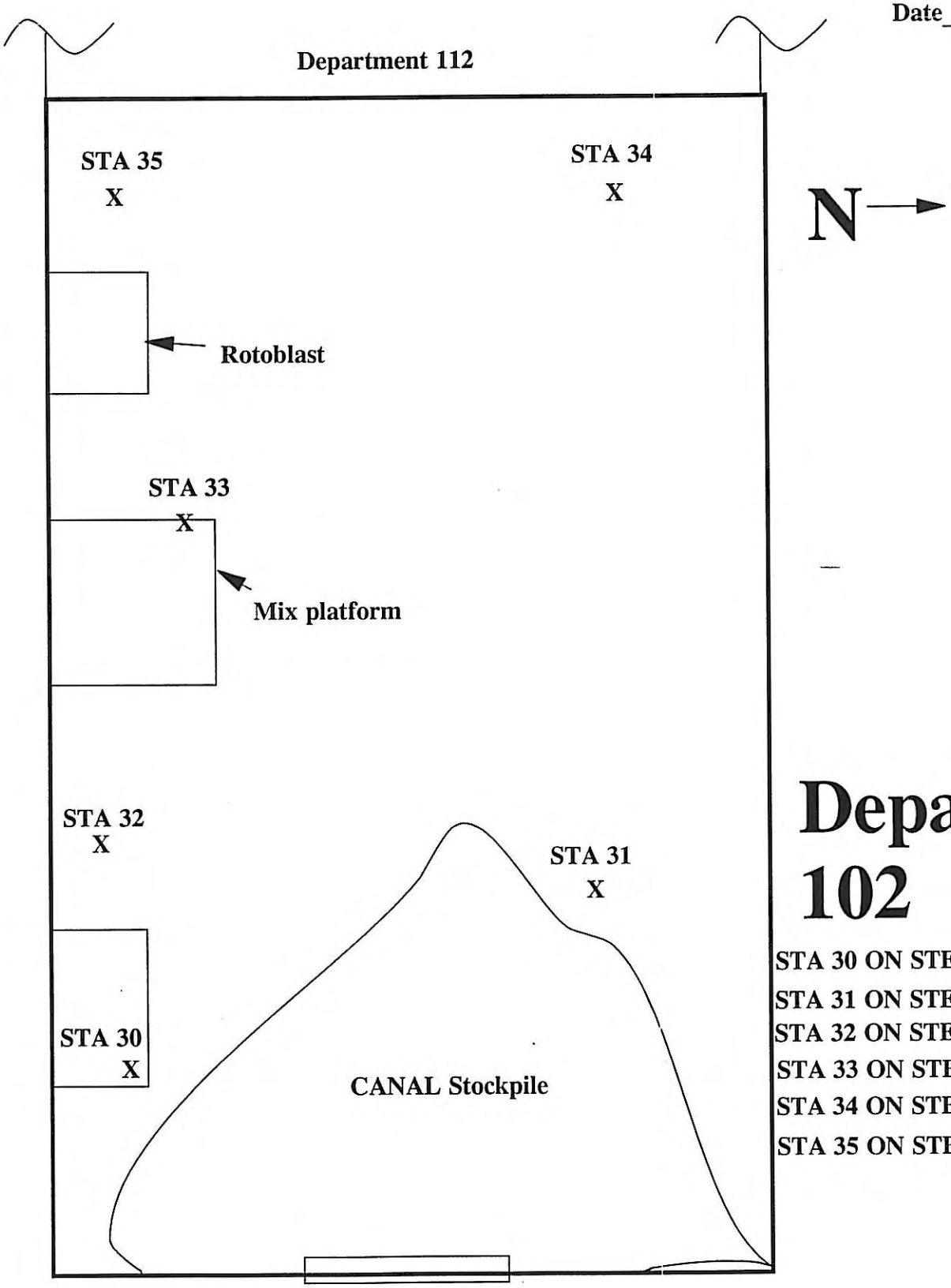
LOCATION ID NUMBER	IDENTIFIER (CLIENT SUPPLIED)	NOTE CODE	EXPOSURE OF DOSIMETER (MILLIREMS AMBIENT DOSE EQUIVALENT) GROSS	NET	NET CUMULATIVE TOTALS (MILLIREMS) CALENDAR QUARTER	YEAR TO DATE	PERMANENT	ADJUST-MENTS	NUMBER OF DOSIMETERS REPORTED	INCEPTION DATE OF PERM. TOTAL
00018			98.2	75.1	75.1	75.1	75.1		1	04/01/96
00019			360.4	337.3	337.3	337.3	360.4		2	04/01/96
00020			1627.2	1604.1	1604.1	1604.1	1612.5		2	04/01/96
00021			30.1	7.0	7.0	7.0	864.4		2	04/01/96
00022			594.8	571.7	571.7	571.7	617.7		2	04/01/96
00023			24.4	1.2	1.2	1.2	178.1		2	04/01/96
00024			32.7	9.6	9.6	9.6	14.1		2	04/01/96
00025			33.2	10.1	10.1	10.1	8.7		2	04/01/96
00026			24.0	0.9	0.9	0.9	6.1		2	04/01/96
00027			28.2	5.1	5.1	5.1	10.8		2	04/01/96
00028			89.2	66.1	66.1	66.1	139.0		2	04/01/96
00029			41.9	18.8	18.8	18.8	89.4		2	10/01/96
00031			110.4	87.3	87.3	87.3	198.7		2	04/01/96
00032			23.5	0.4	0.4	0.4	1.4		2	04/01/96
00033			74.7	51.5	51.5	51.5	53.4		2	04/01/96
00034			35.8	12.7	12.7	12.7	15.5		2	04/01/96
00035			51.1	28.0	28.0	28.0	86.6		2	04/01/96
00036			23.1	0.0	0.0	0.0	40.6		2	04/01/96
00037			637.3	614.2	614.2	614.2	1047.8		2	04/01/96

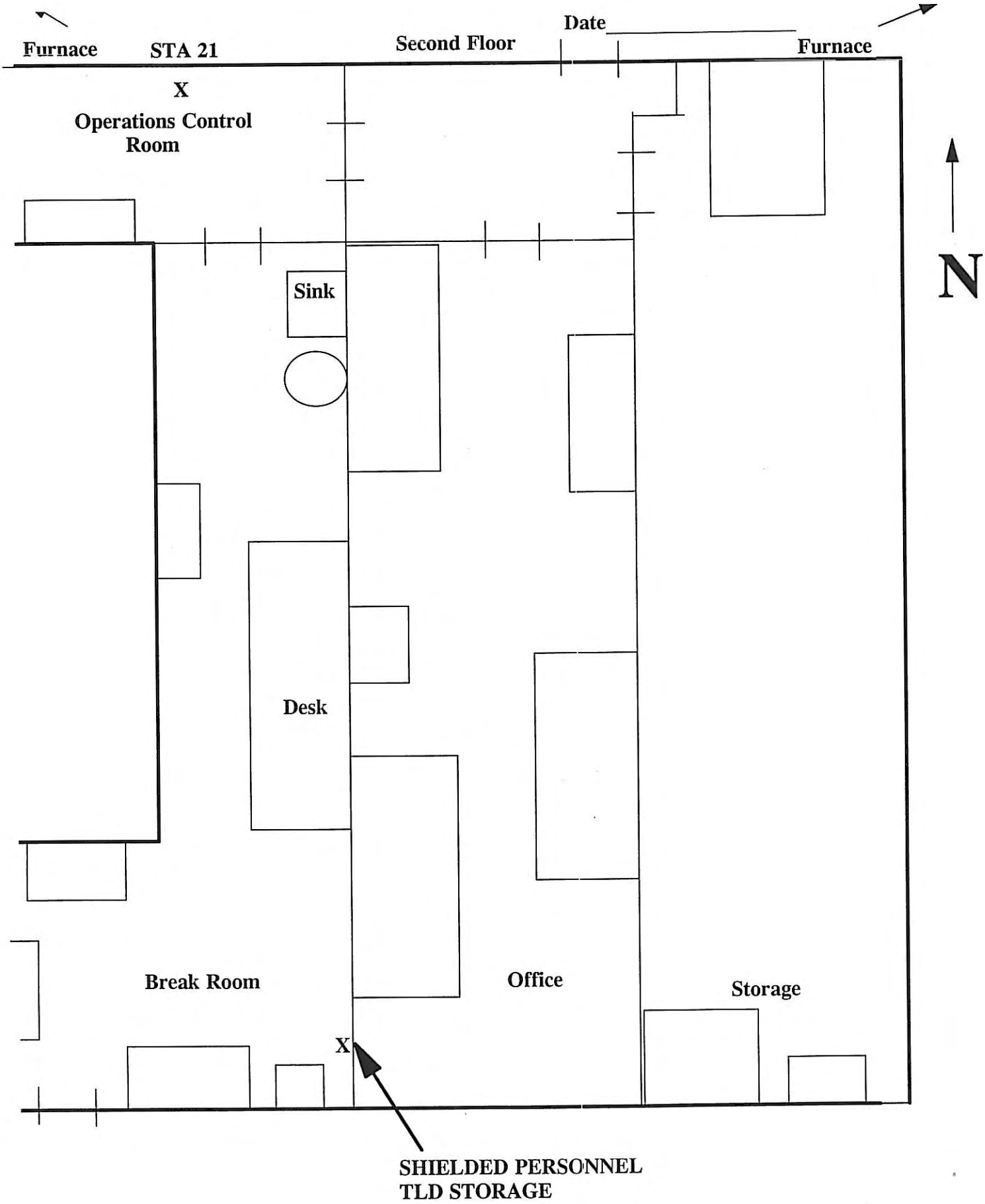
Q.C. Release	Process No.	Reported Date	Date Processed	Date Received	Minimum Detectable Dose In This Process, Millirems Ambient Dose Equivalent	PAGE
LD	EQ443A	09-May-97	08-May-97	05-May-97	0.02	2

Date_____

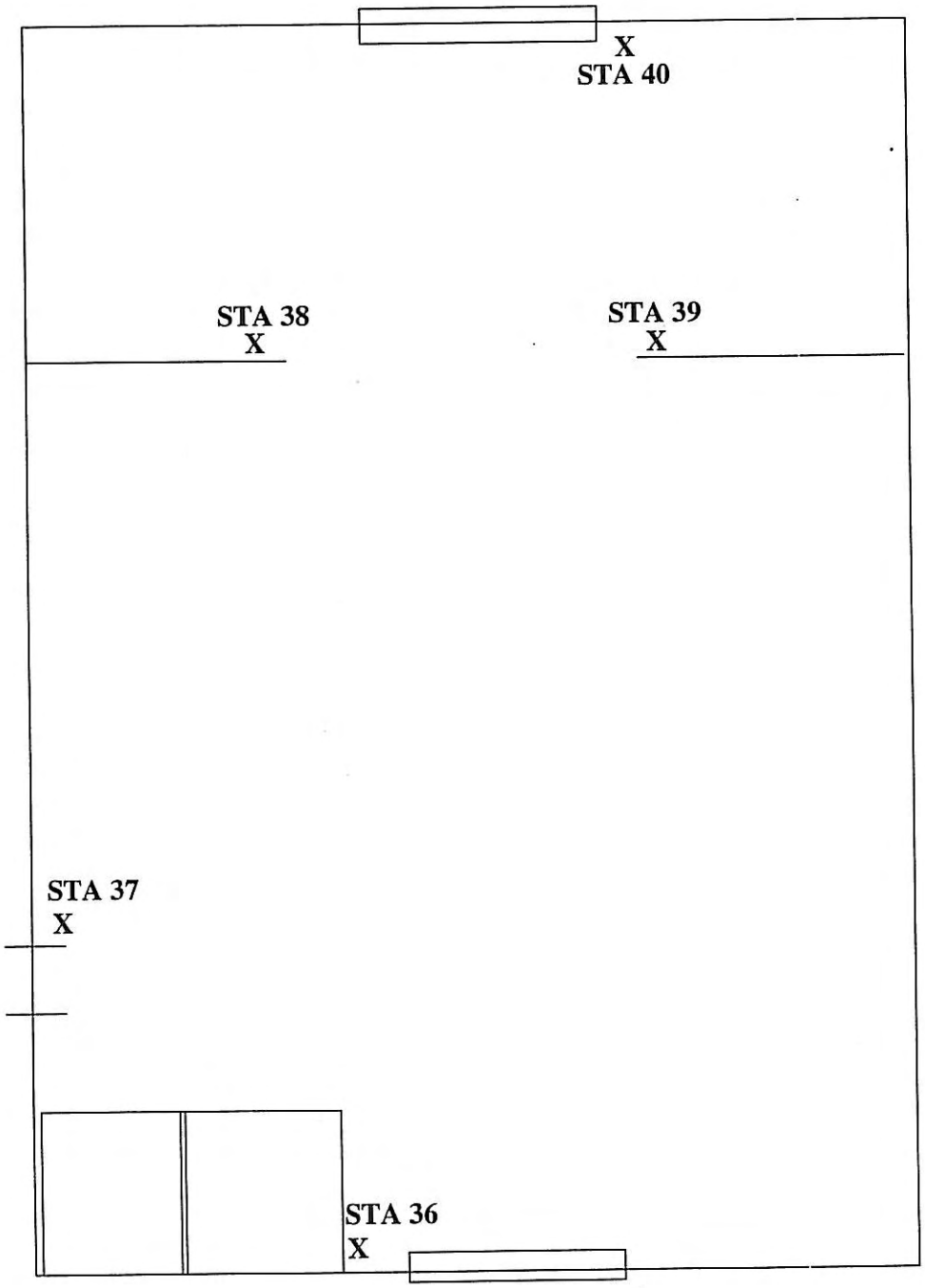


Department 102

STA 30 ON STEEL SUPPORT
STA 31 ON STEEL SUPPORT
STA 32 ON STEEL SUPPORT
STA 33 ON STEEL SUPPORT
STA 34 ON STEEL SUPPORT
STA 35 ON STEEL SUPPORT



D111 - Office and Break Room



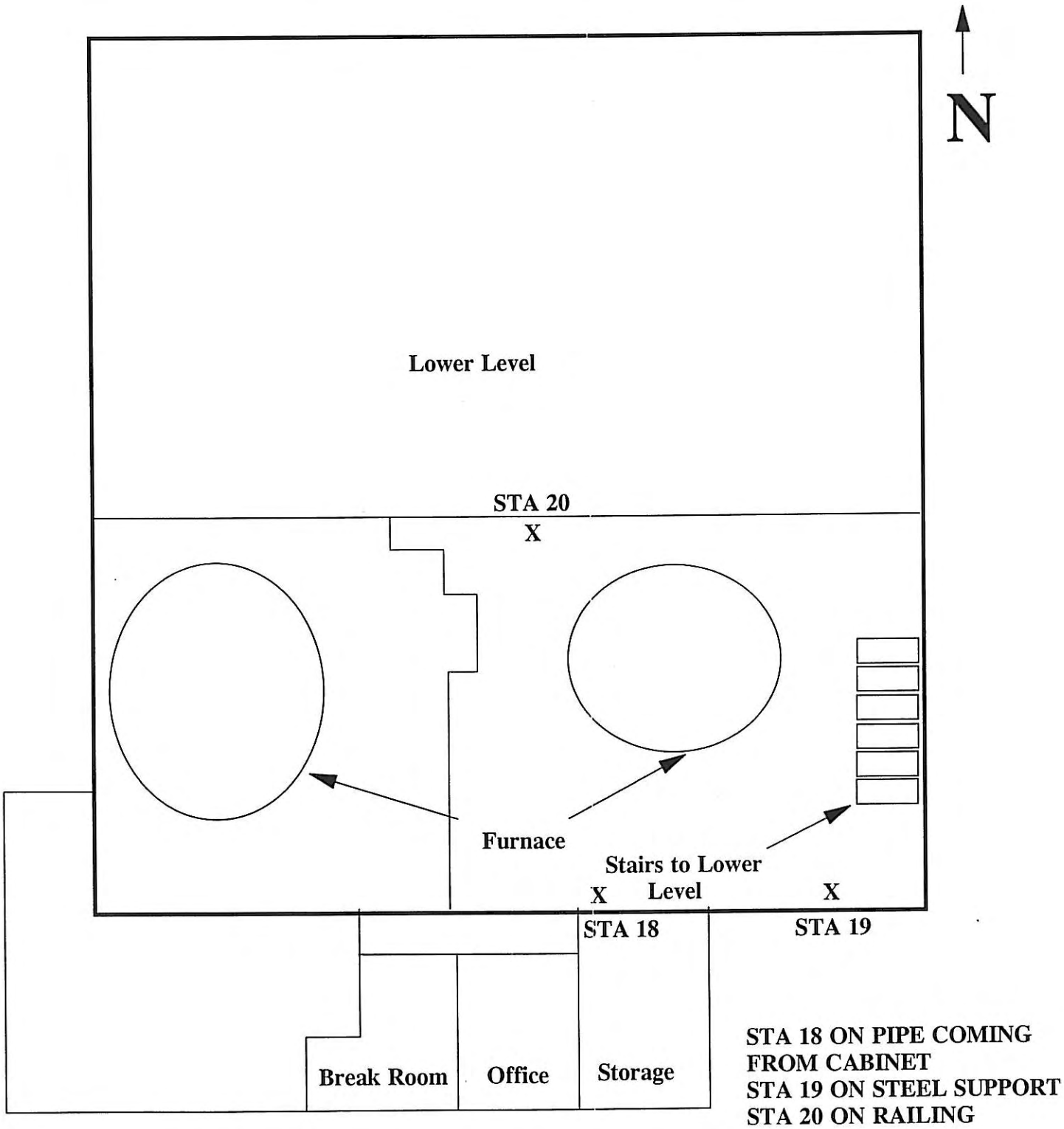
Date_____

N

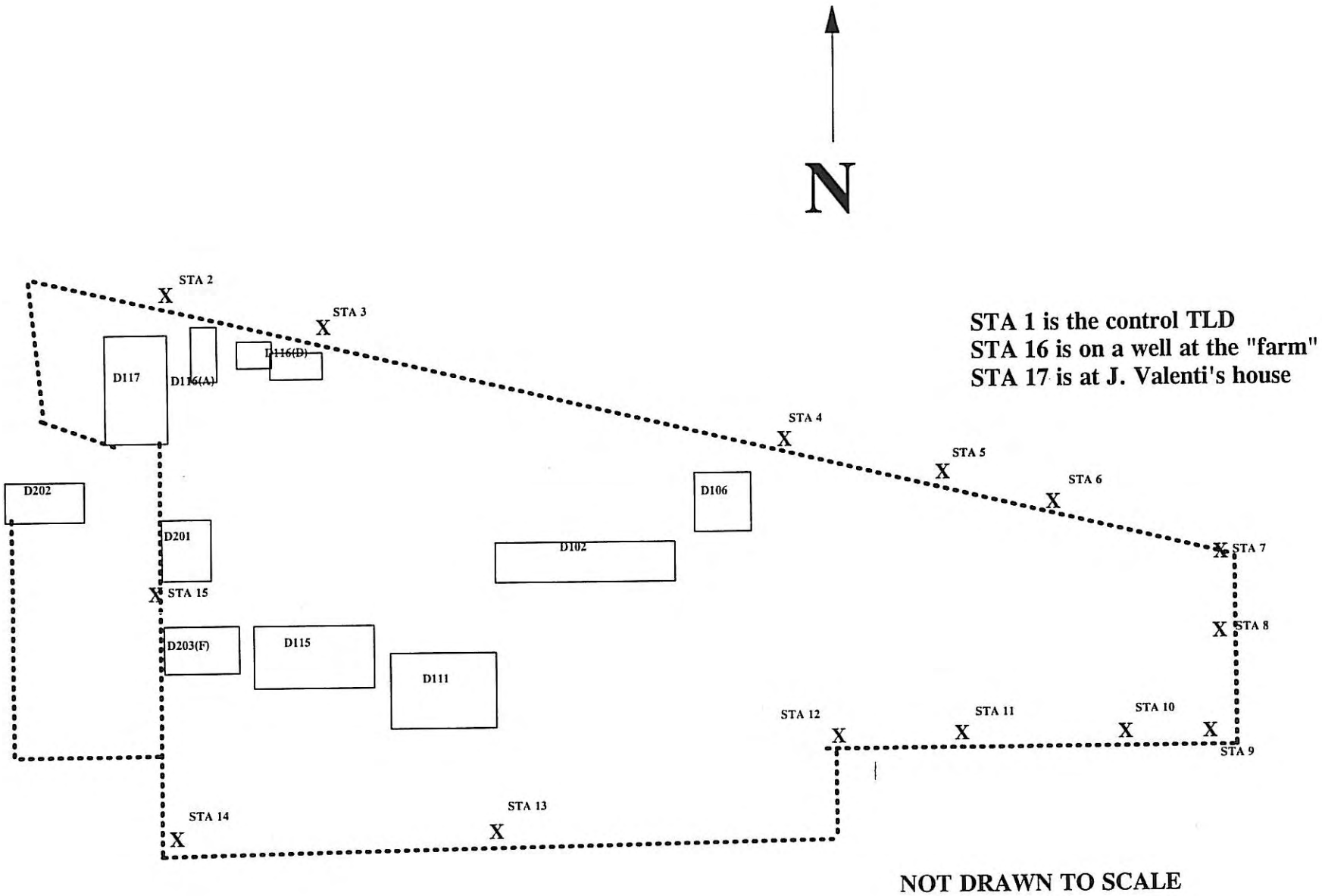
"A" Warehouse

STA 36 ON OFFICE WALL
STA 37 BY DOOR
STA 38 ON FENCE
STA 39 ON FENCE
STA 40 BY ROLLUP DOOR

Date_____



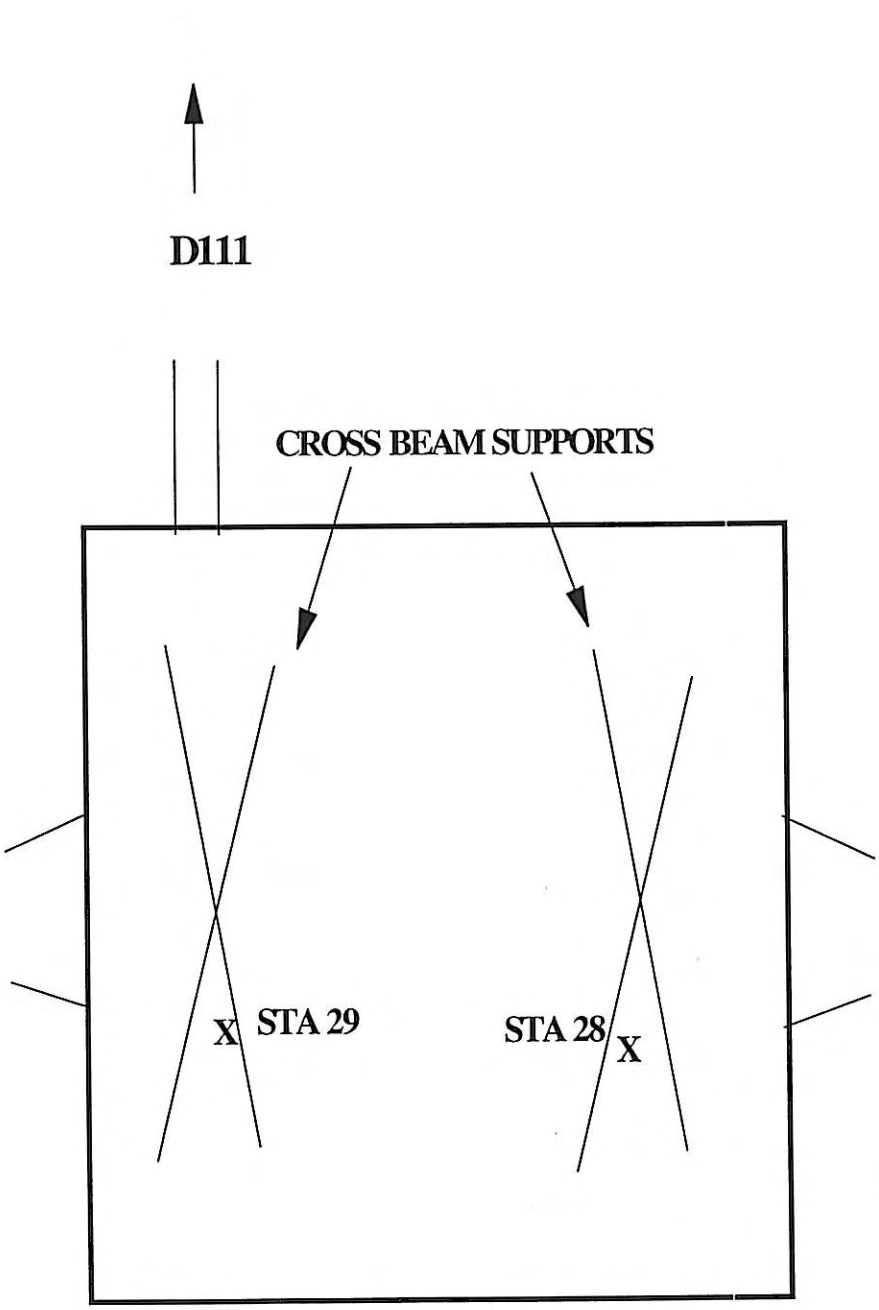
D111 - Upper Level



Perimeter TLD Locations

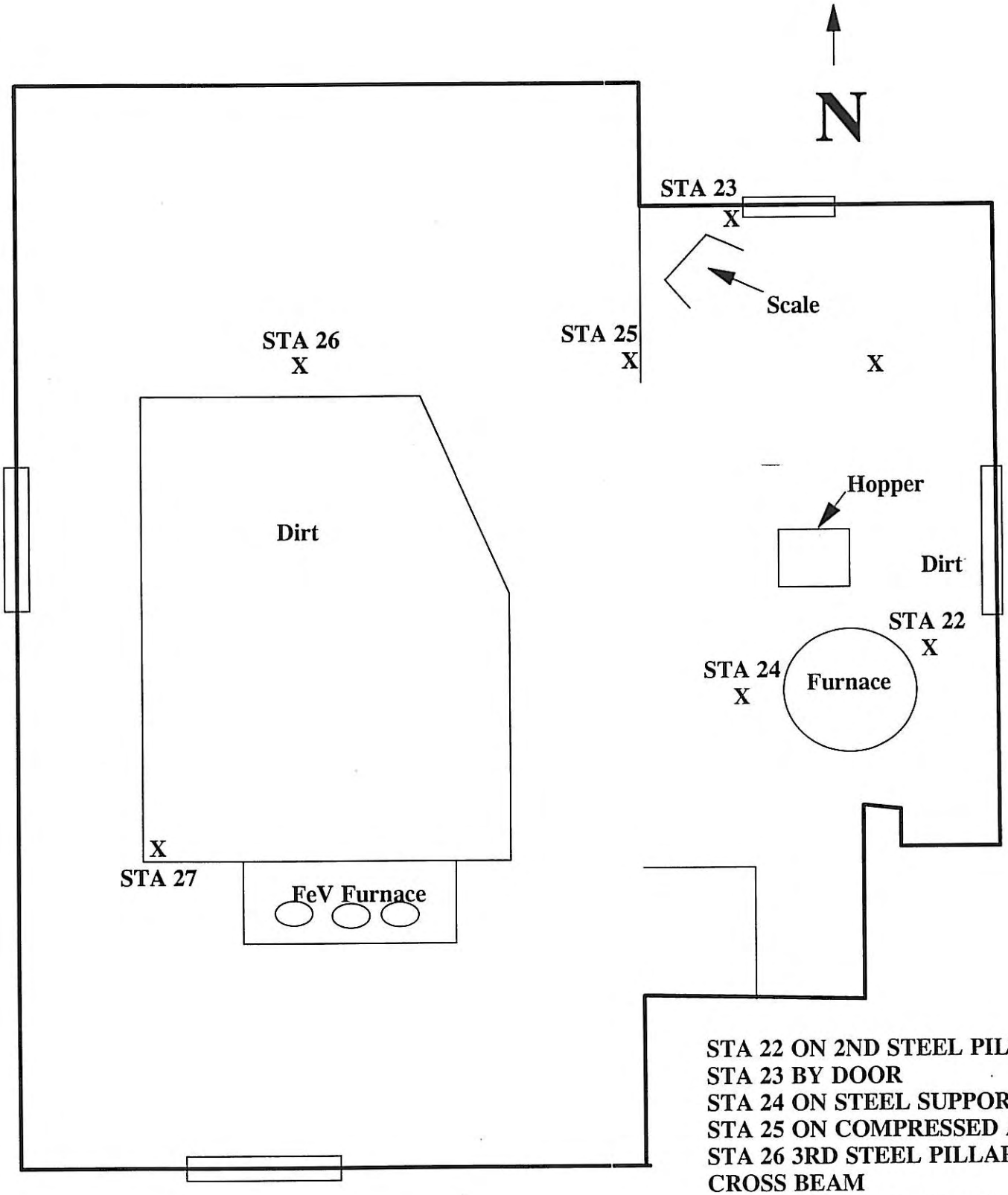
Date _____

Date_____



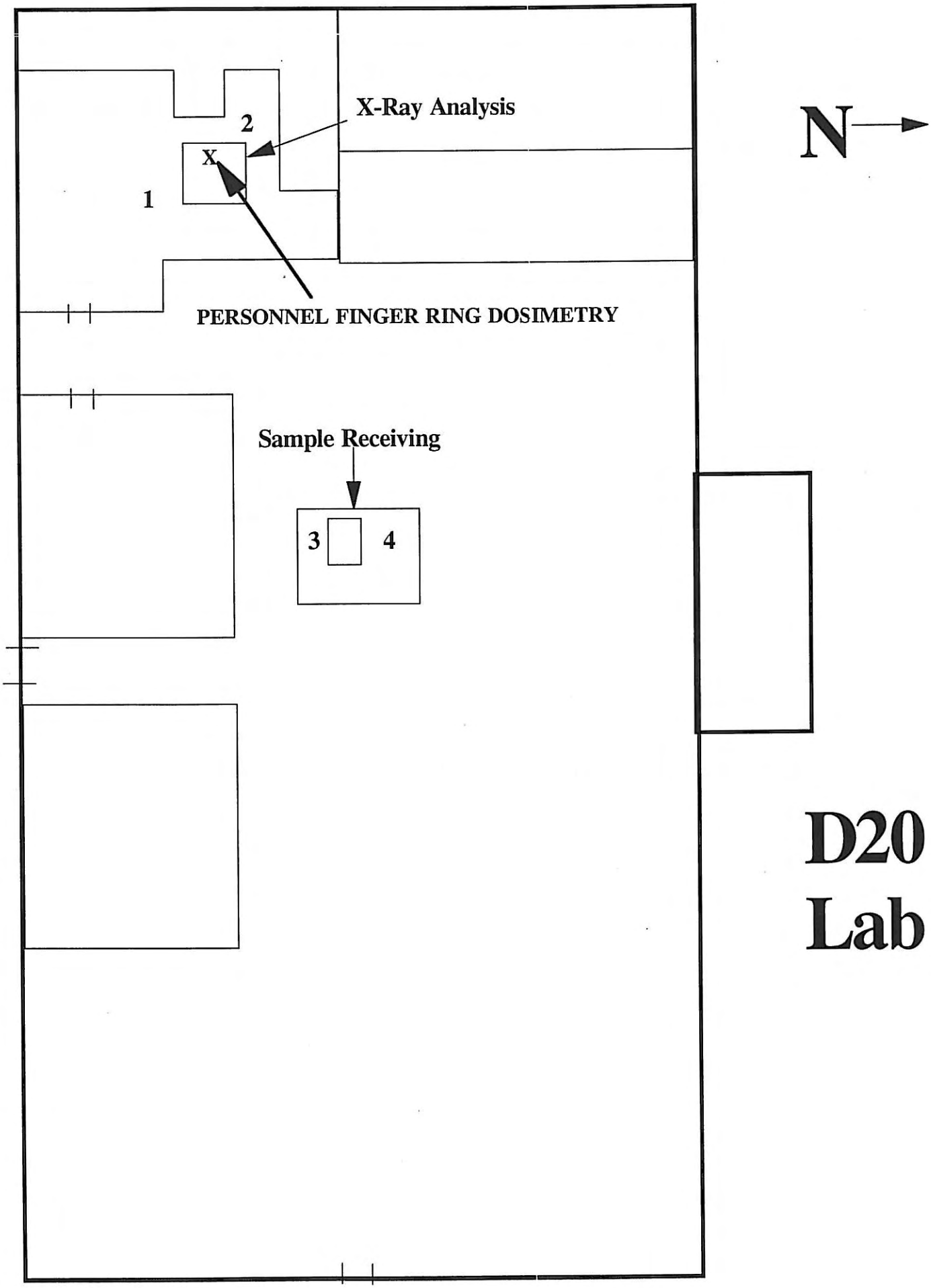
D111 AAF Dust Collecto

Date_____

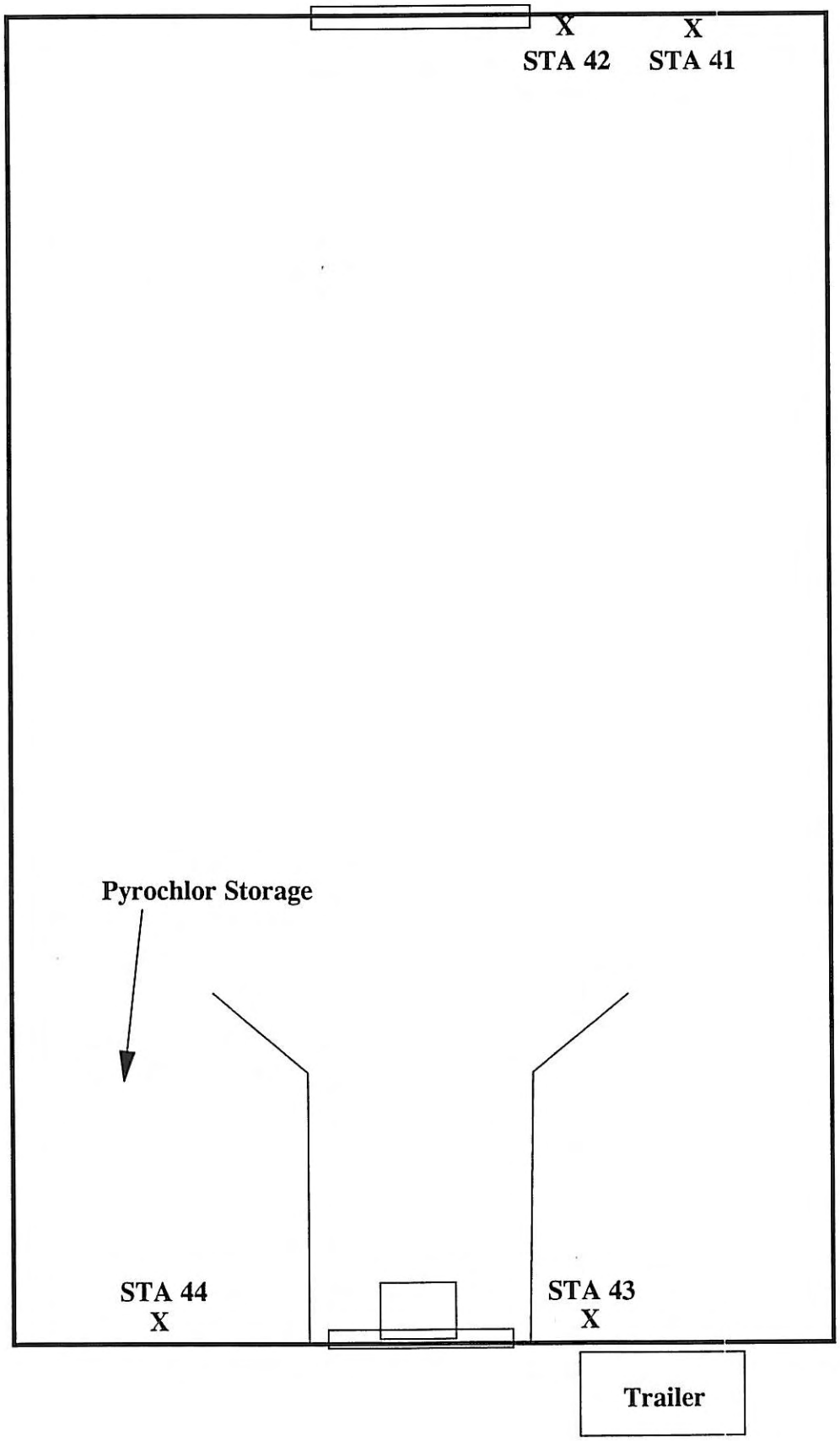


STA 22 ON 2ND STEEL PILLAR
STA 23 BY DOOR
STA 24 ON STEEL SUPPORT
STA 25 ON COMPRESSED AIR LINE
STA 26 3RD STEEL PILLAR ON CROSS BEAM
STA 27 1ST STEEL PILLAR

D111 - Lower Level


X-Ray Analysis
2
X
1
PERSONNEL FINGER RING DOSIMETRY
N
Sample Receiving
3
4
D20
Lab

Date_____



N

"G" Warehouse

Appendix H - Radioactive Materials Inventory

Source Material Inventory for 1997

	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97
Original Thorium Inventory (kg)	293366	293366	293366	293366	293366	293366
Ore Received (kg)	0	0	0	0	0	0
% Th in ore	0.00	0.00	0.00	0.00	0.00	0.00
Thorium Received (kg)	0	0	0	0	0	0
CANAL Shipped (kg)	0	0	0	0	0	0
% Th in CANAL	0.51	0.51	0.51	0.51	0.51	0.51
Thorium Shipped in CANAL (kg)	0	0	0	0	0	0
BHD Shipped (kg)	0	0	0	0	0	0
% Th in BHD	0.0261	0.0261	0.0261	0.0261	0.0261	0.0261
Thorium Shipped in BHD (kg)	0	0	0	0	0	0
Current Thorium Inventory (kg)	293366	293366	293366	293366	293366	293366
Original Uranium Inventory (kg)	39409	39409	39409	39409	39409	39409
Ore Received (kg)	0	0	0	0	0	0
% Uranium in ore	0.00	0.00	0.00	0.00	0.00	0.00
Uranium Received (kg)	0	0	0	0	0	0
CANAL Shipped (kg)	0	0	0	0	0	0
% U in CANAL	0.1	0.1	0.1	0.1	0.1	0.1
Uranium Shipped in CANAL (kg)	0	0	0	0	0	0
BHD Shipped (kg)	0	0	0	0	0	0
% U in BHD	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
Uranium Shipped in BHD (kg)	0	0	0	0	0	0
Current Uranium Inventory (kg)	39409	39409	39409	39409	39409	39409
Current Source Material Inventory (kg)	332775	332775	332775	332775	332775	332775
As of:	30-Jun-97					
% of Thorium Limit	96.80					
% of Uranium Limit	87.57					

Instrument Inspection Log

Date	Instrument Type/Model Number	Serial Number	Location	Condition	Last Calibration Date	Action Taken
3/11	Eberline SAC-4	868	D202	Good	10/96	Sent to Calibration
3/11	Eberline SPA-3 (probe)	408462	D202	Good	10/96	Sent to Calibration
3/11	Eberline HP-210 (probe)	705797	D202	Good	10/96	Sent to Calibration
3/11	Eberline HP-210 (probe)	705796	D202	Good	12/96	
3/11	Eberline AC-3 (probe)	407083-37	D202	Good	10/96	Sent to Calibration
3/11	Eberline AC-3 (probe)	407083-39	D202	Good	12/96	
3/11	Eberline ESP-1	03047	D202	Good	10/96	Sent to Calibration
3/11	Eberline ESP-1	03049	D202	Good	12/96	
3/11	Eberline SRM-100	313	D202	Good	12/96	
3/11	Eberline SRM-100	314	D202	Good	10/96	Sent to Calibration
3/11	Eberline RAS-1	1	D111	Good	3/97	
3/11	Eberline RAS-1	2	D111	Good	3/97	
3/11	Eberline RAS-1	3	D111	Good	3/97	
3/11	Victoreen 489-55 (probe)	860428-3	D202	Good	10/96	
3/11	Victoreen 450-P	195	D202	Good	12/96	
3/11	Victoreen 490	5279	D202	Good	12/96	
3/11	Victoreen 492	4888	D202	Good	12/96	
3/11	Bicron G2 (probe)	A199W	D202	Damaged	N/A	Out of service
3/11	Bicron Analyst	A004Q	D202	Good	10/96	Sent to Calibration

Date	Instrument Type/Model Number	Serial Number	Location	Condition	Last Calibration Date	Action Taken
3/11	Bicron G2 (probe)	A119Q	D202	Damaged	N/A	Out of service
3/11	Gilian Gilibrator	8506-5	D117	Good	3/97	
3/11	Gilian Gil-Air Pump	8240	D117	Good	Daily while in use	
3/11	Gilian Gil-Air Pump	8241	D117	Good	Daily while in use	
3/11	Gilian Gil-Air Pump	8242	D117	Good	Daily while in use	
3/11	Gilian Gil-Air Pump	8243	D117	Good	Daily while in use	
3/11	Gilian Gil-Air Pump	8244	D117	Good	Daily while in use	
3/11	Dosimeter 909	909/ 9441-010	D202	Good		
3/11	Dosimeter 862	3010846	D202	Good		
3/11	Dosimeter 862	3010857	D202	Good		
3/11	Dosimeter 862	3010856	D202	Good		
3/11	SrY-90 source	0213	D202	Good	N/A	
3/11	Cs-137 source	3788	D202	Good	N/A	
3/11	Th-230 source	3785	D202	Good	N/A	

DESIGNER AND MANUFACTURER
OF
Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. (915) 235-4672
SWEETWATER, TEXAS 79556, U.S.A.

RETURNED GOODS FORM

(PLEASE FILL IN THE APPROPRIATE INFORMATION FOR EACH SHIPMENT)

Date 4/30/97

Item(s) returned for:
☒ Calibration ☒ Repair ☐ Other

Company Name Shieldalloy Metallurgical Corp.

Contact Person Scott Eves / Jim Valenti (Technical or User) Phone (609) 692-4200

Bill to Address:
Shield Alloy Metallurgical Corp.
12 West Blvd.
New Field, NJ 08344

Ship to Address: Ship Via Cheapest
Shieldalloy Metallurgical Corp.
Same as Bill to address

INSTRUMENT/PROBE MODEL NUMBER	SERIAL NUMBER	INSTRUMENT/PROBE MODEL NUMBER	SERIAL NUMBER
ESP-1	03047	Bicron Analyst	A004Q
SPA-3	408462-012	AC-3	407083-37
SAC-4	868	SRM-100	314
		HP-210T	705797

Purchase Order # ☐ Call for PO# ☒ Call with Estimate

Contact Person Scott Eves (Purchasing) Phone (609) 692-4200

Malfunction Symptoms, Special Instructions, etc. Probes/meters are newly paired so HV will be off. Calibrate ESP-1 w/ SPA-3 Bicron w/ AC-3 & SRM-100 w/ HP-210T. Replace AC-3 window. Check for short in ESP-1 probe cable.

Form 34

Serving The Nuclear Industry Since 1962

Area (915) 235-5494

FAX 915-235-4672

RECEIVED

JUN 0 1 1997

ENVIRONMENTAL

PACKING LIST
FROM

LUDLUM MEASUREMENTS, INC.
501 Oak Street
Sweetwater, Texas 79556

2

LMI ORDER:

SHIP TO:

Attn: Scott Eles

CUSTOMER ACCOUNT #	SHIP DATE	SHIP VIA	CUSTOMER P O
	5-22-97	UPS	

ITEM #	DESCRIPTION	QTY SHIPPED	QTY B/O
	SRM-100 S/N 314	1	
	Analyst S/N A004Q	1	
	ESP-1 S/N 03047	1	
	AC-3 S/N 407083	1	
	HP-210T S/N 705797	1	
	SPA3 S/N 408462	1	
	BNC Cable	1	
	BNC/CPI Cable	2	

PLEASE NOTIFY US IMMEDIATELY IF ERROR IS FOUND IN SHIPMENT

CONTAINER NO: 2/2

Area (915) 235-5494

FAX 915-235-4672

PACKING LIST
FROM

LUDLUM MEASUREMENTS, INC.
501 Oak Street
Sweetwater, Texas 79556

/

ORDER:

SHIP TO:

CUSTOMER ACCOUNT #	SHIP DATE	SHIP VIA	CUSTOMER P O
	5-22-97	UPS	

ITEM #	DESCRIPTION	QTY SHIPPED	QTY B/O
	SAC-4 S/N 868	1	
	Power Cord	1	

Jim.
Does this match
what was sent out?

CONTAINER NO: 1/2

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER SHIELDALLOY METALURGICAL CORP. ORDER NO. 223774

Mfg. Eberline Model ESP-1 Serial No. 03049

Mfg. Eberline Model AC-3 Serial No. 407083

Cal. Date 12/23/96 Cal Due Date 12/23/97 Cal. Interval 1 Year Meterface DIGITAL

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☐ Reset ck. ☐ Window Operation ☐ Geotropism
☑ Audio ck. ☑ Alarm Setting ck. ☐ Batt. ck. (Min. Volt) _____ VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 750 V Input Sens. 10 mV Det. Oper. 750 V at 10 mV Threshold Dial Ratio _____ = _____ mV

☑ HV Readout (2 points) Ref./Inst. 5.19 to2 / 500 V Ref./Inst. 1.97 to3 / 2000 V

COMMENTS:

DT = 3.91-07
CC = 1.00 to0
calibrated with 54 cable.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*

*Uncertainty within ± 10% C.F. within ± 20%

All Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	4.00 to5	4.00 to5
	40 K cpm	4.00 to4	4.00 to4
	4 K cpm	4.00 to3	4.00 to3
	400 cpm	4.00 to2	4.00 to2
	40 cpm	4.00 to1	4.00 to1

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 12800cpm ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 54668 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 57390613

Calibrated By: Conrad Valenzuela Date 12/23/96

Reviewed By: Debby Gilmore Date 12-28-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER SHIELDALLOY METALLURGICAL CORP. ORDER NO. 221949

Mfg. Eberline Model SAC-4 Serial No. 868

Mfg. Model Serial No.

Cal. Date 10/07/96 Cal Due Date 10/07/97 Cal. Interval 1 Year Meterface SAC-4

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 47 % Alt 704.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☐ Geotropism
☐ Audio ck. ☐ Alarm Setting ck. ☐ Batt. ck. (Min. Volt) VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 750 V Input Sens. 10 mV Det. Oper. V at mV Threshold Dial Ratio = mV

☐ HV Readout (2 points) Ref./Inst. / V Ref./Inst. / V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	400242	400242
	40 K cpm	40037	40037
	4 K cpm	4001	4001
	400 cpm	400	400
	40 cpm	40	40

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th-230 3442 cpm ☐ Beta S/N ☐ Other

☐ m 500 S/N ☐ Oscilloscope S/N ☐ Multimeter S/N

Calibrated By: Conrad Rabendo Date 10/7/96

Reviewed By: Rhonda Harris Date 10-8-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER SHIELDALLOY METALURGICAL CORP. ORDER NO. 223774

Mfg. Victoreen Model 450P Serial No. 195

Mfg. _____ Model _____ Serial No. _____

Cal. Date 12/23/96 Cal Due Date 12/23/97 Cal. Interval 1 Year Meterface DIGITAL

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☑ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☐ Reset ck. ☐ Window Operation ☐ Geotropism
☐ Audio ck. ☐ Alarm Setting ck. ☐ Batt. ck. (Min. Volt) _____ VDC

☐ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☑ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set _____ V Input Sens. _____ mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

☐ HV Readout (2 points) Ref./Inst. _____ / _____ V Ref./Inst. _____ / _____ V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*

*Uncertainty within ± 10% C.F. within ± 20%

Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	2 R/hr	1.94	1.96	Log Scale			
	200 mR/hr	182	184				
	20 mR/hr	18.5	18.5				
	2 mR/hr	1.87	1.87				
	200uR/hr	165	183				

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☑ G112 ☐ M565 ☑ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☐ m 500 S/N _____ ☐ Oscilloscope S/N _____ ☐ Multimeter S/N _____

Calibrated By: Conrad Salinas Date 12/23/96

Reviewed By: Debby Gilmore Date 12-28-96

FORM C22A 02/27/96

Appendix J - Special Project Records

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Page 1 of 1

Reference No

(1) Client Name SMC	(7) Samples Shipment Date	(5) Bill to:
(2)Collected By: (D Berger)	(8) Lab Destination	
(3) Job/Task No: 94005.01	(9) Lab Contact	
(4) Project Manager:	(12) IEM Technical Contact/Phone	(10) Report to:
(6) Purchase Order No.	(13) Carrier/Waybill No.	
(11) Required Report Date		

ONE CONTAINER PER LINE

(14) Sample Number	(15) Sample Description/Type	(16) Date/Time Collected	(17) Container Type	(18) Sample Volume	(19) Preservative	(20) Requested Testing Program
Smear 1-11	Smear	5/20/97				

(23) Special Instructions

(24) Possible Hazard Identification
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

(25) Sample Disposal
Return to Client ☐ Disposal by Lab ☐ Archive _____ months

(26) Turnaround Time Required: Normal ☐ Rush ☐

(27) QC Level: I ☐ II ☐ III ☐ Project Specific _____

(28) Relinquished by: (signature, date, time): D Berger 5/22/97 1:09	Received by: (signature, date, time) [illegible] 5/28/97 11:00
Relinquished by: (signature, date, time):	Received by: (signature, date, time)
Relinquished by: (signature, date, time):	Received by: (signature, date, time)

(See Reverse for Instructions)

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.
INSTRUMENT FIELD CHECK FORM

Site: SMC - Newfield 94005,01	Probe Type: 43-10-1	Probe Number 132238
Meter Number: Ludlum 2929	Suggested Operating Voltage: 0.75 KV	Check Source Number: Th-230 - 18,600 dpm / Tc99 - 213,608 dpm

Number	Date	Location	Battery OK	Operating Voltage	Background α cpm β	Check Source cpm α β	Name	Remarks
1	5/29/97	IEM Knoxville	✓	0.75	0.5 / 64	5808/59650	Dan Jarvis	See IEM calc. sheet for efficiency.
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

IEM
Integrated Environmental Management, Inc.

Project No: 94045.01	Page 1 of 1
Subject: Instrument check-	
Performed by: Dan Jamis	Date: 5/29/97
Checked by:	Date:

Instrument : Ludlum 2929 w/43-10-1 AR 132238

Avg. of 3 10 min Alpha Background Counts = 5 ÷ 10 = 0.5 cpm

Avg. of 3 10 min Beta background count = 641 ÷ 10 = 64 cpm

10 min Th-230 18,600 dpm source check = 58,075 ÷ 10 = 5808 cpm

5 min Tc-99 213,008 dpm source check = 298249 ÷ 5 = 59,650 cpm

Ludlum 2929 voltage = 0.75 KV

Efficiency for Alpha = 5808 cpm ÷ 18,600 dpm = 0.31

Efficiency for Beta = 59,650 cpm ÷ 213,008 dpm = 0.28

$$MDA = \frac{3.71 + 4.65\sqrt{Bkg\ AVG. * t}}{t * Eff.}$$

$$\text{Alpha } MDA = \frac{3.71 + 4.65\sqrt{0.5 * 1}}{1 * 0.31} = 19.3 \text{ dpm}$$

$$\text{Beta } MDA = \frac{3.71 + 4.65\sqrt{64 * 1}}{1 * 0.28} = 142.5 \text{ dpm}$$

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR132238

Order #. 225688

Customer INTEGRATED ENV.MGT.

Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 126126

Beta Input Sensitivity 4 mV

Count Time 1Minute

Beta Window 50 mV

Other

Distance Source to Detector tray

High Voltage	Background		Isotope Pu 239 Size 12.8kcpm		Isotope Tc 99 Size 14.3kcpm		Isotope C14 Size ≈ 0.165μCi	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
675	0	55	9485	497	2	7823	1	28155
700	1	54	9792	432	6	8278	0	33306
725	0	72	9829	437	10	9010	0	38821

Signature Lori Martin

Date 4-4-97

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CERTIFICATE OF CALIBRATION

CUSTOMER INTEGRATED ENV.MGT. ORDER NO. 225688

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 126126

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR 132238

Cal. Date 04/04/97 Cal Due Date 04/04/98 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 51 % Alt 693.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 700 V = 2.86 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 498 / 500 V Ref./Inst. 2016 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Alpha Channel Digital Readout	400K cpm	400226	400226
	40K cpm	40024	40024
	4K cpm	4001	4001
	400 cpm	400	400
	40 cpm	40	40

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Beta/Gamma Channel Digital Readout	400K cpm	400269	400269
	40K cpm	40030	40030
	4K cpm	4000	4000
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ 512 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N Pu239#8743 ☑ Beta S/N C14 # 200A101884 Tc99#635/83 ☐ Other

☑ m 500 S/N 121036 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Louis Martinez Date 4-4-97

Reviewed By: Conrad Salinas Date 4/4/97

FORM C25 02/11/97

This report was prepared under the direction of
Shieldalloy Metallurgical Corporation

by

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