

ACCEPTANCE REVIEW MEMO

Licensee: University of Hawaii

License No.: 53-00017-23

Docket No.: 030-07517

Mail Control No.: 470848

Type of Action: Amend Date of Requested Action: 01-29-06

Reviewer Assigned: Jim Date Assigned to Reviewer: 01-06-06

Reviewer(s) Who Performed Review: Torres

| Response Received | Deficiencies Noted During Acceptance Review |
|-------------------|---|
| | 1. |
| | 2. |
| | 3. |
| | 4. |

Reviewer's Initials: _____

Date: _____

Branch Chief's and/or SR. HP's Initials: _____

Date: _____

- ☐ Yes ☐ No Action - decommissioning notification should be issued within 30 days.
- ☐ Yes ☐ No Termination request < 90 days from date of expiration
- ☐ Yes ☐ No Action to be expedited
- _____ Medical emergency
- _____ Licensee in noncompliance (i.e. no RSO, location of use/storage not on license, radioactive material in possession not on license)
- _____ National Security
- _____ Other (_____)

Branch Chief's and/or Sr. HP's Initials: _____

Date: _____

SISP Review

☒ Yes ☐ No

Not Publicly Available, Sensitive if any item below is checked

- ☒ Radionuclides, forms, and quantities
- _____ Location of RAM
- ☒ Building drawings with locations of RAM
- _____ Security of RAM (locks, alarms, etc.)
- _____ SS&D Control Information
- _____ Specific Emergency Plan (routes to and from RAM, response to security events, etc.)
- _____ Safeguards Information

Branch Chief's and/or Sr. HP's Initials: MT

Date: 2/6/06

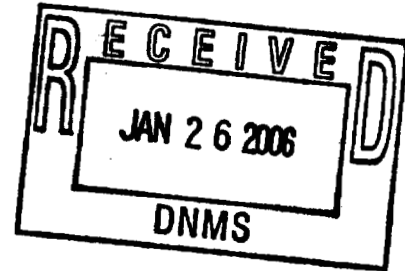
19 January 2006

Aloha Jim!

ATC

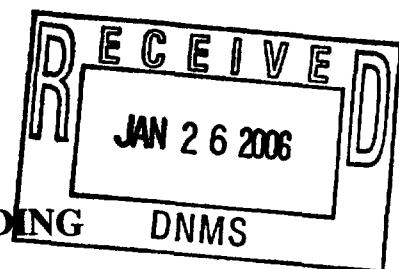
Here's a copy of the Queen's
Tower Decommission report.

Thanks for your patience.



Nancy Miyake

**FINAL RADIOLOGICAL STATUS REPORT
FOR
UNIVERSITY TOWERS IN THE QUEEN'S BUILDING**



1.0 Background Information

RK
UH Tower is located at 1356 Lusitana Street, 7th Floor, Honolulu, Hawaii, 96813-2427. The researcher using radioisotopes at UH Tower was Dr. Richard F. Arakaki (1991-2003). Dr. Arakaki used I-125 compounds for tracer studies in radioimmunoassay and radioreceptor assays, while he used H-3-myristic, and palmitic acids, C-14-myristic acid, P-32 and S-35 in in-vitro translation system studies, and lastly, C-14-glucose was used in tracer studies of glucose transport. Dr. Arakaki worked for the University of Hawaii, Manoa at the time, under NRC License 53-00017-23.

Any unused radioactive isotopes were returned to the Environmental Health and Safety Office, Radiation Safety Program for disposal.

In June-July 2004, a survey to determine the final radiological status was performed for UH Tower, rooms 717, 720 and 722. The surveys were performed in accordance with the *Manual for Conducting Radiological Surveys in Support of License Termination (NUREG/CR-5849)*. This report describes the results of that survey and demonstrates that the room in which radioactive materials were used and stored satisfies the NRC guidelines, established for release of formerly licensed site for unrestricted use.

2.0 Site Information

2.1 Site Description

The 7th floor was under lease to the University of Hawaii, and has since been returned to Queen's Hospital. Dr. Arakaki used no radioisotopes since December 2002.

2.2 Site Conditions at Time of Final Survey

As part of the decommissioning activities, equipment were cleaned and released or disposed of as radioactive waste.

2.3 Identity of Potential Contaminants and Release Guidelines

Dr. Arakaki was authorized for ³H (30 mCi), ¹⁴C (2 mCi), ³²P (1 mCi), ³⁵S (2 mCi), and ¹²⁵I (1 mCi). The isotopes used were in liquid form. There were no major spills of any licensed isotope or any leaking sealed source used or stored by

any of the individuals named. More than ten half-lives have past since the last use of ^{125}I , ^{32}P or ^{35}S in any of the rooms used by Dr. Arakaki.

The average, maximum, and removable acceptable surface contamination levels in the NRC, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" dated August 1987 were used as the surface contamination guideline levels.

3.0 Final Status Survey Overview

3.1 Survey Objectives

The purpose of the final survey was to demonstrate that the radiological conditions at UH Tower rooms 717, 720, and 722 satisfy the NRC Guidelines and that the rooms can therefore be released from licensing restrictions for future use without radiological controls. The specific objectives of the survey were to show that:

a. **Surface Activity in the Rooms**

Average surface activity levels (total of fixed and removable activity) are at or below guidelines values established as acceptable by NRC.

Reasonable efforts have been made to identify, evaluate, and remove areas of residual activity exceeding the guideline value.

Reasonable efforts have been made to clean up removable activity and removable activity in a 100-cm² area does not exceed 20% of the average surface activity values.

b. **Exposure Rate**

Exposure rates do not exceed 5 $\mu\text{R/h}$ above background at 1 m above the surface.

The objective of the survey was to demonstrate at a 95% minimum level of confidence that the above conditions have been met.

3.2 Organization and Responsibilities

The survey performed was by a team composed of qualified personnel from the Environmental Health and Safety Office's Radiation Safety Program. The organizational structure which conducted the characterization survey activities are presented in Attachment (1). The training and qualifications of the individuals performing the surveys and decontamination is listed in Attachment (2)

The University of Hawaii's Radiation Safety Program in accordance with the University of Hawaii's NRC License 53-00017-23 performed the analysis for gross gamma, and gross beta levels on smears.

3.3 Instrumentation

Attachment (3) lists the instrumentation used for the survey activities, along with parameters and detection sensitivities for the instrumentation and survey technique. The combination of instrumentation and technique were chosen to provide a detection sensitivity of 25% or less of the guideline levels. The Micro R Meters were calibrated a minimum of once every year, the meter used for surface scans was calibrated once every six months, and the gross gamma and liquid scintillation analyzer was calibrated during use using NIST-traceable standards.

3.4 Survey Procedures

Survey planning and procedures were in accordance with the *Manual for Conducting Radiological Surveys in Support of License Termination*, NUREG/CR-5849. Procedures are briefly described in this section.

3.4.1 Area Classification

For purposes of establishing the sampling and measurement frequency and pattern, the rooms were classified as affected area. The basis for this classification is:

Affected areas: Areas that have potential radioactive contamination or known radioactive contamination (based on past or preliminary radiological surveillance). This includes areas where radioactive materials were used and stored, where records indicate spills or other unusual occurrences that could have resulted in spread of contamination.

3.4.2 Reference Grids

Grids were established for the purpose of referencing locations of samples and measurements, relative to the rooms. The grid intervals were based on the potential for residual contamination in the rooms (Attachment 4). All affected rooms, floors and walls surfaces were grid at 3 ft. intervals.

3.4.3 Surface Scans

Scanning of surfaces to identify locations of residual surface and near-surface activity was performed according to the following schedule:

Affected area surfaces: 100% of surface

Room surface scans were conducted for beta-gamma radiations.

Instrumentation for scanning is listed in Attachment (3). The instruments having the lowest detection sensitivity were used for the scans, wherever physical surface conditions and measurement locations permitted.

Scanning speeds were 1 detector width per second for beta detection instruments and 0.5 m per second for gamma instruments.

3.4.4 Surface Activity Measurements

a. Direct Measurements

Direct measurements of beta-gamma surface activity were performed over grid areas using instrumentation described in Attachment (3). Unless precluded by surface conditions or physical parameters, the most sensitive of the instruments listed for surface measurements (Attachment 3) were used. Attachment (4) shows grid over which direct measurement were taken.

Measurement spacings/frequencies were as follows:

Floor and walls:

Affected areas: 3 ft. intervals floor and walls.

b. Removable Contamination Measurements

A smear for removable contamination was performed at each grid area.

3.4.5 Exposure Rate Measurements

Gamma exposure rates were measured at 1 m above floor surfaces, using a gamma scintillation instrument. Measurements were uniformly spaced according to the following pattern:

Room Surveyed

Affected areas: Measurement was taken over the grid areas.

3.4.6 Special Measurements and Samples

Room Interiors

Hood and refrigerator in affected area was accessed, smears, direct beta-gamma scans and measurements performed at all access points, and a swab obtained from sink drains.

3.5 Background Level Determinations

Background exposure rates were determined for the rooms by taking measurements outside the rooms.

3.6 Sample Analysis

Smears and swabs for removable contamination were analyzed for gross gamma activity.

3.7 Data Interpretation

Data conversions and evaluations were performed, following the guidance in NUREG/CR-5849. Measurement data were converted to units of dpm/100 cm² (surface activity) and μ R/h (exposure rates) for comparison with guidelines.

Additional remediation and/or further sampling and measurements were not performed since guideline levels were met.

3.8 Records

Original survey data have been archived at the Radiation Safety Program office and will be held until such time as authorized by the NRC for disposal.

4.0 Survey Findings and Results

Attachment (4) contains the grids for the rooms. The numbers in the grid correspond to the results of smears and swabs taken. A total of 264 smears and

swabs were taken in the rooms. The rooms were scanned and radiation survey performed with the instrument listed in Attachment (3).

4.1 Background Levels

Background exposure rates outside the rooms were 3 to 4 $\mu\text{R/h}$ using the Ludlum Model 12S Micro R Meter. The instrument is listed in Attachment (3).

4.2 Laboratory and Counting Room Surveys

a. Scans

Scans were conducted over the grid areas of Attachment (4) and the hood. Scans of surfaces did not identify any areas of residual contamination. The readings were less than 120 counts above the background. The background was 30 to 40 cpm using the Ludlum Model 3 survey meter with Ludlum Model 44-9 pancake defector. The instrument is listed in Attachment (3).

b. Surface Activity Measurement

Surface activity measurements were determined by taking smears and swabs in the grid areas shown in Attachment (4). The results of the smears and swab in Attachment (4) correspond to the number in the grid. All individual measurements were within guideline levels. The Packard Multi-Prias Auto-Gamma System listed in Attachment (3) was used to count the smears and swabs with many of the measurement being below the sensitivity levels of the procedures.

c. Exposure Rates

Exposure rates inside the rooms from 3 to 4 $\mu\text{R/h}$ using the Ludlum Model 12S Micro R Meter. The background was 3 to 4 $\mu\text{R/hr}$. The instrument is listed in Attachment (3). These rates were within the guideline levels of 5 $\mu\text{R/h}$ above background.

4.3 Data Evaluation

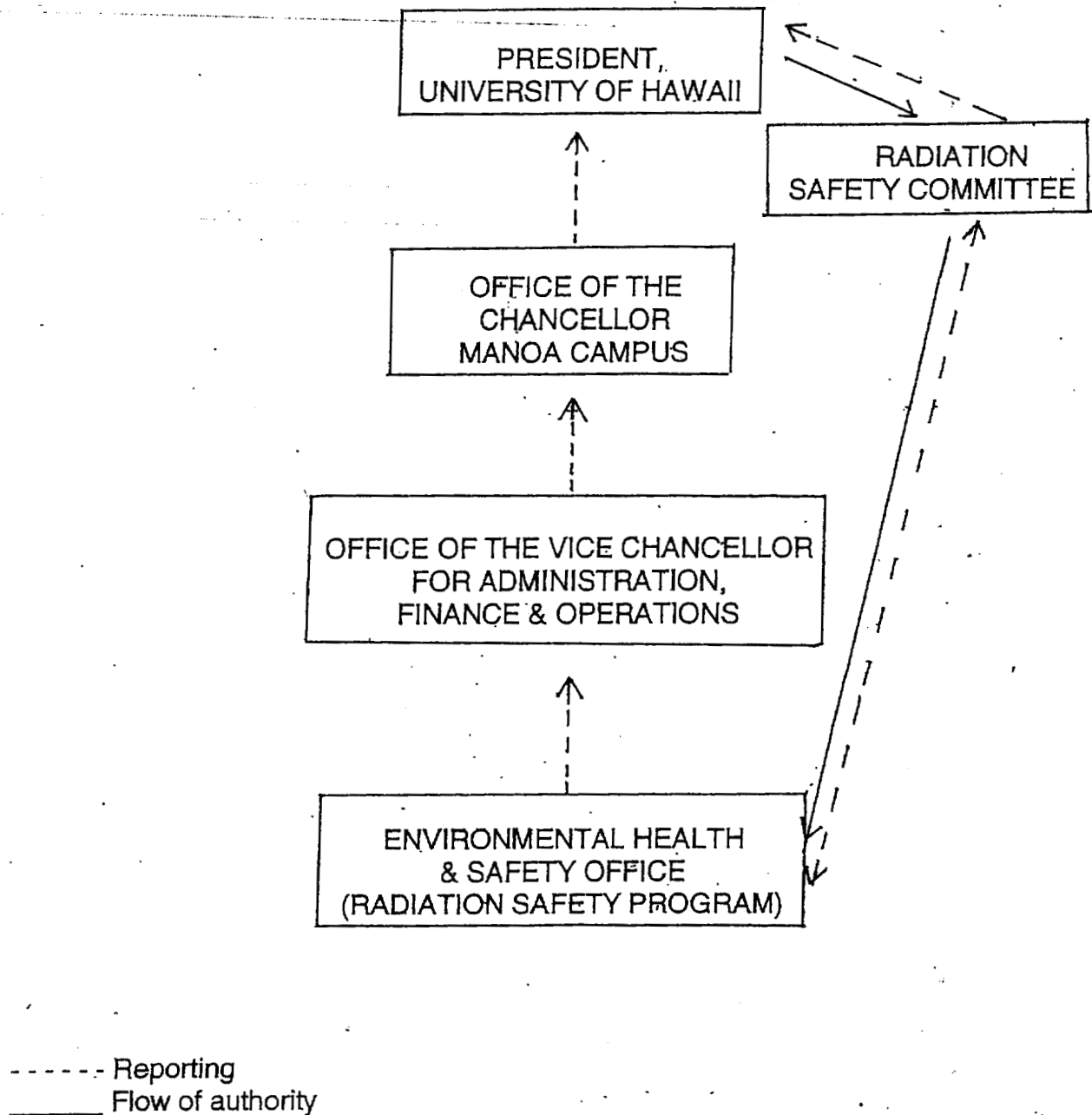
The results of the radiation and contamination surveys indicated the guidelines were satisfied at the 95% confidence level conditions.

4.4 Summary

During June-July 2004 surveys of the rooms in UH Tower at the Queen's Building, leased to the University of Hawaii at Manoa campus were conducted. Results of the survey demonstrate that the activity at the site meet the NRC limits for release for unrestricted use.

Attachment (1)

ORGANIZATIONAL CHART FOR REPORTING AND FLOW OF AUTHORITY
(Updated 05-14-03)



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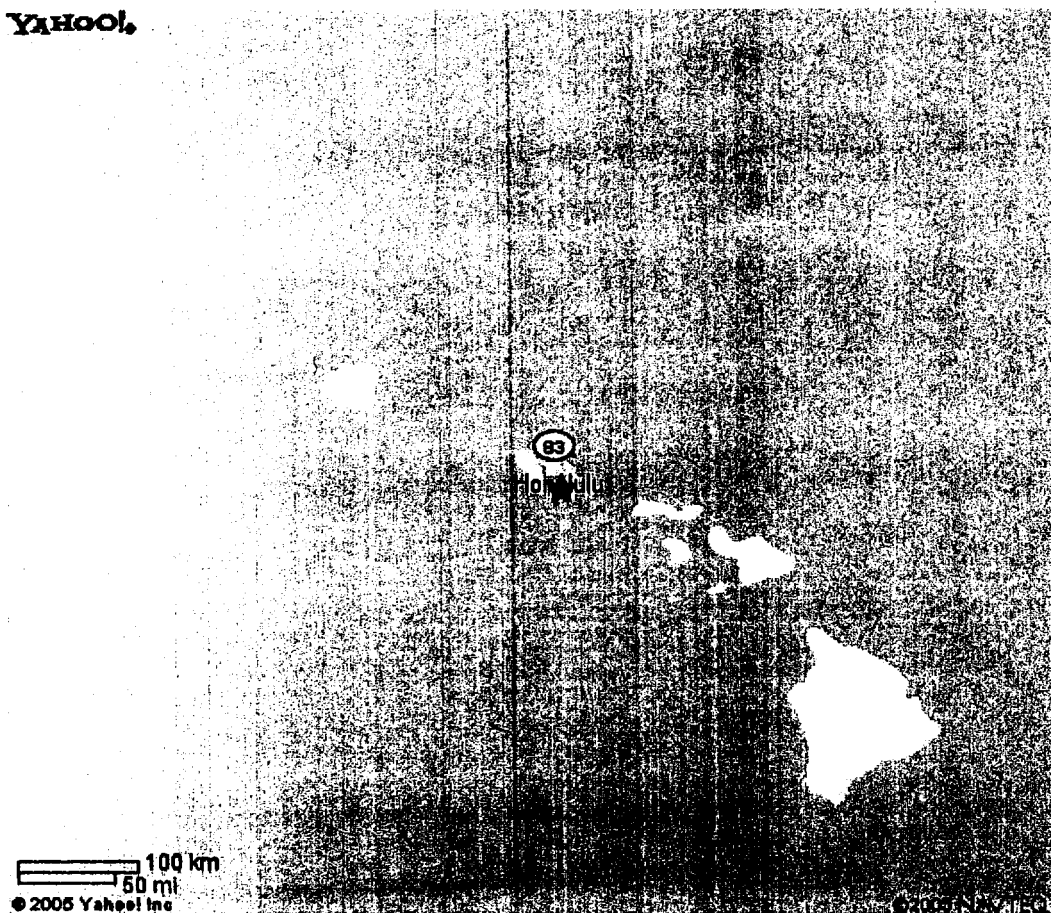
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When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

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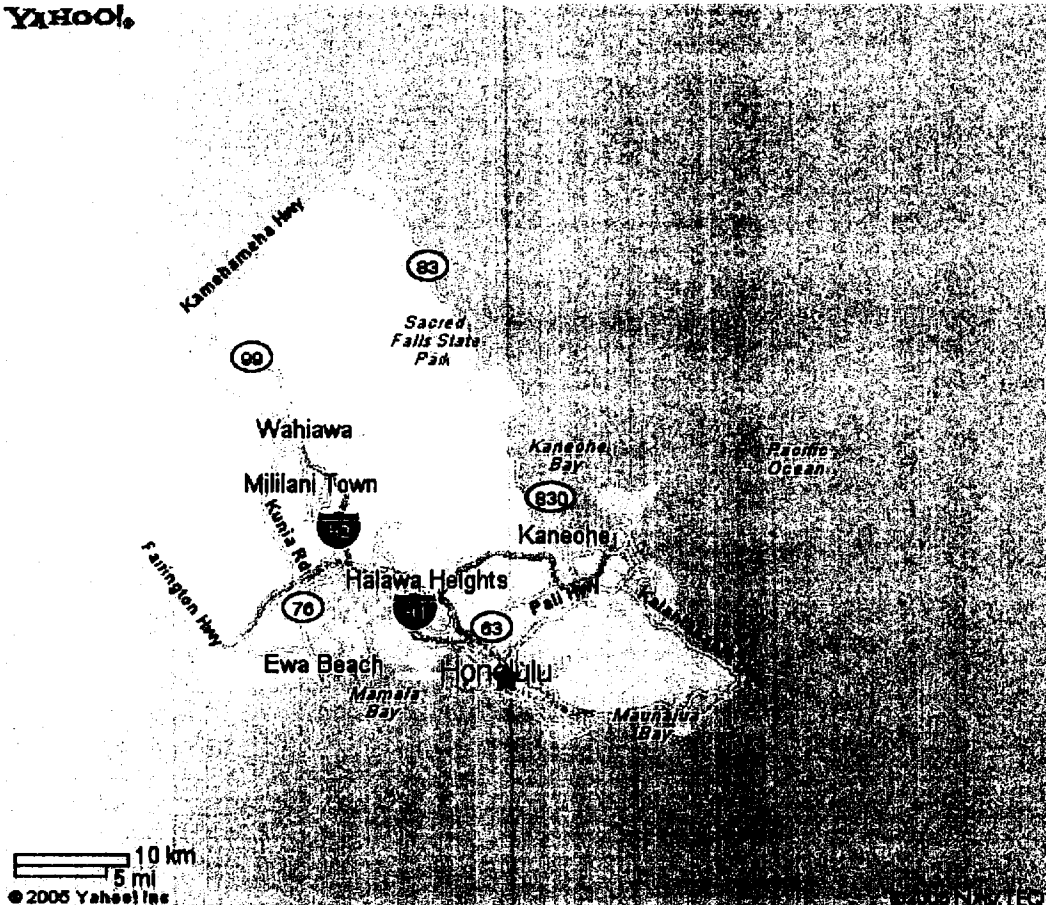
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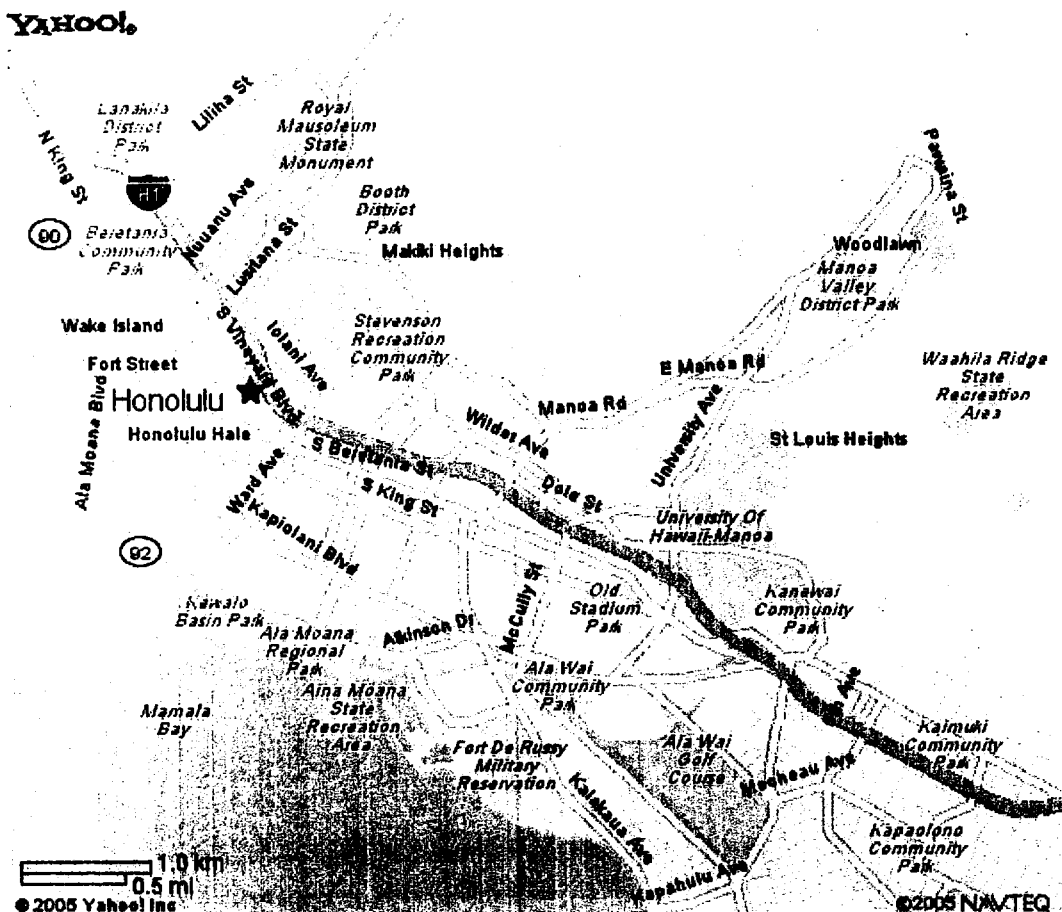
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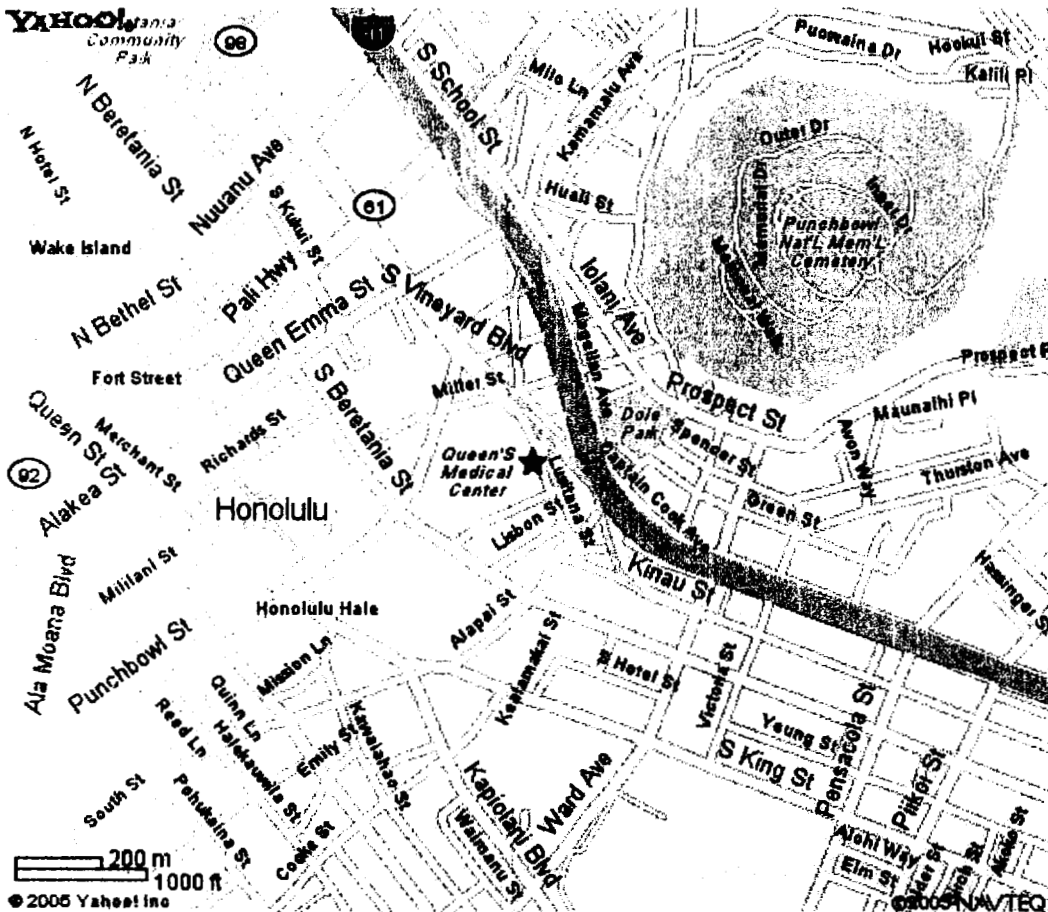
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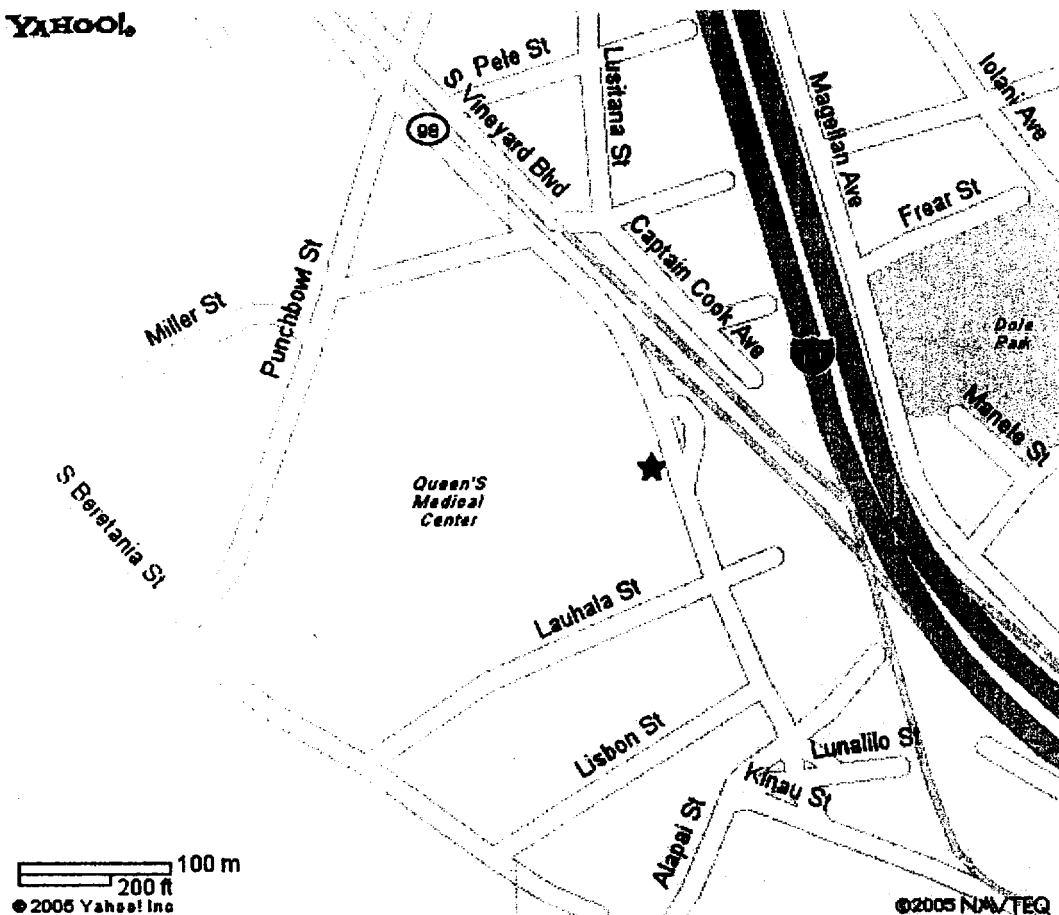
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Attachment (2)

**Training Record for Irene Sakimoto
Radiation Safety Officer**

1. **Pearl Harbor Naval Shipyard Radiological Control Technician.
Date: 1981-1983**
2. **University of Hawaii Environmental Safety Specialist III.
Date: 1983-1990**
3. **Radiation Safety Officer training class (40 hours) at the University of Texas
Health Sciences Center.
Date: 1990**
4. **Internal Dosimetry – Short Course, Berkeley, CA.
Date: October 1991**
5. **NIOSH Ionizing and Non-ionizing Training Class (40 hours) at the University of
Southern California.
Date: September 2000**
6. **Laser Safety Officer Training (40 hours) by the Laser Institute of America.
Date: September 2000**
7. **Transporting Dangerous Good by Air, IATA Initial training.
Date: December 2004**
8. **Transportation Skills Programs, Inc., Hazardous Materials and Waste
Management and Compliance Seminar.
Date: January 2005**

Attachment (2)

**Training Record for Nancy Miyake
Radiation Safety Specialist**

1. **Radiation Safety Training by Irene Sakimoto. Radiation Safety Officer of the University of Hawaii's Radiation Safety Program.
Date: September 1995**
2. **IATA by Aloha Airlines.
Date: September 1996**
3. **Spill Prevention Guidelines, Containment and Transport of Hazardous Waste sponsored by Safety Systems.
Date: March 1997**
4. **Health Physics Technician by Radiation Safety Associates, Inc.
Date: May 1999**
5. **Radiation Safety Officer Training by Ohmart-Vega.
Date: February 2001**
6. **Hazardous Waste Management Training
Date: September 2002**
7. **Hazardous Materials & Waste Management and Compliance Seminar by Transportation Skills Program, Inc.
Date: January 2003**
8. **Radiation Detection and Measurement by Technical Management Services, Inc.
Date: March 2004**
9. **Transporting Dangerous Goods By Air – IATA Initial.
Date: July 2005**

Attachment (2)

**Training Record for A. Brad Smith
Radiation Safety Technician**

1. **Radiation Safety Training by Irene Sakimoto. Radiation Safety Officer of the University of Hawaii's Radiation Safety Program.
Date: July 2004**
2. **Transporting Dangerous Goods By Air – IATA Initial.
Date: 11/17/2004**
3. **Hazardous Materials & Waste Management and Compliance Seminar by Transportation Skills Program, Inc.
Date: 01/25/2005**
4. **Occupational and Environmental Radiation Protection by Harvard School of Public Health
Date: April 2005**

Attachment (3)

SURVEY INSTRUMENT USED AND CERTIFICATION

| <u>Survey Instrument Used</u> | <u>Instrument Certification and Tested</u> | <u>Type of Measurement</u> | <u>Efficiency</u> | <u>Minimum Detectable Activity</u> |
|--|---|--|-------------------------|---|
| 1. Ludlum Model 12S, Micro R Meter, Ser. No. 29441 | 09/22/2003 | Surface Scans Gamma | | 3 uR/h above Background |
| 2. Ludlum Model 2401-P, Ser. No. 174865 (pancake detector) | 09/22/2003 | Surface Scans Beta-Gamma | P-32, 58% S-35, 1.7% | 200 dpm under the probe (20 cm ²), P-32 equivalent |
| 3. Ludlum Model 3, Ser. No. 86788 with Ludlum Model 44-9 Ser. No. PR 112927 (pancake detector) | 11/03/2003 | Surface Scans Beta-gamma | P-32, 65% S-35, 2% | 200 dpm under the probe (20 cm ²), P-32 equivalent |
| 4. Ludlum Model 2, Ser. No. 11602 with Ludlum Model 44-7, Ser. No. RN014790 (open-end detector) | 12/29/2003 | Surface Scans alpha-beta-gamma surveys | | 2100 cpm/mR/hr, Cs-137 gamma (6 cm ²) |
| 5. Packard, 1900CA, TRI-CARB, Liquid Scintillation Analyzer, Serial No. 102434 | Before Use BG, H-3, C-14 standards provided by Packard Instrument | Gross alpha/ beta on smears, 0-12 kEv 12-156 kEv 0-200 kEv | C-14, 95% H-3, 60% | 17.07 dpm 15.71 dpm |

PACKARD STANDARDS USED TO CHECK ANALYZER

H-3, <2.0 uCi, 260500 dpm, 16 Feb. 1998, Serial No. 48

C-14, <0.1 uCi, 122900 dpm, 16 Feb. 1998, Serial No. 107



Designer and Manufacturer
of
Scientific and Industrial
Instruments

Attachment (3)

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER UNIV OF HAWAII

ORDER NO. 208143/277765

Mfg. Ludlum Measurements, Inc.

Model 2

Serial No. 11602

Mfg. Ludlum Measurements, Inc.

Model 44-7

Serial No. RN014790

Cal. Date 29-Dec-03

Cal Due Date 29-Jun-04

Cal. Interval 6 Months Meterface 202-001

Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 703.8 mm Hg

☐ New Instrument ☐ Instrument Received ☐ Within Toler. +10% ☐ 10-20% ☐ Out of Tol. ☒ Requiring Repair ☐ Other-See comments

☒ Mechanical ck.

☒ Meter Zeroed

☐ Background Subtract

☐ Input Sens. Linearity

☒ F/S Resp. ck

☒ Reset ck.

☐ Window Operation

☒ Geotopism

☐ Audio ck.

☐ Alarm Setting ck.

☒ Batt. ck. (Min. Volt) 2.2 VDC

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

☒ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 900 V Input Sens. 31 mV Det. Oper. 900 V at 31 mV Threshold Dial Ratio =

☐ 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* |
|------------------|-------------------------|--|------------------------------|
| X 10 | 40 mR/hr | NA | 4 |
| X 10 | 10 mR/hr | | 1 |
| X 1 | 4 mR/hr = 7600 cpm | | 4 |
| X 1 | 1 mR/hr | | 4 |
| X 0.1 | 760 cpm | | 4 |
| X 0.1 | 190 cpm | | |
| | | | |
| | | | |
| | | | |
| | | | |

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

X 0.1 Range(s) Calibrated Electronically

| REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* | REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|-------------------------|------------------------|------------------------------|-------------------------|------------------------|------------------------------|
| Digital Readout | | | 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 ANSI/NCSL Z540-1-1994 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 ☐ E552 ☒ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☒ m 500 S/N 132899 ☐ Oscilloscope S/N ☒ Multimeter S/N 82080087

Calibrated By: Josh Boston

Date 29 Dec 03

Reviewed By: Rhonda Hermin

Date 31 Dec 03

Page 2 of 6

Attachment (3)
UNIVERSITY OF HAWAII AT MANOA
RADIATION SAFETY OFFICE
INSTRUMENT CALIBRATION RECORD

Instrument Ludlum #3 Date of Calibration 11/3/03
Serial Number 86788 Date Due Next 11/3/04
Detector Model 44-9 Detector Serial Number PR 112927
Type of Source (1) 90 Sr Activity of Source (1) 0.0198 μ Ci
(2) 14 C (2) 0.155 μ Ci

| RANGE | CALIBRATION POINT | READING | % OFF |
|-------|----------------------------------|---------|-------|
| X0.1 | 100 | 100 | |
| X0.1 | 400 | 400 | |
| X1 | 1000 | 1000 | |
| X1 | 4000 | 4000 | |
| X10 | 10,000 | 10,000 | |
| X10 | 40,000 | 40,000 | |
| X100 | ^{NM} 100,000 | 100,000 | |
| X100 | 400,000 | 400,000 | |
| | | | |
| | | | |
| | | | |

Operation Voltage 1.0 VOLTS

Efficiency (%):

Radioactive Source Check: satisfactory

S-35: 2%

I-125: _____

Principal Investigator RSP

P-32: 65%

Other: _____

Signature [Signature]



Designer and Manufacturer
of
Scientific and Industrial
Instruments

Attachment (3)

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

1. T OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER UNIVERSITY OF HAWAII

ORDER NO. 203248 / 275323

Mfg. Ludlum Measurements, Inc. Model 2401-P Serial No. 174865

Mfg. _____ Model _____ Serial No. _____

Cal. Date 22-Sep-03 Cal Due Date 22-Mar-04 Cal. Interval 6 Months Meterface 202-857

Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 74 °F RH 48 % Alt 704.8 mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler. +10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☐ F/S Resp. ck. ☐ Reset ck. ☐ Window Operation ☒ Geotrolism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 7.2 VDC

☐ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☒ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 879 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* |
|------------------|----------------------|-------------------------------------|---------------------------|
| X 100 | 10 mR/hr | 0.105 | 0.10 |
| X 100 | 5 mR/hr | 0.055 | 0.05 |
| X 10 | 1 mR/hr = 3220 cpm | 0.10 | 0.10 |
| X 10 | 500 µR/hr | 0.05 | 0.05 |
| X 1 | 322 cpm | 0.10 | 0.10 |
| X 1 | 161 cpm | 0.05 | 0.05 |
| | | | |
| | | | |
| | | | |

*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 | | | 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 ANSI/NCSL Z540-1-1994 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 ☐ E552 ☒ E551

☐ Neutron Am-241 Be S/N T-304

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

☒ m 500 S/N 134709 ☐ Oscilloscope S/N _____ ☒ Multimeter S/N 57390613

Calibrated By: Conrad Galindo Date 22 Sep 03

Reviewed By: W. R. R. R. Date 23 Sep 03 Page 4 of 6

RECEIVED
JAN 26 2006
DNMS

Instrument Ludlum 2401-P Date of Calibration 9/22/03
Serial Number 174365 Date Due Next 9/22/04
Detector Model 44-9 Detector Serial Number _____
Type of Source (1) 90 Sr Activity of Source (1) 0.0124 μ ci
(2) 14 C (2) 0.155 μ ci

[illegible]

Page 5 of 6



Scientific and Industrial
Instruments

Attachment (3)

CERTIFICATE OF CALIBRATION

OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER UNIVERSITY OF HAWAII

ORDER NO. 203248 / 275323

Mfg. Ludlum Measurements, Inc. Model 12S Serial No. 142323

Mfg. Model Serial No.

Cal. Date 22-Sep-03 Cal Due Date 22-Mar-04 Cal. Interval 6 Months Meterface 202-004

Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 74 °F RH 48 % Alt 704.8 mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler. +10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ 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) 2.2 VDC

☐ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☒ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 775 V Input Sens. 32 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* |
|------------------|----------------------------|--|------------------------------|
| X 1000 | 2000 μ R/hr | 19 | 2 |
| X 1000 | 1000 μ R/hr | 1 | 1 |
| X 100 | 200 μ R/hr = 35300 cpm | 19 | 2 |
| X 100 | 100 μ R/hr | 1 | 1 |
| X 10 | 3530 cpm | 2 | 2 |
| X 10 | 1760 cpm | 1 | 1 |
| X 1 | 353 cpm | 2 | 2 |
| X 1 | 176 cpm | 1 | 1 |

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

X10,X1 Range(s) Calibrated Electronically

| REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* | REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|-------------------------|------------------------|------------------------------|-------------------------|------------------------|------------------------------|
| Digital Readout | | | 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 ANSI/NCSL Z540-1-1994 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 ☐ E552 ☐ E551

☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

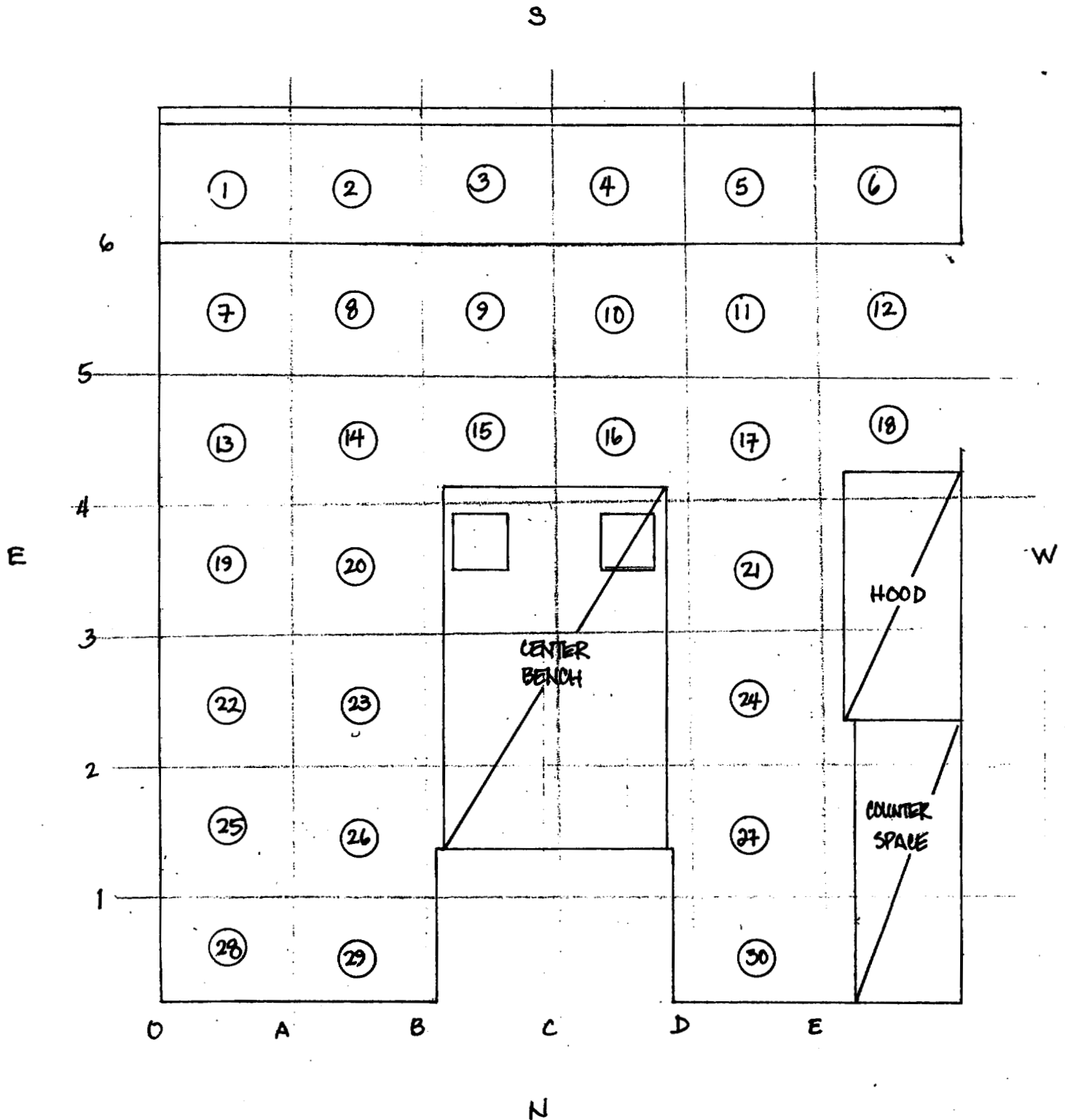
☒ m 500 S/N 134709 ☐ Oscilloscope S/N ☒ Multimeter S/N 57390613

Calibrated By: Conrad Johnson Date 22 Sep 03

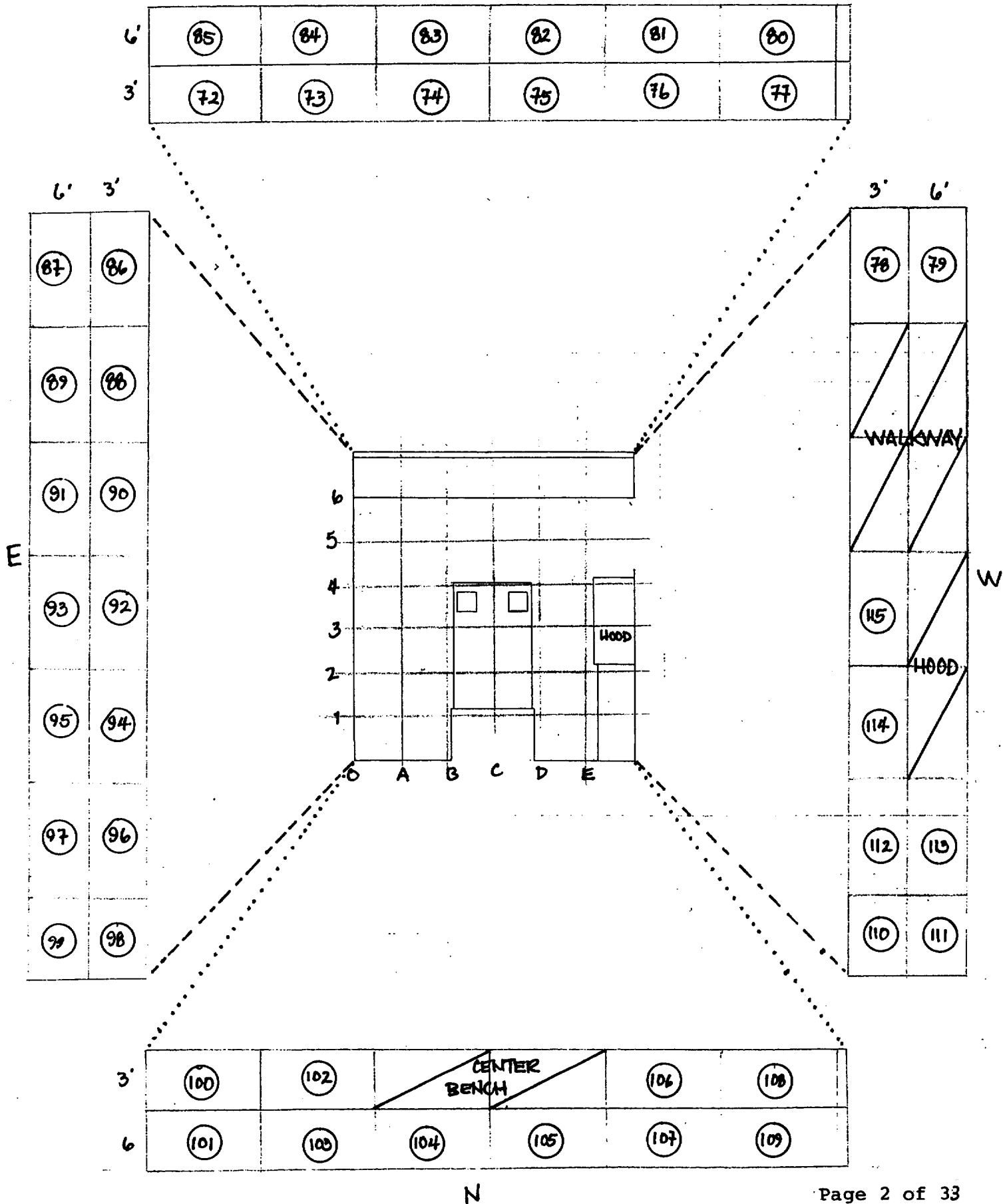
Reviewed By: W. Ruben Date 23 Sep 03

Page 6 of 1

Attachment (4) Diagram (I)
UH Tower-floor
Room 717

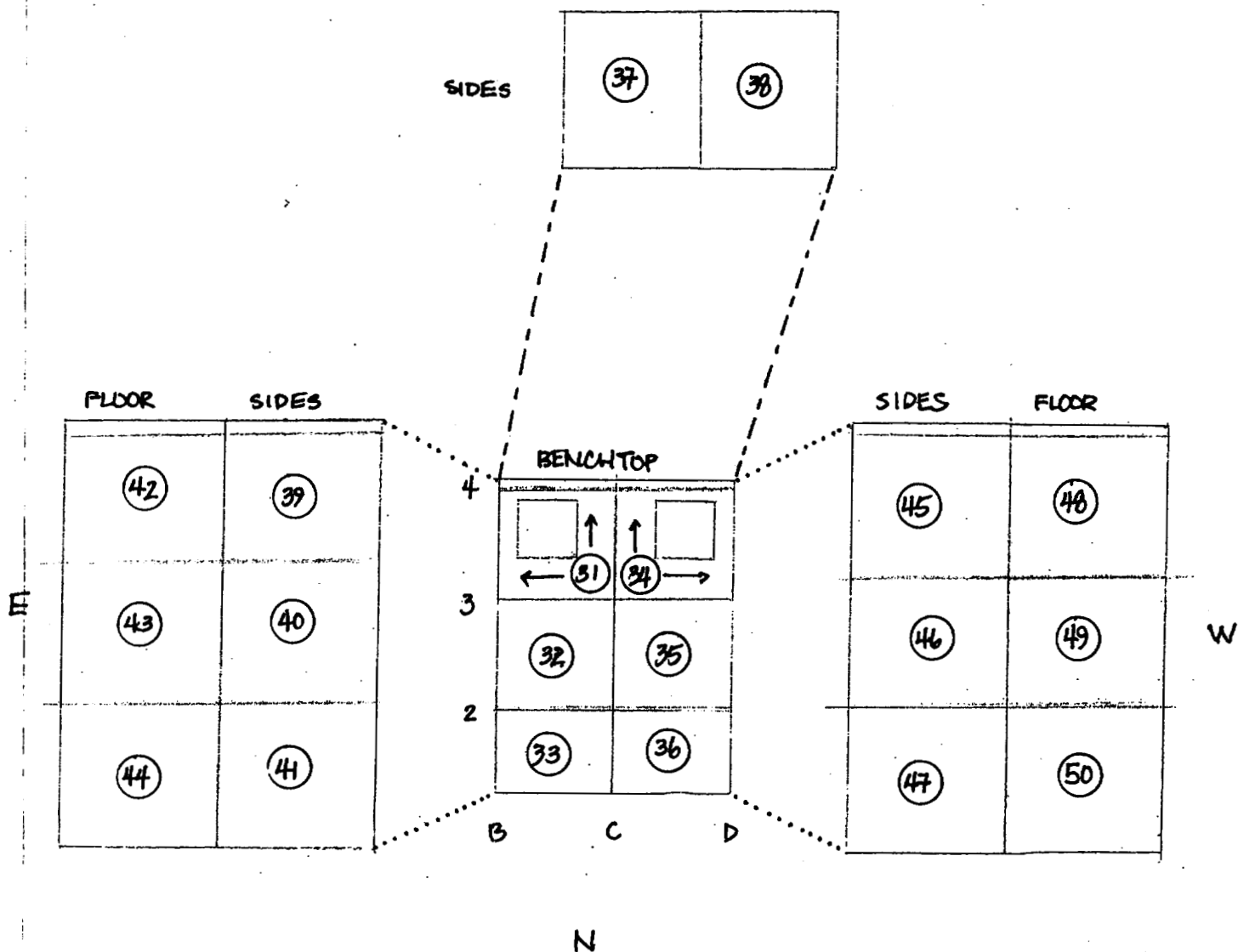


Attachment (4) Diagram (I)
UH Tower--walls
Room 717
S

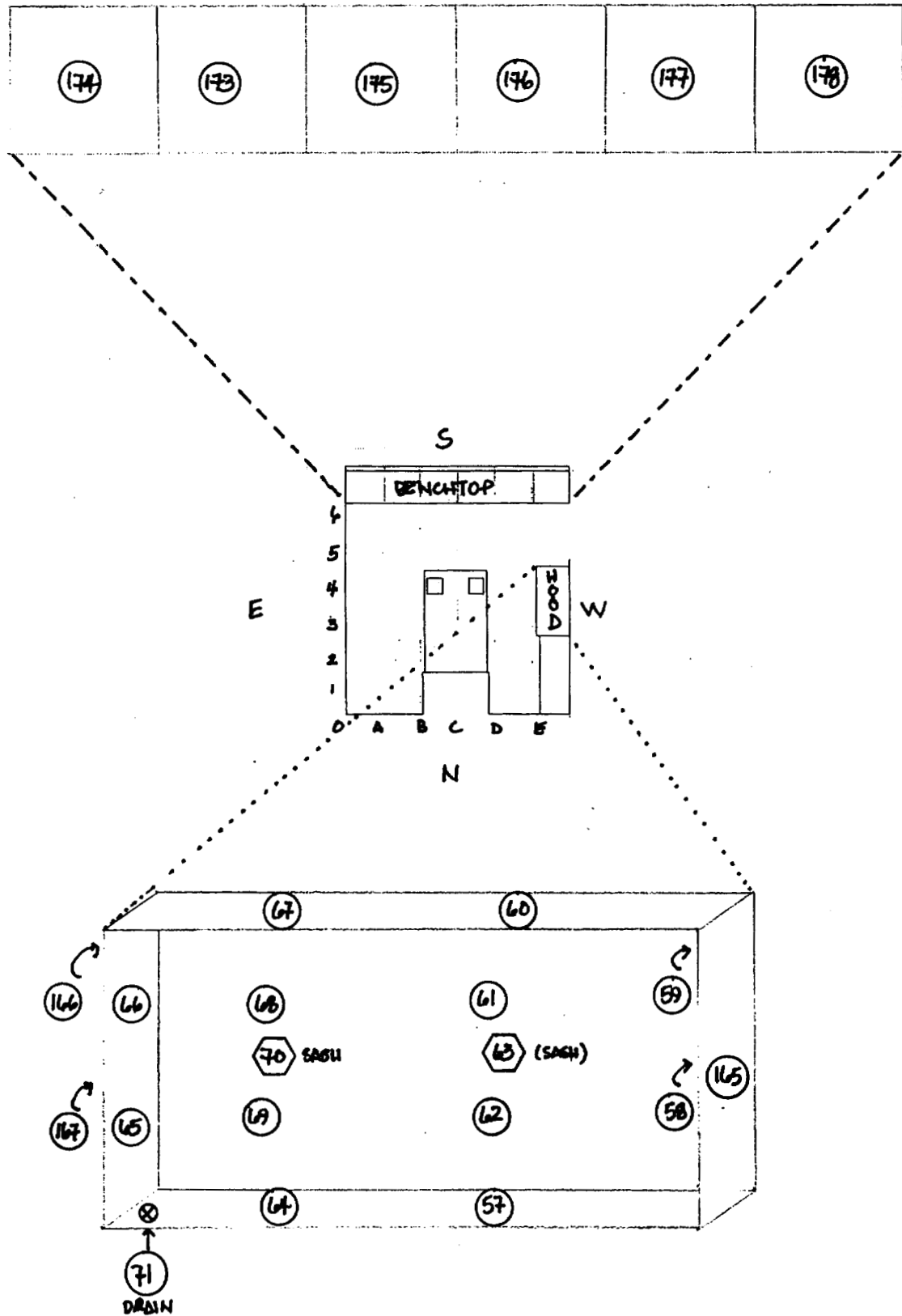


Attachment (4) Diagram (I)
UH Tower 717-center bench (on top, sides), and floors
Room 717

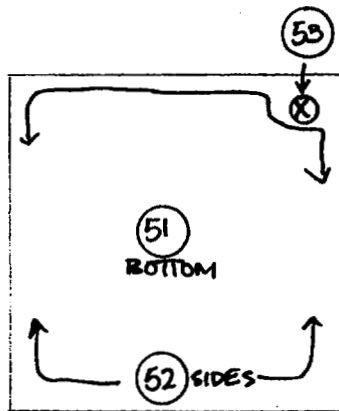
S



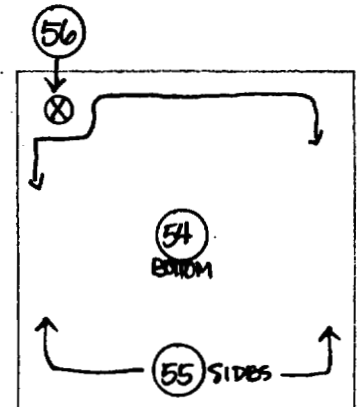
Attachment (4) Diagram (I)
UH Tower-hood, bench top-southside
Room 717



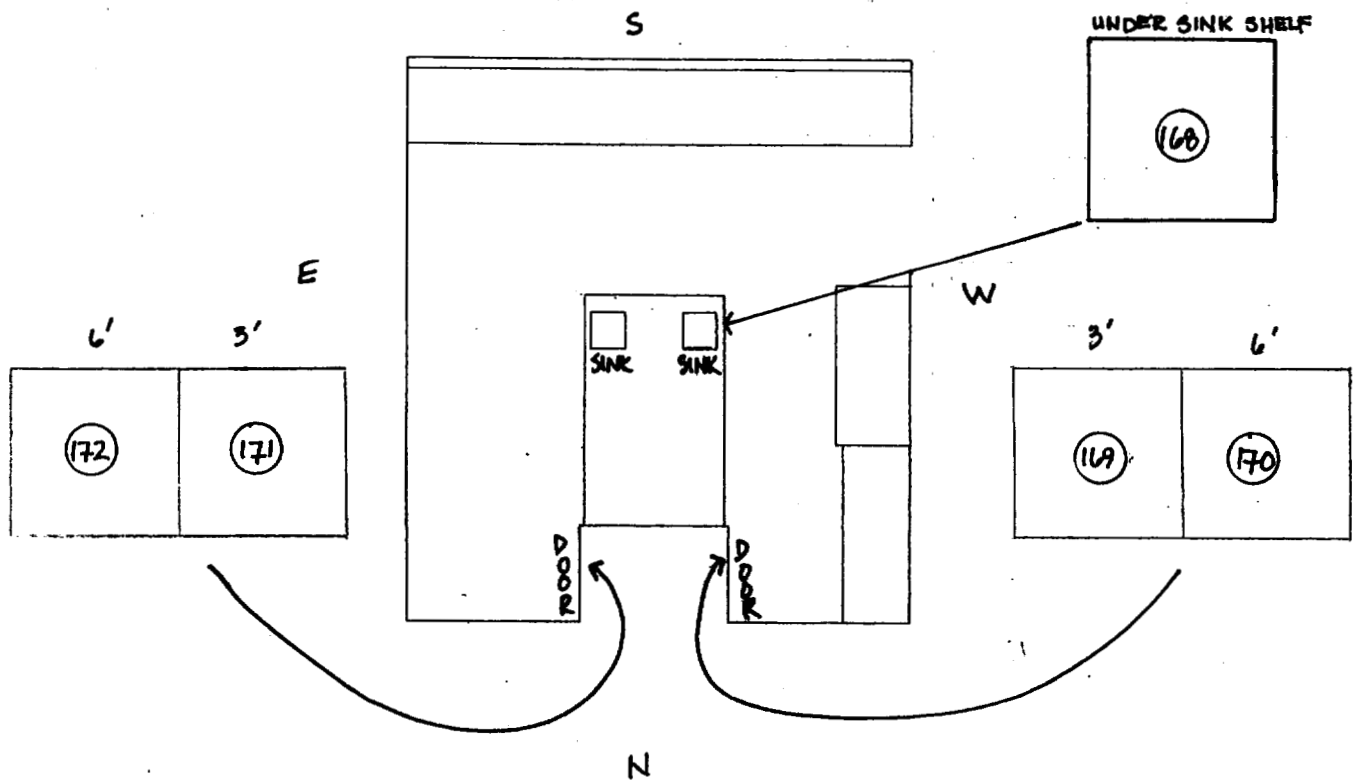
Attachment (4) Diagram (I)
UH Tower- 2 sinks, 2 doors
Room 717



EAST SINK

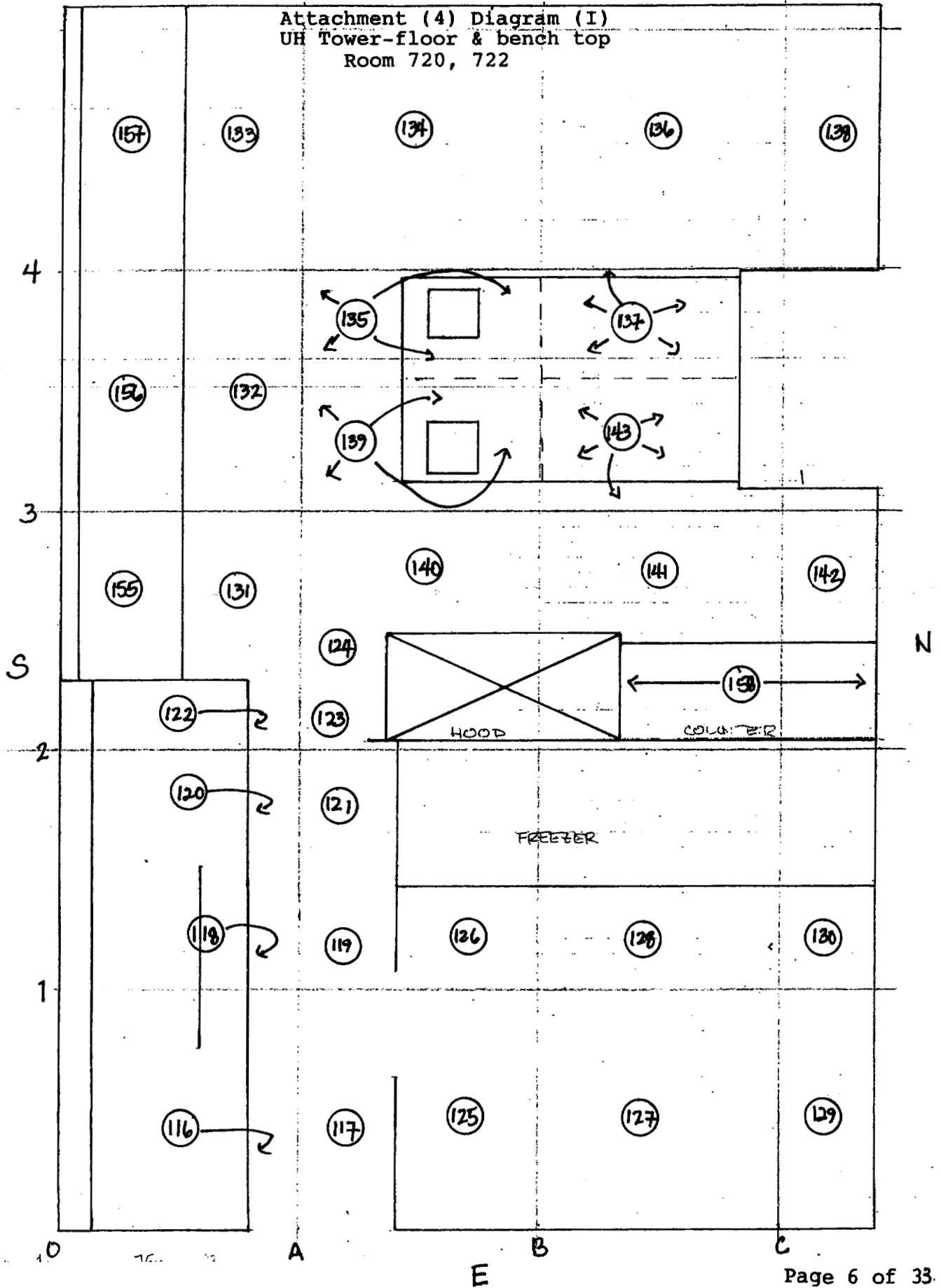


WEST SINK

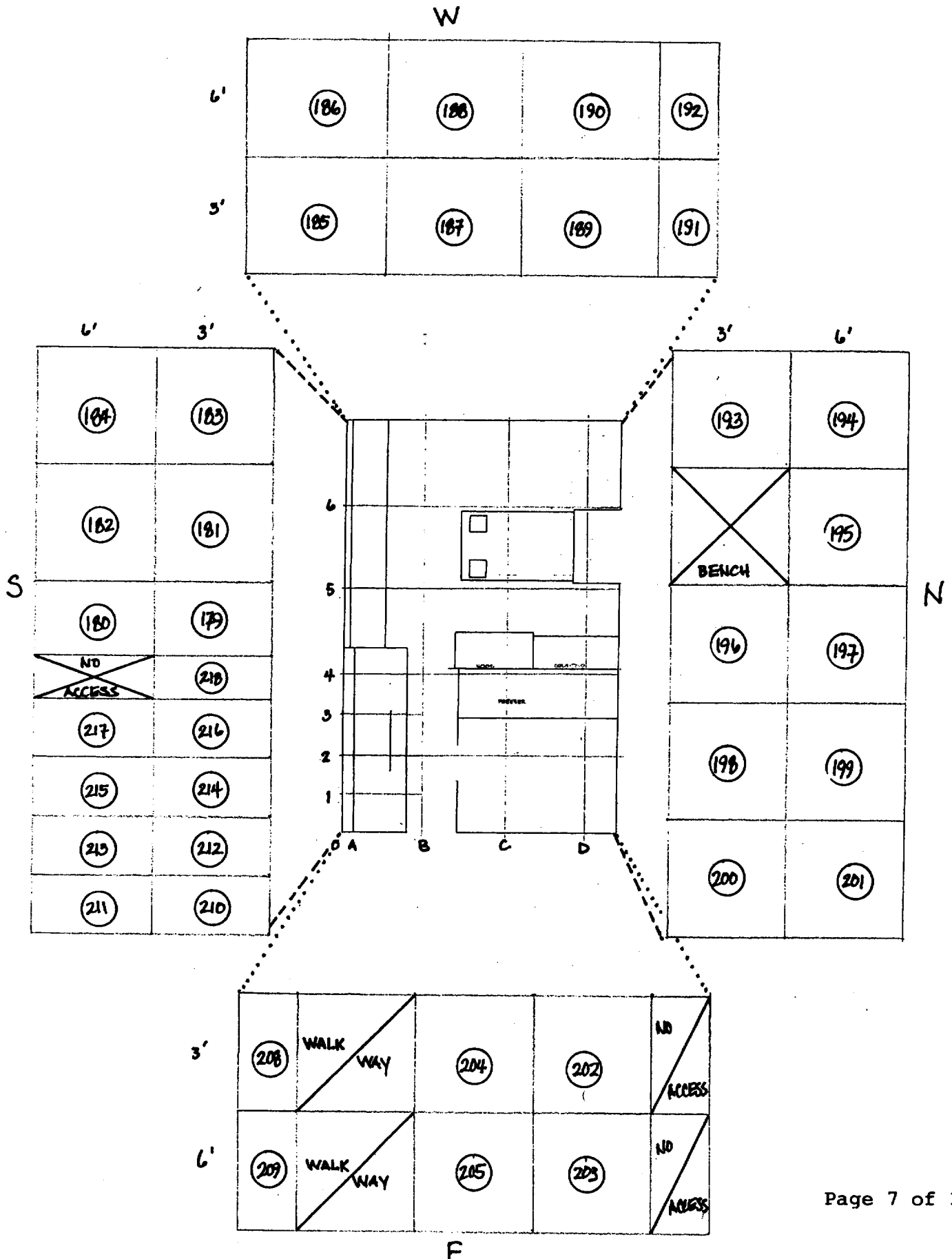


W

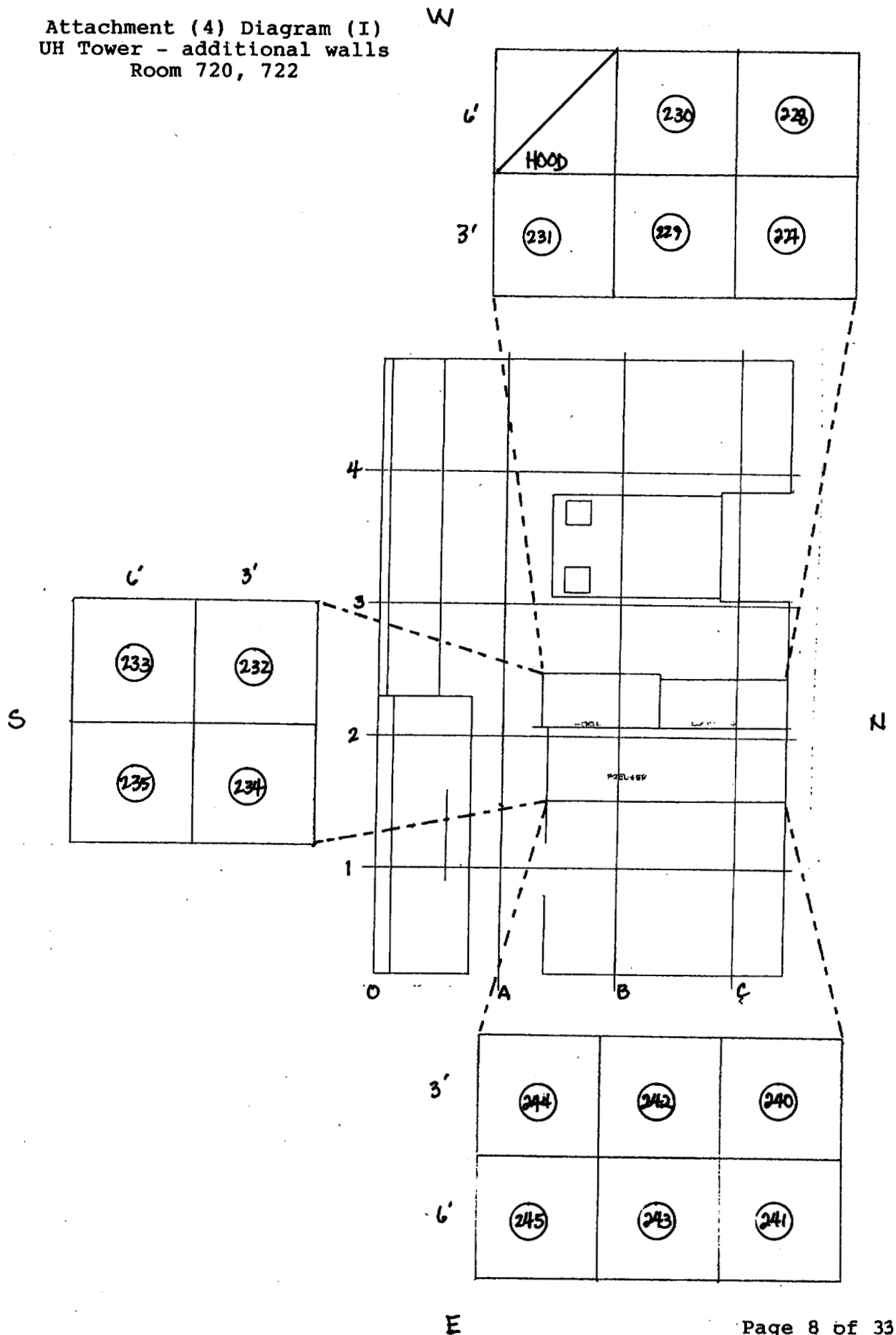
Attachment (4) Diagram (I)
UH Tower-floor & bench top
Room 720, 722



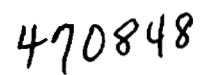
Attachment (4) Diagram (I)
UH Tower-walls
Room 720, 722



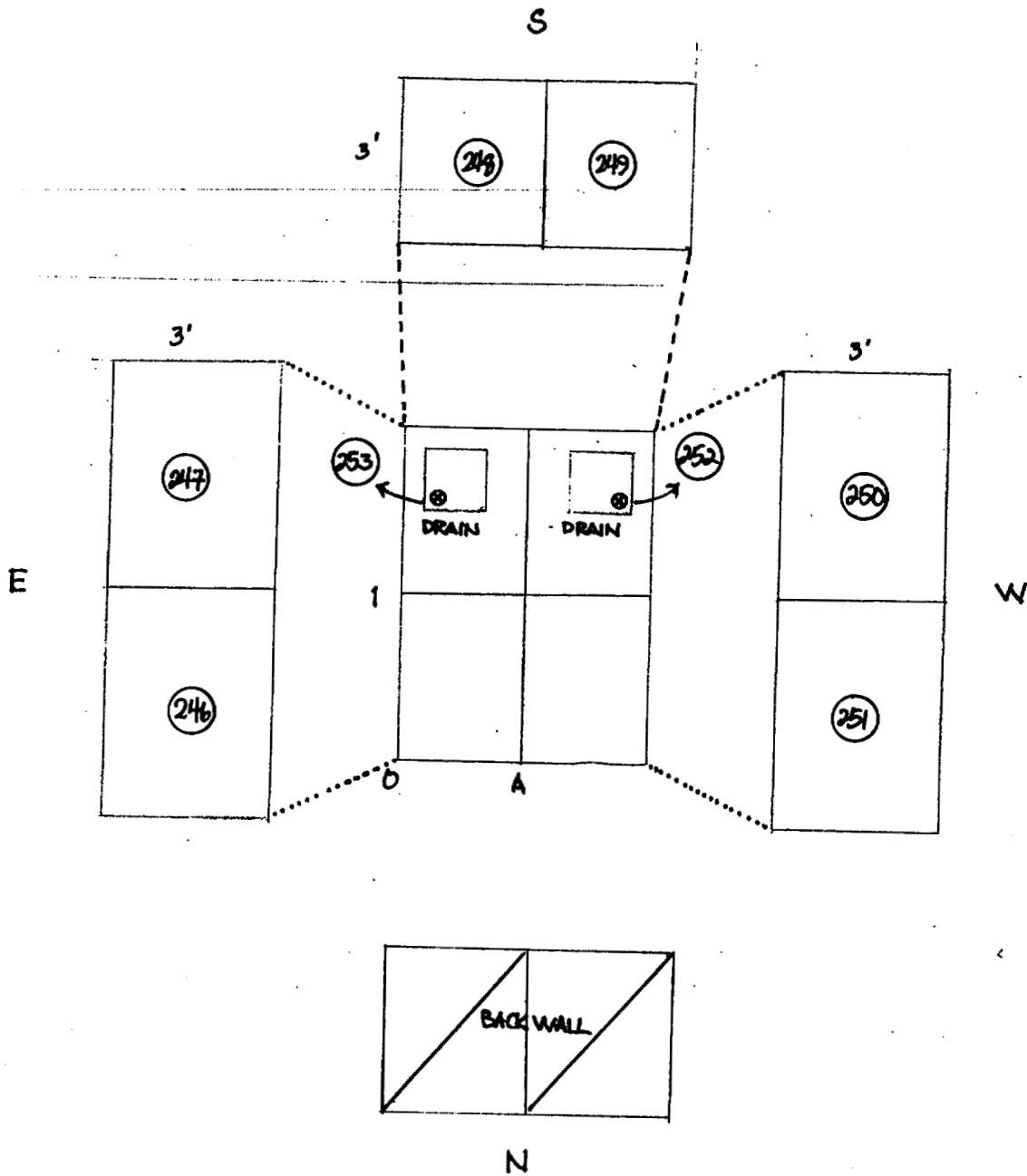
Attachment (4) Diagram (I)
UH Tower - additional walls
Room 720, 722



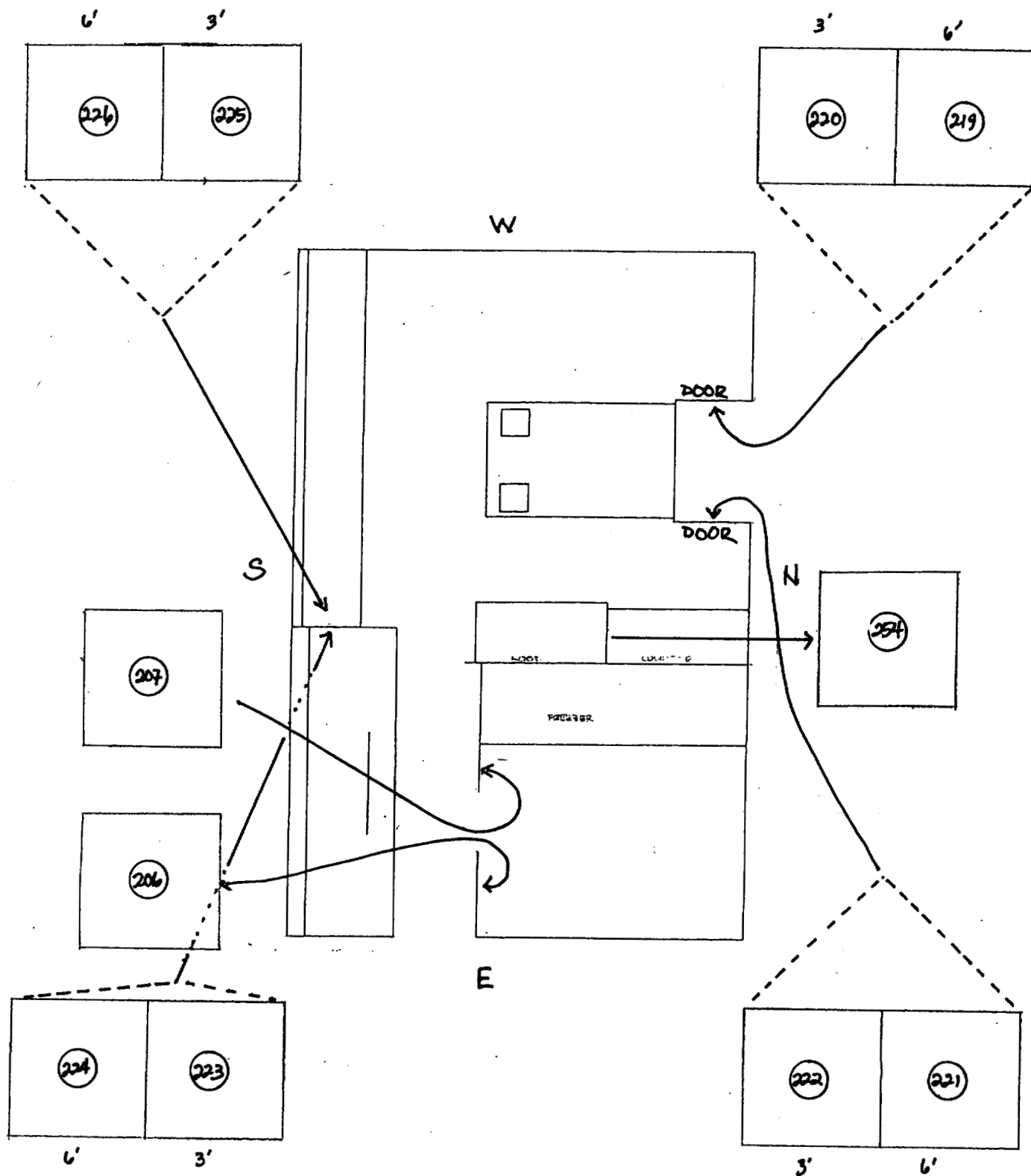
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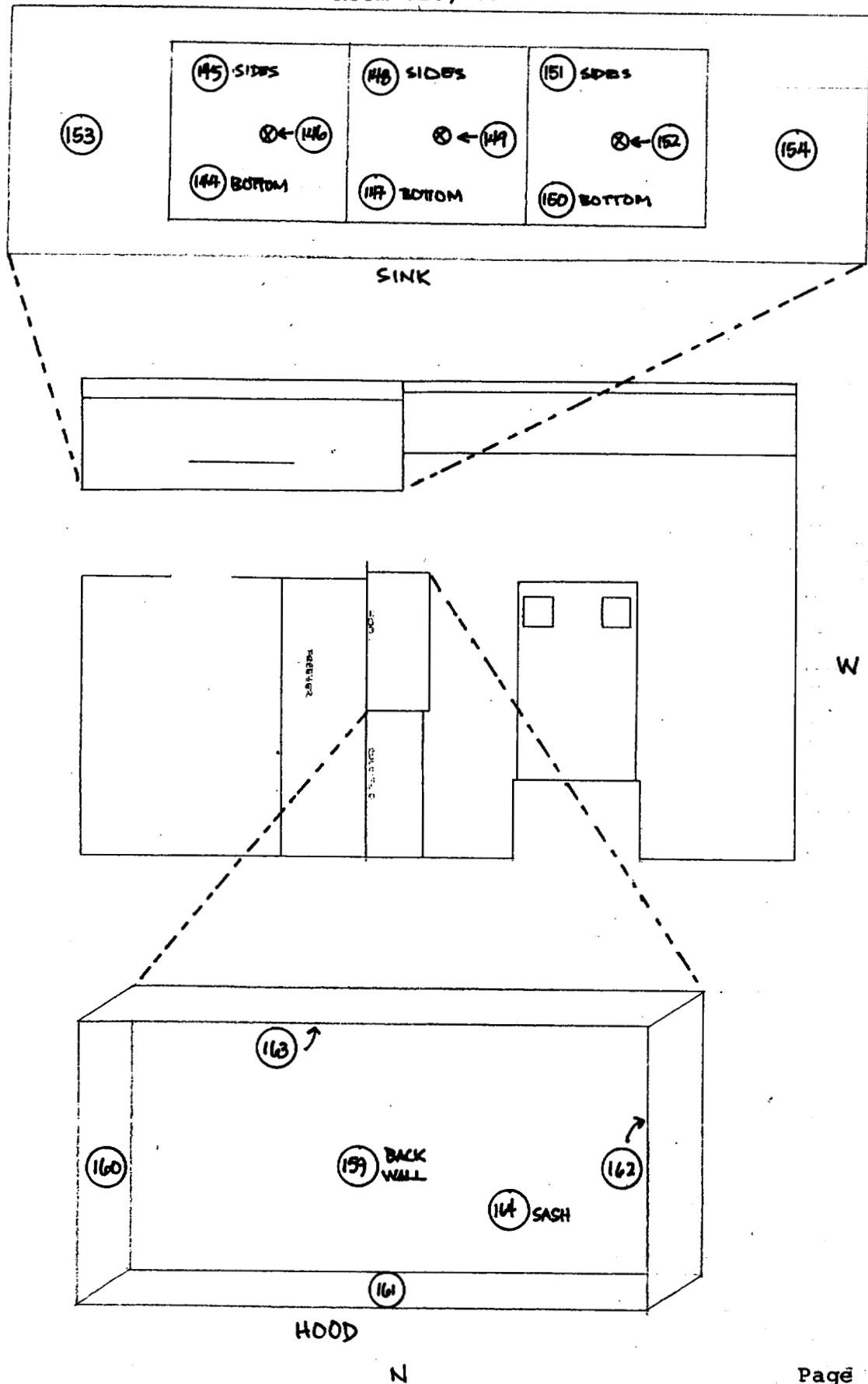
Attachment (4) Diagram (I)
UH Tower-bench (sides & drains)
Room 722



Attachment (4) Diagram (I)
UH Tower-doors & other walls
Room 720, 722



Attachment (4) Diagram (I)
UH Tower-sink & hood
Room 720, 722



Attachment (4) for Diagram (I)
UH Tower-swipe results
Room 717, 720, & 722

Protocol #:13 Name:H-3 DPM 30-Jun-2004 18:10
Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tsIE ES Terminator = Count
ARAKAKI DECOMMISSION SURVEY
Conventional DPM
Nuclide 1 = 253561
Warning: User program changes may have invalidated DPM calculation

| SN | TIME | CPMA | DFM1 | SIS | tsIE | FLAG |
|-----|------|-------|--------|--------|------|------|
| ✓6 | 5.00 | 9.44 | 17.04 | 22.299 | 560. | |
| ✓7 | 5.00 | 16.00 | 30.38 | 18.036 | 506. | |
| ✓8 | 5.00 | 14.80 | 27.46 | 19.846 | 530. | |
| ✓9 | 5.00 | 12.60 | 23.83 | 22.368 | 510. | |
| ✓10 | 5.00 | 13.00 | 24.27 | 21.013 | 524. | |
| ✓11 | 5.00 | 17.80 | 33.29 | 20.035 | 522. | |
| ✓12 | 5.00 | 17.64 | 32.48 | 22.889 | 538. | |
| ✓13 | 5.00 | 17.20 | 32.07 | 18.364 | 525. | |
| ✓14 | 5.00 | 14.04 | 26.27 | 23.158 | 521. | |
| ✓15 | 5.00 | 8.40 | 15.33 | 24.151 | 548. | |
| ✓16 | 5.00 | 13.40 | 24.63 | 21.464 | 540. | |
| ✓17 | 5.00 | 14.04 | 25.86 | 21.920 | 538. | |
| ✓18 | 5.00 | 15.84 | 29.44 | 19.445 | 528. | |
| ✓19 | 5.00 | 8.44 | 15.29 | 20.827 | 556. | |
| ✓20 | 5.00 | 11.00 | 19.99 | 21.069 | 553. | |
| ✓21 | 5.00 | 16.88 | 31.34 | 19.088 | 529. | |
| ✓22 | 5.00 | 14.04 | 27.90 | 18.022 | 464. | |
| ✓23 | 5.00 | 15.24 | 28.65 | 18.605 | 516. | |
| ✓24 | 5.00 | 20.04 | 37.07 | 21.138 | 533. | |
| ✓25 | 5.00 | 13.60 | 24.81 | 21.738 | 548. | |
| ✓26 | 5.00 | 13.00 | 24.39 | 20.544 | 518. | |
| ✓27 | 5.00 | 12.44 | 22.91 | 19.389 | 538. | |
| ✓28 | 5.00 | 59.24 | 108.53 | 13.881 | 544. | |
| ✓29 | 5.00 | 15.24 | 28.00 | 18.394 | 540. | |
| ✓30 | 5.00 | 13.60 | 25.65 | 19.402 | 513. | |
| ✓31 | 5.00 | 31.64 | 59.78 | 16.446 | 511. | |
| ✓32 | 5.00 | 11.24 | 20.59 | 21.925 | 544. | |
| ✓33 | 5.00 | 14.64 | 27.11 | 22.778 | 532. | |
| ✓34 | 5.00 | 47.80 | 87.49 | 15.190 | 545. | |
| ✓35 | 5.00 | 20.20 | 37.79 | 16.876 | 521. | |
| ✓36 | 5.00 | 16.00 | 30.54 | 18.819 | 501. | |
| ✓37 | 5.00 | 15.20 | 27.73 | 19.774 | 548. | |
| ✓38 | 5.00 | 32.44 | 59.49 | 18.576 | 543. | |
| ✓39 | 5.00 | 8.88 | 16.00 | 21.558 | 562. | |
| ✓40 | 5.00 | 19.20 | 35.39 | 18.407 | 537. | |
| ✓41 | 5.00 | 17.24 | 31.59 | 21.742 | 544. | |
| ✓42 | 5.00 | 13.20 | 24.14 | 20.768 | 546. | |
| ✓43 | 5.00 | 19.00 | 35.03 | 18.662 | 537. | |
| ✓44 | 5.00 | 24.64 | 45.74 | 18.895 | 529. | |
| ✓45 | 5.00 | 18.60 | 34.87 | 18.789 | 519. | |
| ✓46 | 5.00 | 16.80 | 30.41 | 17.579 | 557. | |
| ✓47 | 5.00 | 15.20 | 27.47 | 21.562 | 559. | |
| ✓48 | 5.00 | 12.20 | 22.67 | 19.023 | 528. | |
| ✓49 | 5.00 | 14.60 | 26.88 | 19.480 | 538. | |
| ✓50 | 5.00 | 19.84 | 36.77 | 22.081 | 531. | |
| ✓51 | 5.00 | 15.60 | 28.24 | 22.347 | 557. | |

Attachment (4) for Diagram (I)
UH Tower-swipe results:continued
Room 717, 720, & 722

| S# | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|-----|------|---------|---------|--------|------|------|
| 774 | 5.00 | 15.00 | 27.27 | 21.079 | 552. | |
| 777 | 5.00 | 24.60 | 46.18 | 16.389 | 518. | |
| 778 | 5.00 | 14.24 | 26.33 | 18.604 | 534. | |
| 779 | 5.00 | 16.40 | 30.34 | 19.671 | 533. | |
| 780 | 5.00 | 19.04 | 35.34 | 22.588 | 530. | |
| 781 | 5.00 | 9.20 | 16.78 | 18.832 | 549. | |
| 782 | 5.00 | 15.00 | 28.63 | 21.657 | 501. | |
| 783 | 5.00 | 10.40 | 20.49 | 24.322 | 472. | |
| 784 | 5.00 | 11.80 | 21.62 | 20.865 | 544. | |
| 785 | 5.00 | 13.84 | 26.00 | 19.213 | 517. | |
| 786 | 5.00 | 20.20 | 39.86 | 17.862 | 470. | |
| 787 | 5.00 | 18.64 | 35.17 | 18.069 | 513. | |
| 788 | 5.00 | 58.60 | 108.31 | 16.088 | 534. | |
| 789 | 5.00 | 39.20 | 71.92 | 15.084 | 542. | |
| 790 | 5.00 | 28.24 | 52.12 | 17.678 | 536. | |
| 791 | 5.00 | 38.40 | 71.15 | 16.644 | 531. | |
| 792 | 5.00 | 125.24 | 232.66 | 14.273 | 529. | |
| 793 | 5.00 | 47.20 | 89.42 | 16.642 | 509. | |
| 794 | 5.00 | 69.48 | 131.64 | 15.046 | 509. | |
| 795 | 5.00 | 983.48 | 1799.67 | 13.970 | 545. | |
| 796 | 5.00 | 88.84 | 160.53 | 14.752 | 559. | |
| 797 | 5.00 | 56.64 | 104.52 | 14.723 | 536. | |
| 798 | 5.00 | 106.00 | 195.02 | 14.281 | 539. | |
| 799 | 5.00 | 1356.88 | 2518.20 | 13.538 | 530. | |
| 800 | 5.00 | 152.44 | 282.25 | 14.314 | 532. | |
| 801 | 5.00 | 19.08 | 37.86 | 20.172 | 465. | |
| 802 | 5.00 | 37.20 | 71.42 | 15.230 | 496. | |
| 803 | 5.00 | 39.00 | 72.71 | 15.680 | 525. | |
| 804 | 5.00 | 33.04 | 61.77 | 16.604 | 522. | |
| 805 | 5.00 | 20.20 | 36.68 | 15.462 | 554. | |
| 806 | 5.00 | 21.84 | 40.21 | 19.319 | 538. | |
| 807 | 5.00 | 22.20 | 40.46 | 18.971 | 549. | |
| 808 | 5.00 | 13.60 | 24.72 | 17.513 | 553. | |
| 809 | 5.00 | 14.40 | 26.20 | 22.448 | 551. | |
| 810 | 5.00 | 13.80 | 30.77 | 20.749 | 377. | |
| 811 | 5.00 | 8.40 | 20.78 | 19.948 | 322. | |
| 812 | 5.00 | 12.20 | 23.11 | 19.602 | 509. | |
| 813 | 5.00 | 12.04 | 23.51 | 19.902 | 480. | |
| 814 | 5.00 | 11.40 | 21.66 | 18.106 | 506. | |
| 815 | 5.00 | 11.80 | 21.94 | 21.817 | 528. | |
| 816 | 5.00 | 32.24 | 59.19 | 18.114 | 541. | |
| 817 | 5.00 | 16.28 | 29.74 | 19.359 | 547. | |
| 818 | 5.00 | 11.84 | 21.81 | 22.579 | 538. | |
| 819 | 5.00 | 13.00 | 23.30 | 18.618 | 569. | |
| 820 | 5.00 | 45.68 | 83.50 | 15.452 | 546. | |
| 821 | 5.00 | 23.80 | 42.53 | 16.873 | 572. | |
| 822 | 5.00 | 46.24 | 84.66 | 16.925 | 544. | |
| 823 | 5.00 | 25.00 | 45.52 | 16.024 | 551. | |
| 824 | 5.00 | 17.24 | 31.25 | 20.902 | 555. | |
| 825 | 5.00 | 26.60 | 48.82 | 17.949 | 542. | |
| 826 | 5.00 | 27.40 | 52.12 | 15.605 | 505. | |
| 827 | 5.00 | 31.24 | 57.30 | 16.554 | 542. | |
| 828 | 5.00 | 16.64 | 31.59 | 18.506 | 506. | |
| 829 | 5.00 | 10.20 | 18.60 | 22.250 | 548. | |
| 830 | 5.00 | 19.80 | 35.78 | 17.444 | 559. | |
| 831 | 5.00 | 23.40 | 42.42 | 17.888 | 555. | |

Attachment (4) for Diagram (I)
UH Tower--continued swipe results
Room 717, 720, & 722

| S# | TIME | CPMA | DPM1 | SIS | tsIE | FLAG |
|-----|------|---------|---------|--------|------|------|
| 102 | 5.00 | 27.60 | 51.26 | 17.795 | 529. | |
| 103 | 5.00 | 234.60 | 426.62 | 14.045 | 552. | |
| 104 | 5.00 | 9.24 | 16.67 | 25.087 | 561. | |
| 105 | 5.00 | 12.64 | 22.63 | 21.808 | 570. | |
| 106 | 5.00 | 17.00 | 31.00 | 20.292 | 549. | |
| 107 | 5.00 | 16.52 | 30.18 | 17.361 | 547. | |
| 108 | 5.00 | 13.60 | 24.67 | 22.305 | 555. | |
| 109 | 5.00 | 15.04 | 27.52 | 19.260 | 545. | |
| 110 | 5.00 | 15.04 | 27.57 | 20.223 | 543. | |
| 111 | 5.00 | 13.40 | 24.27 | 19.571 | 557. | |
| 112 | 5.00 | 24.24 | 44.50 | 17.601 | 541. | |
| 113 | 5.00 | 14.20 | 25.47 | 20.209 | 568. | |
| 114 | 5.00 | 17.40 | 31.67 | 20.385 | 551. | |
| 115 | 5.00 | 2540.24 | 4631.75 | 13.805 | 549. | |
| 116 | 5.00 | 18.64 | 33.99 | 19.070 | 549. | |
| 117 | 5.00 | 13.80 | 25.49 | 19.400 | 535. | |
| 118 | 5.00 | 15.80 | 28.28 | 20.804 | 570. | |
| 119 | 5.00 | 14.60 | 26.78 | 20.755 | 542. | |
| 120 | 5.00 | 86.64 | 160.20 | 13.922 | 534. | |
| 121 | 5.00 | 12.28 | 22.95 | 19.523 | 522. | |
| 122 | 5.00 | 15.44 | 28.36 | 19.177 | 541. | |
| 123 | 5.00 | 14.44 | 26.18 | 17.900 | 555. | |
| 124 | 5.00 | 12.00 | 22.04 | 21.079 | 541. | |
| 125 | 5.00 | 11.04 | 19.97 | 20.048 | 558. | |
| 126 | 5.00 | 11.64 | 21.77 | 23.881 | 521. | |
| 127 | 5.00 | 16.00 | 30.12 | 20.163 | 515. | |
| 128 | 5.00 | 13.20 | 24.70 | 23.467 | 521. | |
| 129 | 5.00 | 15.40 | 28.10 | 20.677 | 548. | |
| 130 | 5.00 | 14.00 | 26.21 | 21.025 | 521. | |
| 131 | 5.00 | 10.60 | 19.35 | 24.499 | 547. | |
| 132 | 5.00 | 10.60 | 19.72 | 22.682 | 527. | |
| 133 | 5.00 | 11.40 | 21.50 | 22.104 | 513. | |
| 134 | 5.00 | 12.44 | 23.20 | 22.729 | 525. | |
| 135 | 5.00 | 13.80 | 25.84 | 21.609 | 521. | |
| 136 | 5.00 | 14.24 | 26.80 | 23.872 | 515. | |
| 137 | 5.00 | 12.64 | 25.05 | 20.840 | 467. | |
| 138 | 5.00 | 11.00 | 21.17 | 20.515 | 493. | |
| 139 | 5.00 | 12.80 | 24.02 | 20.765 | 518. | |
| 140 | 5.00 | 15.00 | 28.02 | 18.696 | 523. | |
| 141 | 5.00 | 12.84 | 23.65 | 22.771 | 538. | |
| 142 | 5.00 | 9.20 | 17.82 | 20.580 | 487. | |
| 143 | 5.00 | 12.00 | 22.01 | 24.155 | 542. | |
| 144 | 5.00 | 8010.08 | 15043.7 | 12.918 | 517. | |
| 145 | 5.00 | 99.00 | 197.54 | 13.268 | 461. | |
| 146 | 5.00 | 45.80 | 89.99 | 14.263 | 474. | |
| 147 | 5.00 | 114.28 | 215.86 | 13.444 | 512. | |
| 148 | 5.00 | 70.60 | 137.51 | 13.040 | 482. | |
| 149 | 5.00 | 239.80 | 469.55 | 13.056 | 477. | |
| 150 | 5.00 | 120.80 | 218.89 | 14.870 | 556. | |
| 151 | 5.00 | 51.44 | 94.15 | 15.794 | 545. | |
| 152 | 5.00 | 14.00 | 27.49 | 21.191 | 475. | |
| 153 | 5.00 | 170.40 | 318.65 | 13.283 | 522. | |
| 154 | 5.00 | 9.88 | 18.89 | 20.767 | 499. | |
| 155 | 5.00 | 10.64 | 20.00 | 19.623 | 516. | |
| 156 | 5.00 | 12.60 | 23.81 | 21.196 | 511. | |
| 157 | 5.00 | 11.24 | 20.55 | 20.234 | 546. | |

Attachment (4) for Diagram (I)
UH Tower- continued swipe results
Room 717, 720, & 722

| S# | TIME | CPMA | DFM1 | SIS | tsIE | FLAG |
|-----|------|---------|---------|--------|------|--------------------------|
| 116 | 5.00 | 14.40 | 27.80 | 20.435 | 490. | |
| 117 | 5.00 | 13.88 | 26.74 | 19.425 | 492. | |
| 118 | 5.00 | 14.40 | 26.48 | 24.276 | 540. | |
| 119 | 5.00 | 12.20 | 23.11 | 20.260 | 509. | |
| 120 | 5.00 | 12.40 | 22.92 | 23.920 | 534. | |
| 121 | 5.00 | 12.24 | 22.47 | 20.444 | 541. | |
| 122 | 5.00 | 16.80 | 31.32 | 20.254 | 525. | |
| 123 | 5.00 | 24.20 | 45.78 | 17.867 | 510. | |
| 124 | 5.00 | 13.24 | 24.16 | 21.984 | 548. | |
| 125 | 5.00 | 60.84 | 118.72 | 14.735 | 480. | |
| 126 | 5.00 | 1015.40 | 25233.0 | 10.821 | 53.6 | E (extrapolated results) |
| 127 | 5.00 | 20.24 | 37.37 | 17.766 | 535. | |
| 128 | 5.00 | 20.00 | 36.91 | 17.623 | 536. | |
| 129 | 5.00 | 11.44 | 21.38 | 24.976 | 523. | |
| 130 | 5.00 | 13.40 | 24.48 | 21.619 | 547. | |
| 131 | 5.00 | 13.24 | 24.91 | 19.163 | 515. | |
| 132 | 5.00 | 11.20 | 21.19 | 24.562 | 510. | |
| 133 | 5.00 | 12.20 | 23.36 | 20.391 | 498. | |
| 134 | 5.00 | 15.24 | 29.35 | 19.894 | 493. | |
| 135 | 5.00 | 11.80 | 21.91 | 23.041 | 529. | |
| 136 | 5.00 | 8.44 | 15.61 | 24.343 | 533. | |
| 137 | 5.00 | 12.20 | 23.58 | 21.128 | 489. | |
| 138 | 5.00 | 9.04 | 18.38 | 22.934 | 445. | |
| 139 | 5.00 | 11.00 | 20.88 | 22.470 | 507. | |
| 140 | 5.00 | 9.00 | 18.00 | 23.504 | 458. | |
| 141 | 5.00 | 9.60 | 18.99 | 21.199 | 468. | |
| 142 | 5.00 | 10.28 | 20.34 | 22.753 | 468. | |
| 143 | 5.00 | 14.00 | 26.31 | 21.782 | 517. | |
| 144 | 5.00 | 9.40 | 17.80 | 23.187 | 509. | |
| 145 | 5.00 | 12.52 | 22.65 | 23.143 | 558. | |
| 146 | 5.00 | 7.40 | 13.33 | 22.427 | 563. | |
| 147 | 5.00 | 13.40 | 24.60 | 25.009 | 542. | |
| 148 | 5.00 | 8.60 | 15.87 | 28.143 | 536. | |
| 149 | 5.00 | 11.40 | 21.14 | 22.104 | 530. | |
| 150 | 5.00 | 13.80 | 25.53 | 20.097 | 533. | |
| 151 | 5.00 | 11.24 | 20.36 | 22.441 | 557. | |
| 152 | 5.00 | 10.04 | 18.11 | 24.171 | 561. | |
| 153 | 5.00 | 15.68 | 28.26 | 22.902 | 562. | |
| 154 | 5.00 | 11.80 | 21.48 | 20.566 | 551. | |
| 155 | 5.00 | 11.40 | 20.70 | 22.723 | 553. | |
| 156 | 5.00 | 14.08 | 26.47 | 17.930 | 516. | |
| 157 | 5.00 | 16.60 | 29.80 | 22.644 | 567. | |
| 158 | 5.00 | 13.20 | 24.10 | 20.087 | 547. | |
| 159 | 5.00 | 12.60 | 23.24 | 24.100 | 536. | |
| 160 | 5.00 | 10.20 | 19.42 | 25.198 | 504. | |
| 161 | 5.00 | 21.60 | 40.58 | 18.487 | 517. | |
| 162 | 5.00 | 13.24 | 24.35 | 21.765 | 539. | |
| 163 | 5.00 | 27.24 | 51.23 | 16.239 | 516. | |
| 164 | 5.00 | 14.24 | 27.06 | 21.068 | 506. | |
| 165 | 5.00 | 11.80 | 21.74 | 21.031 | 537. | |
| 166 | 5.00 | 10.00 | 18.11 | 22.021 | 556. | |
| 167 | 5.00 | 14.08 | 27.01 | 20.888 | 496. | |
| 168 | 5.00 | 16.44 | 29.34 | 20.963 | 574. | |
| 169 | 5.00 | 11.04 | 20.03 | 22.499 | 555. | |
| 170 | 5.00 | 11.40 | 20.88 | 22.780 | 544. | |
| 171 | 5.00 | 10.60 | 19.37 | 21.622 | 547. | |

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

| S# | TIME | CPMA | DPM1 | SIS | tsIE | FLAG |
|----------------|------|-------|-------|--------|------|------|
| 214 | 5.00 | 9.84 | 18.22 | 22.765 | 532. | |
| 215 | 5.00 | 13.24 | 24.41 | 23.151 | 537. | |
| 216 | 5.00 | 9.00 | 16.45 | 22.042 | 546. | |
| 217 | 5.00 | 9.84 | 18.19 | 21.946 | 534. | |
| 218 | 5.00 | 11.80 | 21.65 | 20.675 | 542. | |
| 219 | 5.00 | 9.80 | 17.54 | 23.158 | 570. | |
| 220 | 5.00 | 18.20 | 32.58 | 21.168 | 570. | |
| 221 | 5.00 | 11.48 | 20.37 | 25.905 | 580. | |
| 222 | 5.00 | 9.88 | 17.90 | 21.749 | 556. | |
| 223 | 5.00 | 13.00 | 24.13 | 22.001 | 530. | |
| 224 | 5.00 | 20.60 | 37.65 | 18.216 | 546. | |
| 225 | 5.00 | 14.60 | 27.08 | 18.512 | 530. | |
| 226 | 5.00 | 10.88 | 19.45 | 20.895 | 572. | |
| 227 | 5.00 | 10.84 | 20.10 | 23.094 | 531. | |
| 228 | 5.00 | 8.40 | 15.48 | 24.037 | 537. | |
| 229 | 5.00 | 9.64 | 18.19 | 23.373 | 513. | |
| 230 | 5.00 | 11.04 | 20.50 | 26.818 | 529. | |
| 231 | 5.00 | 10.64 | 19.50 | 24.348 | 543. | |
| 232 | 5.00 | 15.08 | 28.54 | 19.538 | 510. | |
| 233 | 5.00 | 14.44 | 26.46 | 20.375 | 543. | |
| 234 | 5.00 | 17.40 | 32.66 | 21.953 | 518. | |
| 235 | 5.00 | 11.64 | 21.22 | 18.707 | 549. | |
| 236 | 5.00 | 9.00 | 16.43 | 24.895 | 547. | |
| 237 | 5.00 | 12.60 | 22.93 | 24.534 | 551. | |
| 238 | 5.00 | 11.40 | 20.74 | 25.004 | 551. | |
| 239 | 5.00 | 11.04 | 19.97 | 20.690 | 558. | |
| 240 | 5.00 | 26.88 | 49.46 | 19.017 | 539. | |
| 241 | 5.00 | 13.00 | 25.43 | 20.667 | 478. | |
| 242 | 5.00 | 14.00 | 26.53 | 17.586 | 508. | |
| 243 | 5.00 | 12.20 | 22.23 | 20.418 | 549. | |
| 244 | 5.00 | 13.80 | 25.27 | 23.272 | 544. | |
| 245 | 5.00 | 16.08 | 30.50 | 19.721 | 508. | |
| 246 | 5.00 | 8.08 | 15.02 | 20.103 | 528. | |
| 247 | 5.00 | 11.84 | 21.31 | 21.463 | 564. | |
| 248 | 5.00 | 9.80 | 18.50 | 25.123 | 512. | |
| 249 | 5.00 | 10.40 | 19.45 | 22.439 | 521. | |
| 250 | 5.00 | 7.00 | 12.69 | 24.396 | 556. | |
| 251 | 5.00 | 11.80 | 21.54 | 21.382 | 547. | |
| 252 | 5.00 | 12.40 | 25.40 | 24.049 | 439. | |
| 253 | 5.00 | 10.40 | 20.99 | 27.748 | 451. | |
| 254 | 5.00 | 12.60 | 25.25 | 22.597 | 457. | |

(1 missing vial) standards follow

| | | | | | | |
|----------------|------|---------|---------|--------|------|------------|
| 255 | 5.00 | 13.00 | 19.54 | 20.914 | 898. | background |
| 256 | 5.00 | 112935. | 171267. | 19.187 | 874. | |
| 257 | 5.00 | 24676.6 | 36992.6 | 32.916 | 906. | |

MDA H-3: 11.59 dpm

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

SYSTEM NORMALIZED

C14 IPA DATA PROCESSED - 01-Jul-2004 21:54

C14 Eff (0-156 keV) = 95.18 %

WARNING: Questionable C14 Chi square value - Please view historic data

H3 IPA DATA PROCESSED - 01-Jul-2004 22:06

H3 Eff (0-18.6 keV) = 62.75 %

H3 CHI SQUARE IPA DATA PROCESSED - 01-Jul-2004 22:16

H3 Chi Square = 164.86

EKG IPA DATA PROCESSED - 01-Jul-2004 23:17

Bkg (0-18.6 keV) = 13.73 cpm

Bkg (0-156 keV) = 20.73 cpm

C14 E²/B (1-156 keV) = 561.82

H3 E²/B (1-18.6 keV) = 286.20

Attachment (4) for Diagram (I)
UH Tower - swipe result

Protocol #:13 Name:H-3 DPM 02-Jul-2004 08:42
Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE ES Terminator = Count
ARAKAKI RE-RUN #168
Conventional DPM
Nuclide 1 = 253561
Warning: User program changes may have invalidated DPM calculation

| S# | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|----|------|---------|---------|--------|------|--------------------------|
| 1 | 5.00 | 10.60 | 19.15 | 22.743 | 560. | |
| 2 | 5.00 | 1287.92 | 15543.9 | 10.761 | 80.2 | E (extrapolated results) |

Attachment (4) for Diagram (I)
UH Tower-swipe results
Room 717, 720, & 722

Protocol #:14 Name:C-14 DPM 21-Jun-2004 07:35
Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE/AEC ES Terminator = Count
ARAKAKI DECOMMISSION SWIPES UH TOWER 717
Conventional DPM
Nuclide 1 = 108000

| # | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|----|------|-------|-------|--------|------|------------|
| 1 | 5.00 | 13.40 | 14.11 | 52.534 | 580. | background |
| 2 | 5.00 | 23.20 | 24.51 | 34.853 | 508. | |
| 3 | 5.00 | 18.40 | 19.42 | 49.790 | 530. | |
| 4 | 5.00 | 18.40 | 19.43 | 44.888 | 514. | |
| 5 | 5.00 | 19.20 | 20.26 | 48.535 | 536. | |
| 6 | 5.00 | 23.40 | 24.70 | 47.597 | 528. | |
| 7 | 5.00 | 20.20 | 21.31 | 41.237 | 543. | |
| 8 | 5.00 | 18.40 | 19.42 | 40.893 | 530. | |
| 9 | 5.00 | 16.00 | 16.89 | 40.025 | 520. | |
| 10 | 5.00 | 13.20 | 13.92 | 37.037 | 550. | |
| 11 | 5.00 | 16.00 | 16.88 | 59.084 | 538. | |
| 12 | 5.00 | 14.20 | 14.98 | 41.414 | 538. | |
| 13 | 5.00 | 19.40 | 20.47 | 52.237 | 532. | |
| 14 | 5.00 | 13.20 | 13.92 | 56.370 | 555. | |
| 15 | 5.00 | 19.42 | 20.47 | 53.941 | 558. | |
| 16 | 5.00 | 16.80 | 17.73 | 46.621 | 531. | |
| 17 | 5.00 | 16.80 | 17.79 | 28.164 | 465. | |
| 18 | 5.00 | 16.40 | 17.32 | 48.718 | 518. | |
| 19 | 5.00 | 24.00 | 25.33 | 39.095 | 533. | |
| 20 | 5.00 | 19.40 | 20.46 | 45.800 | 550. | |
| 21 | 5.00 | 18.00 | 19.01 | 34.240 | 521. | |
| 22 | 5.00 | 16.40 | 17.30 | 37.933 | 538. | |
| 23 | 5.00 | 59.00 | 62.23 | 21.485 | 545. | |
| 24 | 5.00 | 15.60 | 16.45 | 38.870 | 544. | |
| 25 | 5.00 | 17.00 | 17.95 | 39.993 | 523. | |
| 26 | 5.00 | 39.47 | 41.70 | 24.689 | 511. | |
| 27 | 5.00 | 17.80 | 18.77 | 42.295 | 545. | |
| 28 | 5.00 | 17.80 | 18.79 | 43.353 | 529. | |
| 29 | 5.00 | 47.80 | 50.42 | 27.782 | 541. | |
| 30 | 5.00 | 26.60 | 28.08 | 33.017 | 527. | |
| 31 | 5.00 | 19.00 | 20.08 | 39.483 | 501. | |
| 32 | 5.00 | 16.20 | 17.09 | 40.997 | 545. | |
| 33 | 5.00 | 33.60 | 35.44 | 29.224 | 544. | |
| 34 | 5.00 | 14.20 | 14.97 | 61.080 | 558. | |
| 35 | 5.00 | 27.80 | 29.34 | 36.095 | 532. | |
| 36 | 5.00 | 18.60 | 19.62 | 38.606 | 543. | |
| 37 | 5.00 | 17.20 | 18.14 | 53.208 | 544. | |
| 38 | 5.00 | 21.40 | 22.58 | 35.505 | 538. | |
| 39 | 5.00 | 28.80 | 30.40 | 28.478 | 528. | |
| 40 | 5.00 | 25.20 | 26.60 | 35.272 | 525. | |
| 41 | 5.00 | 20.00 | 21.09 | 35.326 | 553. | |
| 42 | 5.00 | 17.80 | 18.76 | 47.699 | 559. | |
| 43 | 5.00 | 17.40 | 18.36 | 45.604 | 529. | |
| 44 | 5.00 | 20.00 | 21.10 | 40.767 | 534. | |
| 45 | 5.00 | 20.60 | 21.73 | 40.499 | 537. | |
| 46 | 5.00 | 21.40 | 22.55 | 49.290 | 562. | |
| 47 | 5.00 | 17.60 | 18.55 | 45.998 | 555. | |

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

| ## | TIME | CFMA | DPM1 | SIS | tsIE | FLAG |
|-----|------|---------|---------|--------|------|------|
| 47 | 5.00 | 27.80 | 29.36 | 33.081 | 516. | |
| 48 | 5.00 | 17.40 | 18.36 | 45.272 | 532. | |
| 49 | 5.00 | 17.00 | 17.94 | 48.494 | 533. | |
| 50 | 5.00 | 18.18 | 19.19 | 36.665 | 525. | |
| 51 | 5.00 | 13.20 | 13.92 | 54.424 | 544. | |
| 52 | 5.00 | 16.00 | 16.91 | 68.213 | 504. | |
| 53 | 5.00 | 18.58 | 19.65 | 47.853 | 481. | |
| 54 | 5.00 | 20.40 | 21.52 | 49.613 | 540. | |
| 55 | 5.00 | 13.40 | 14.15 | 52.989 | 518. | |
| 56 | 5.00 | 19.80 | 20.96 | 47.112 | 472. | |
| 57 | 5.00 | 25.60 | 27.04 | 40.438 | 510. | |
| 58 | 5.00 | 60.20 | 63.53 | 26.565 | 533. | |
| 59 | 5.00 | 40.00 | 42.20 | 28.609 | 541. | |
| 60 | 5.00 | 33.00 | 34.83 | 35.806 | 530. | |
| 61 | 5.00 | 41.20 | 43.48 | 27.849 | 530. | |
| 62 | 5.00 | 130.80 | 138.05 | 21.804 | 530. | |
| 63 | 5.00 | 49.60 | 52.40 | 23.907 | 508. | |
| 64 | 5.00 | 77.40 | 81.78 | 24.477 | 507. | |
| 65 | 5.00 | 990.20 | 1044.34 | 15.894 | 545. | |
| 66 | 5.00 | 87.00 | 91.70 | 24.573 | 558. | |
| 67 | 5.00 | 56.80 | 59.94 | 27.353 | 533. | |
| 68 | 5.00 | 113.80 | 120.06 | 19.026 | 538. | |
| 69 | 5.00 | 1341.40 | 1415.87 | 16.189 | 528. | |
| 70 | 5.00 | 151.20 | 159.58 | 19.126 | 529. | |
| 71 | 5.00 | 20.60 | 21.81 | 42.026 | 470. | |
| 72 | 5.00 | 42.40 | 44.81 | 24.628 | 499. | |
| 73 | 5.00 | 39.20 | 41.38 | 29.037 | 526. | |
| 74 | 5.00 | 38.40 | 40.53 | 30.595 | 527. | |
| 75 | 5.00 | 28.20 | 29.73 | 41.605 | 554. | |
| 76 | 5.00 | 18.40 | 19.41 | 42.236 | 540. | |
| 77 | 5.00 | 26.60 | 28.05 | 39.220 | 551. | |
| 78 | 5.00 | 17.00 | 17.92 | 37.406 | 554. | |
| 79 | 5.00 | 15.80 | 16.66 | 63.103 | 548. | |
| 80 | 5.00 | 11.80 | 12.62 | 42.546 | 376. | |
| 81 | 5.00 | 14.00 | 15.06 | 41.569 | 335. | |
| 82 | 5.00 | 15.40 | 16.27 | 47.275 | 513. | |
| 83 | 5.00 | 14.00 | 14.81 | 47.393 | 477. | |
| 84 | 5.00 | 17.00 | 17.96 | 47.848 | 507. | |
| 85 | 5.00 | 12.16 | 12.84 | 58.903 | 525. | |
| 86 | 5.00 | 36.00 | 37.97 | 34.472 | 545. | |
| 87 | 5.00 | 19.60 | 20.67 | 40.698 | 548. | |
| 88 | 5.00 | 15.00 | 15.82 | 51.724 | 539. | |
| 89 | 5.00 | 18.40 | 19.38 | 45.167 | 572. | |
| 90 | 5.00 | 49.80 | 52.53 | 28.316 | 544. | |
| 91 | 5.00 | 26.00 | 27.39 | 38.051 | 573. | |
| 92 | 5.00 | 48.20 | 50.84 | 24.958 | 542. | |
| 93 | 5.00 | 30.27 | 31.91 | 31.356 | 551. | |
| 94 | 5.00 | 21.40 | 22.56 | 33.735 | 558. | |
| 95 | 5.00 | 27.60 | 29.12 | 27.704 | 539. | |
| 96 | 5.00 | 33.00 | 34.87 | 31.963 | 505. | |
| 97 | 5.00 | 33.35 | 35.18 | 33.473 | 541. | |
| 98 | 5.00 | 22.20 | 23.45 | 36.799 | 507. | |
| 99 | 5.00 | 17.80 | 18.77 | 43.155 | 552. | |
| 100 | 5.00 | 21.00 | 22.14 | 42.815 | 553. | |
| 101 | 5.00 | 25.80 | 27.20 | 41.394 | 556. | |
| 102 | 5.00 | 30.00 | 31.67 | 29.832 | 525. | |

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

| S# | TIME | CPMA | DPM1 | SIS | tsIE | FLAG |
|--------|------|---------|---------|--------|------|------|
| 114103 | 5.00 | 239.00 | 251.99 | 19.189 | 552. | |
| 114104 | 5.00 | 13.40 | 14.12 | 50.258 | 560. | |
| 114105 | 5.00 | 14.60 | 15.38 | 43.137 | 572. | |
| 114106 | 5.00 | 22.80 | 24.04 | 40.195 | 548. | |
| 114107 | 5.00 | 20.00 | 21.09 | 34.203 | 545. | |
| 114108 | 5.00 | 15.00 | 15.81 | 33.063 | 558. | |
| 114109 | 5.00 | 15.60 | 16.45 | 33.335 | 548. | |
| 114110 | 5.00 | 18.40 | 19.41 | 35.729 | 543. | |
| 114111 | 5.00 | 18.20 | 19.19 | 54.923 | 556. | |
| 114112 | 5.00 | 23.67 | 24.96 | 35.433 | 543. | |
| 114113 | 5.00 | 16.60 | 17.49 | 63.813 | 570. | |
| 114114 | 5.00 | 19.80 | 20.88 | 49.398 | 545. | |
| 114115 | 5.00 | 2437.60 | 2570.82 | 13.886 | 546. | |
| 114116 | 5.00 | 19.40 | 20.45 | 49.854 | 554. | |
| 114117 | 5.00 | 21.60 | 22.79 | 47.541 | 532. | |
| 114118 | 5.00 | 17.60 | 18.54 | 47.043 | 571. | |
| 114119 | 5.00 | 16.00 | 16.88 | 46.826 | 543. | |
| 114120 | 5.00 | 90.80 | 95.80 | 18.150 | 536. | |
| 114121 | 5.00 | 15.20 | 16.05 | 46.651 | 525. | |
| 114122 | 5.00 | 15.00 | 15.83 | 47.594 | 537. | |
| 114123 | 5.00 | 15.60 | 16.45 | 44.858 | 554. | |
| 114124 | 5.00 | 13.40 | 14.13 | 52.869 | 544. | |
| 114125 | 5.00 | 16.20 | 17.08 | 48.903 | 556. | |
| 114126 | 5.00 | 16.40 | 17.32 | 44.079 | 521. | |
| 114127 | 5.00 | 14.20 | 15.00 | 40.939 | 511. | |
| 114128 | 5.00 | 17.73 | 18.72 | 51.488 | 520. | |
| 114129 | 5.00 | 15.00 | 15.82 | 58.593 | 550. | |
| 114130 | 5.00 | 17.40 | 18.37 | 44.184 | 523. | |
| 114131 | 5.00 | 15.60 | 16.45 | 53.397 | 547. | |
| 114132 | 5.00 | 16.20 | 17.10 | 52.608 | 525. | |
| 114133 | 5.00 | 17.40 | 18.39 | 48.747 | 503. | |
| 114134 | 5.00 | 15.20 | 16.04 | 60.166 | 530. | |
| 114135 | 5.00 | 18.00 | 19.01 | 49.167 | 517. | |
| 114136 | 5.00 | 15.40 | 16.26 | 48.171 | 516. | |
| 114137 | 5.00 | 15.20 | 16.10 | 41.308 | 461. | |
| 114138 | 5.00 | 15.20 | 16.07 | 54.380 | 490. | |
| 114139 | 5.00 | 17.60 | 18.59 | 46.654 | 518. | |
| 114140 | 5.00 | 17.40 | 18.37 | 55.271 | 524. | |
| 114141 | 5.00 | 14.00 | 14.77 | 45.032 | 537. | |
| 114142 | 5.00 | 13.80 | 14.59 | 50.290 | 486. | |
| 114143 | 5.00 | 16.70 | 17.62 | 51.360 | 544. | |
| 114144 | 5.00 | 7092.60 | 7490.89 | 12.617 | 514. | |
| 114145 | 5.00 | 93.59 | 99.09 | 17.957 | 469. | |
| 114146 | 5.00 | 55.80 | 59.03 | 20.865 | 481. | |
| 114147 | 5.00 | 130.00 | 137.31 | 17.040 | 512. | |
| 114148 | 5.00 | 73.20 | 77.42 | 21.198 | 484. | |
| 114149 | 5.00 | 234.00 | 247.48 | 14.371 | 485. | |
| 114150 | 5.00 | 118.40 | 124.86 | 18.623 | 547. | |
| 114151 | 5.00 | 50.40 | 53.16 | 23.922 | 542. | |
| 114152 | 5.00 | 17.60 | 18.62 | 38.757 | 476. | |
| 114153 | 5.00 | 178.60 | 188.56 | 15.275 | 523. | |
| 114154 | 5.00 | 16.60 | 17.54 | 52.017 | 500. | |
| 114155 | 5.00 | 14.08 | 14.87 | 55.969 | 515. | |
| 114156 | 5.00 | 12.00 | 12.67 | 49.889 | 516. | |
| 114157 | 5.00 | 18.00 | 18.98 | 44.334 | 549. | |
| 114158 | 5.00 | 12.40 | 13.11 | 45.794 | 493. | |

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

| # | TIME | CPMA | DFM1 | SIS | tSIE | FLAG |
|-----|------|---------|---------|--------|------|------|
| 159 | 5.00 | 15.60 | 16.49 | 37.285 | 494. | |
| 160 | 5.00 | 15.80 | 16.67 | 57.069 | 540. | |
| 161 | 5.00 | 15.80 | 16.70 | 45.143 | 504. | |
| 162 | 5.00 | 14.80 | 15.61 | 54.527 | 537. | |
| 163 | 5.00 | 13.34 | 14.07 | 51.020 | 545. | |
| 164 | 5.00 | 23.60 | 24.91 | 43.158 | 526. | |
| 165 | 5.00 | 28.20 | 29.79 | 35.060 | 513. | |
| 166 | 5.00 | 15.40 | 16.24 | 38.186 | 550. | |
| 167 | 5.00 | 57.60 | 60.91 | 24.549 | 486. | |
| 168 | 5.00 | 1165.22 | 1596.49 | 11.729 | 64.4 | |
| 169 | 5.00 | 21.60 | 22.79 | 28.637 | 537. | |
| 170 | 5.00 | 25.80 | 27.20 | 34.675 | 554. | |
| 171 | 5.00 | 14.60 | 15.41 | 71.697 | 525. | |
| 172 | 5.00 | 13.80 | 14.55 | 55.254 | 545. | |
| 173 | 5.00 | 14.80 | 15.63 | 53.681 | 516. | |
| 174 | 5.00 | 13.00 | 13.73 | 53.385 | 509. | |
| 175 | 5.00 | 13.00 | 13.74 | 35.483 | 499. | |
| 176 | 5.00 | 17.00 | 17.97 | 42.399 | 496. | |
| 177 | 5.00 | 13.80 | 14.57 | 39.171 | 527. | |
| 178 | 5.00 | 12.40 | 13.09 | 43.677 | 533. | |
| 179 | 5.00 | 16.60 | 17.55 | 48.885 | 493. | |
| 180 | 5.00 | 12.00 | 12.74 | 48.444 | 443. | |
| 181 | 5.00 | 15.40 | 16.27 | 54.174 | 510. | |
| 182 | 5.00 | 14.00 | 14.84 | 61.242 | 457. | |
| 183 | 5.00 | 14.60 | 15.45 | 56.791 | 473. | |
| 184 | 5.00 | 17.60 | 18.65 | 50.382 | 459. | |
| 185 | 5.00 | 13.80 | 14.57 | 44.987 | 520. | |
| 186 | 5.00 | 17.47 | 18.46 | 46.803 | 503. | |
| 187 | 5.00 | 13.80 | 14.55 | 51.779 | 557. | |
| 188 | 5.00 | 16.20 | 17.07 | 54.610 | 564. | |
| 189 | 5.00 | 14.80 | 15.61 | 39.236 | 543. | |
| 190 | 5.00 | 12.60 | 13.29 | 52.455 | 543. | |
| 191 | 5.00 | 12.80 | 13.51 | 53.216 | 533. | |
| 192 | 5.00 | 11.40 | 12.03 | 43.822 | 540. | |
| 193 | 5.00 | 14.00 | 14.76 | 46.820 | 554. | |
| 194 | 5.00 | 13.80 | 14.54 | 49.546 | 563. | |
| 195 | 5.00 | 15.80 | 16.65 | 49.267 | 568. | |
| 196 | 5.00 | 14.40 | 15.18 | 58.560 | 552. | |
| 197 | 5.00 | 13.00 | 13.70 | 53.311 | 557. | |
| 198 | 5.00 | 16.20 | 17.11 | 33.725 | 516. | |
| 199 | 5.00 | 20.60 | 21.71 | 37.242 | 566. | |
| 200 | 5.00 | 16.20 | 17.08 | 60.421 | 550. | |
| 201 | 5.00 | 12.20 | 12.87 | 46.650 | 538. | |
| 202 | 5.00 | 15.80 | 16.69 | 55.301 | 505. | |
| 203 | 5.00 | 27.20 | 28.72 | 48.504 | 519. | |
| 204 | 5.00 | 18.00 | 18.98 | 41.355 | 547. | |
| 205 | 5.00 | 25.00 | 26.39 | 36.209 | 526. | |
| 206 | 5.00 | 19.40 | 20.50 | 38.735 | 504. | |
| 207 | 5.00 | 17.60 | 18.57 | 51.342 | 540. | |
| 208 | 5.00 | 14.00 | 14.76 | 52.965 | 560. | |
| 209 | 5.00 | 18.60 | 19.66 | 44.146 | 494. | |
| 210 | 5.00 | 18.40 | 19.38 | 49.267 | 575. | |
| 211 | 5.00 | 15.60 | 16.45 | 44.158 | 554. | |
| 212 | 5.00 | 12.80 | 13.50 | 63.272 | 547. | |
| 213 | 5.00 | 15.40 | 16.24 | 39.729 | 549. | |
| 214 | 5.00 | 13.60 | 14.35 | 53.343 | 531. | |

E (extrapolated results)

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

| SN# | TIME | CPMA | DPM1 | SIS | tsIE | FLAG |
|--------------------------------------|------|---------|---------|--------|------|---------------|
| 215 | 5.00 | 14.60 | 15.40 | 44.236 | 538. | |
| 216 | 5.00 | 17.00 | 17.93 | 51.473 | 547. | |
| 217 | 5.00 | 14.20 | 14.99 | 57.735 | 530. | |
| 218 | 5.00 | 15.00 | 15.82 | 49.169 | 543. | |
| 219 | 5.00 | 12.00 | 12.64 | 66.447 | 566. | |
| 220 | 5.00 | 19.97 | 21.04 | 38.909 | 565. | |
| 221 | 5.00 | 13.20 | 13.90 | 44.940 | 580. | |
| 222 | 5.00 | 13.40 | 14.12 | 51.600 | 557. | |
| 223 | 5.00 | 15.20 | 16.04 | 63.250 | 533. | |
| 224 | 5.00 | 18.80 | 19.82 | 41.207 | 553. | |
| 225 | 5.00 | 15.20 | 16.04 | 42.321 | 529. | |
| 226 | 5.00 | 11.00 | 11.59 | 57.430 | 576. | |
| 227 | 5.00 | 13.80 | 14.56 | 51.569 | 540. | |
| 228 | 5.00 | 11.80 | 12.45 | 51.822 | 541. | |
| 229 | 5.00 | 12.40 | 13.09 | 56.408 | 518. | |
| 230 | 5.00 | 16.40 | 17.31 | 51.203 | 531. | |
| 231 | 5.00 | 10.40 | 10.97 | 47.317 | 548. | |
| 232 | 5.00 | 21.60 | 22.81 | 49.190 | 514. | |
| 233 | 5.00 | 19.60 | 20.67 | 53.096 | 548. | |
| 234 | 5.00 | 19.20 | 20.27 | 42.716 | 525. | |
| 235 | 5.00 | 15.80 | 16.66 | 58.247 | 553. | |
| 236 | 5.00 | 15.80 | 16.66 | 53.168 | 547. | |
| 237 | 5.00 | 15.40 | 16.23 | 61.219 | 555. | |
| 238 | 5.00 | 13.80 | 14.55 | 42.381 | 551. | |
| 239 | 5.00 | 15.20 | 16.01 | 52.247 | 569. | |
| 240 | 5.00 | 28.60 | 30.17 | 35.927 | 541. | |
| 241 | 5.00 | 20.40 | 21.58 | 38.536 | 477. | |
| 242 | 5.00 | 20.40 | 21.56 | 49.267 | 504. | |
| 243 | 5.00 | 17.40 | 18.35 | 49.681 | 552. | |
| 244 | 5.00 | 18.20 | 19.18 | 52.806 | 559. | |
| 245 | 5.00 | 24.00 | 25.36 | 32.662 | 502. | |
| 246 | 5.00 | 16.60 | 17.50 | 63.833 | 549. | |
| 247 | 5.00 | 12.60 | 13.28 | 42.724 | 565. | |
| 248 | 5.00 | 12.40 | 13.10 | 59.489 | 516. | |
| 249 | 5.00 | 14.00 | 14.78 | 48.173 | 525. | |
| 250 | 5.00 | 16.00 | 16.87 | 53.768 | 558. | |
| 251 | 5.00 | 13.20 | 13.92 | 66.340 | 549. | |
| 252 | 5.00 | 13.00 | 13.79 | 44.570 | 447. | |
| 253 | 5.00 | 14.60 | 15.46 | 52.877 | 468. | |
| 254 | 5.00 | 16.80 | 17.80 | 49.105 | 462. | |
| (1 missing vial) re-run of swipe 168 | | | | | | |
| 255 | 5.00 | 20.80 | 21.94 | 29.368 | 541. | |
| (1 missing vial) standard follow | | | | | | |
| 256 | 5.00 | 13.60 | 14.10 | 57.332 | 898. | background |
| 257 | 5.00 | 113580. | 117836. | 19.185 | 869. | H-3 standard |
| 258 | 5.00 | 115564. | 119793. | 154.84 | 895. | C-14 standard |

MDA C-14: 8.61 dpm

Attachment (4) for Diagram (I)
UH Tower-continued swipe results
Room 717, 720, & 722

SYSTEM NORMALIZED

C14 IPA DATA PROCESSED - 22-Jun-2004 11:23

C14 Eff (0-156 keV) = 95.48 %

WARNING: Questionable C14 Chi square value - Please view historic data

H3 IPA DATA PROCESSED - 22-Jun-2004 11:35

H3 Eff (0-18.6 keV) = 63.03 %

H3 CHI SQUARE IPA DATA PROCESSED - 22-Jun-2004 11:45

H3 Chi Square = 100.60

BKG IPA DATA PROCESSED - 22-Jun-2004 12:45

Bkg (0-18.6 keV) = 14.77 cpm

Bkg (0-156 keV) = 20.93 cpm

C14 E²/B (1-156 keV) = 575.57

H3 E²/B (1-18.6 keV) = 267.91

Attachment (4) for Diagram (I)
UH Tower-reswipe results

Protocol #:13 Name:H-3 DPM 06-Jul-2004 14:00
 Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Time = 5.00 QIP = tsIE ES Terminator = Count
 ARAKAKI RE-SURVEY
 Conventional DPM
 Nuclide 1 = 253561
 Warning: User program changes may have invalidated DPM calculation

| # | TIME | CPMA | DPM1 | SIS | tsIE | FLAG |
|----|------|---------|---------|--------|------|--------------|
| 1 | 5.00 | 8.80 | 15.71 | 24.403 | 573. | (background) |
| 21 | 5.00 | 366.64 | 705.92 | 14.187 | 493. | (swipe 65) |
| 22 | 5.00 | 37.20 | 71.94 | 16.369 | 489. | (swipe 66) |
| 23 | 5.00 | 17.40 | 33.92 | 17.341 | 481. | (swipe 70) |
| 24 | 5.00 | 622.36 | 1232.99 | 12.950 | 467. | (swipe 69) |
| 25 | 5.00 | 68.48 | 133.75 | 13.938 | 479. | (swipe 68) |
| 26 | 5.00 | 33.44 | 65.90 | 13.907 | 471. | (swipe 67) |
| 27 | 5.00 | 53.80 | 104.31 | 14.851 | 486. | (swipe 62) |
| 28 | 5.00 | 27.84 | 53.34 | 15.530 | 498. | (swipe 61) |
| 29 | 5.00 | 20.60 | 39.85 | 16.081 | 488. | (swipe 60) |
| 30 | 5.00 | 18.84 | 36.26 | 18.287 | 493. | (swipe 63) |
| 31 | 5.00 | 52.44 | 102.06 | 14.776 | 483. | (swipe 58) |
| 32 | 5.00 | 14.40 | 28.13 | 20.107 | 479. | (swipe 59) |
| 33 | 5.00 | 11.04 | 21.36 | 20.281 | 488. | (swipe 64) |
| 34 | 5.00 | 1266.84 | 2454.17 | 12.135 | 487. | (swipe 115) |
| 35 | 5.00 | 43.00 | 84.85 | 16.042 | 470. | (swipe 72) |
| 36 | 5.00 | 28.28 | 55.57 | 15.777 | 474. | (swipe 73) |
| 37 | 5.00 | 45.04 | 88.52 | 14.287 | 474. | (swipe 74) |
| 38 | 5.00 | 78.64 | 158.68 | 13.122 | 451. | (swipe 86) |
| 39 | 5.00 | 21.80 | 43.18 | 18.892 | 467. | (swipe 90) |
| 40 | 5.00 | 14.00 | 27.51 | 20.498 | 474. | (swipe 92) |
| 41 | 5.00 | 13.24 | 25.94 | 20.403 | 477. | (swipe 96) |
| 42 | 5.00 | 14.20 | 27.81 | 19.870 | 477. | (swipe 97) |
| 43 | 5.00 | 18.40 | 35.85 | 17.097 | 482. | (swipe 102) |
| 44 | 5.00 | 10.80 | 20.92 | 20.984 | 487. | (swipe 103) |
| 45 | 5.00 | 15.00 | 29.76 | 18.425 | 466. | (swipe 167) |
| 46 | 5.00 | 272.36 | 552.30 | 13.803 | 447. | (swipe 168) |
| 47 | 5.00 | 25.60 | 51.20 | 16.802 | 459. | (swipe 22) |
| 48 | 5.00 | 55.44 | 112.69 | 15.032 | 445. | (swipe 25) |
| 49 | 5.00 | 103.24 | 206.76 | 13.748 | 457. | (swipe 28) |
| 50 | 5.00 | 11.40 | 22.40 | 19.682 | 474. | (swipe 153) |
| 51 | 5.00 | 8.24 | 15.96 | 19.495 | 487. | (swipe 145) |
| 52 | 5.00 | 11.20 | 22.60 | 23.158 | 451. | (swipe 144) |
| 53 | 5.00 | 14.00 | 29.64 | 18.549 | 413. | (swipe 146) |
| 54 | 5.00 | 14.60 | 28.20 | 22.514 | 490. | (swipe 148) |
| 55 | 5.00 | 38.84 | 75.94 | 14.826 | 479. | (swipe 147) |
| 56 | 5.00 | 49.64 | 104.90 | 14.218 | 415. | (swipe 149) |
| 57 | 5.00 | 15.04 | 29.42 | 17.826 | 478. | (swipe 150) |
| 58 | 5.00 | 10.04 | 19.62 | 23.289 | 479. | (swipe 151) |
| 59 | 5.00 | 10.60 | 20.84 | 19.563 | 473. | (swipe 120) |

Attachment (4) for Diagram (I)
UH Tower - reswipe results 2

Protocol #:14 Name:C-14 DPM 07-Jul-2004 11:48
 Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Time = 5.00 QIP = tSIE/AEC ES Terminator = Count
 ARAKAKI RESURVEY 7-7-2004
 Conventional DPM
 Nuclide 1 = 108000

| S# | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|------------------|------|--------|--------|--------|------|--------------|
| ✓ 1 | 5.00 | 16.20 | 17.07 | 47.139 | 564. | (background) |
| ✓ 2 | 5.00 | 15.40 | 16.28 | 41.897 | 488. | (swipe 86) |
| ✓ 3 | 5.00 | 15.00 | 15.86 | 46.588 | 487. | (swipe 72) |
| ✓ 4 | 5.00 | 10.60 | 11.21 | 49.725 | 490. | (swipe 73) |
| ✓ 5 | 5.00 | 11.00 | 11.63 | 59.852 | 494. | (swipe 74) |
| ✓ 6 | 5.00 | 16.60 | 17.56 | 41.846 | 486. | (swipe 28) |
| ✓ 7 | 5.00 | 14.20 | 15.02 | 46.002 | 485. | (swipe 25) |
| ✓ 8 | 5.00 | 16.00 | 16.92 | 49.755 | 491. | (swipe 168) |
| ✓ 9 | 5.00 | 35.80 | 38.16 | 33.409 | 404. | (swipe 168) |
| ✓ 10 | 5.00 | 65.00 | 68.73 | 25.468 | 489. | (swipe 65) |
| ✓ 11 | 5.00 | 20.60 | 21.78 | 53.479 | 491. | (swipe 66) |
| ✓ 12 | 5.00 | 130.60 | 138.11 | 18.935 | 487. | (swipe 69) |
| ✓ 13 | 5.00 | 26.60 | 28.13 | 31.991 | 488. | (swipe 68) |
| ✓ 14 | 5.00 | 24.20 | 25.61 | 36.690 | 476. | (swipe 67) |
| (1 missing vial) | | | | | | |
| ✓ 15 | 5.00 | 20.60 | 21.79 | 34.001 | 485. | (swipe 62) |
| ✓ 16 | 5.00 | 18.60 | 19.68 | 61.421 | 481. | (swipe 58) |
| ✓ 17 | 5.00 | 21.80 | 23.06 | 31.982 | 485. | (swipe 147) |
| ✓ 18 | 5.00 | 40.06 | 42.59 | 23.850 | 427. | (swipe 149) |
| ✓ 19 | 5.00 | 104.80 | 110.81 | 18.876 | 489. | (swipe 115) |
| ✓ 20 | 5.00 | 13.49 | 14.26 | 54.043 | 491. | (swipe 115) |

Attachment (4) for Diagram (I)
UH Tower - reswipe results 3

Protocol #:14 Name:C-14 DPM 08-Jul-2004 15:18
Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE/AEC ES Terminator = Count
ARAKAKI RE-RE-SURVEY 7/8/04
Conventional DPM
Nuclide 1 = 108000

| S# | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|----|------|--------|--------|--------|------|--------------|
| N | 5.00 | 12.40 | 13.08 | 67.042 | 574. | (background) |
| 21 | 5.00 | 32.20 | 34.09 | 31.033 | 471. | (swipe 168) |
| 22 | 5.00 | 148.00 | 156.55 | 21.488 | 482. | (swipe 65) |
| 23 | 5.00 | 176.20 | 186.40 | 20.484 | 479. | (swipe 69) |
| 24 | 5.00 | 17.00 | 18.07 | 46.073 | 431. | (swipe 149) |
| 25 | 5.00 | 30.00 | 31.72 | 33.502 | 490. | (swipe 115) |
| 26 | 5.00 | 9.60 | 10.15 | 47.214 | 486. | (swipe 115) |
| 27 | 5.00 | 14.40 | 15.23 | 53.812 | 488. | (swipe 115) |

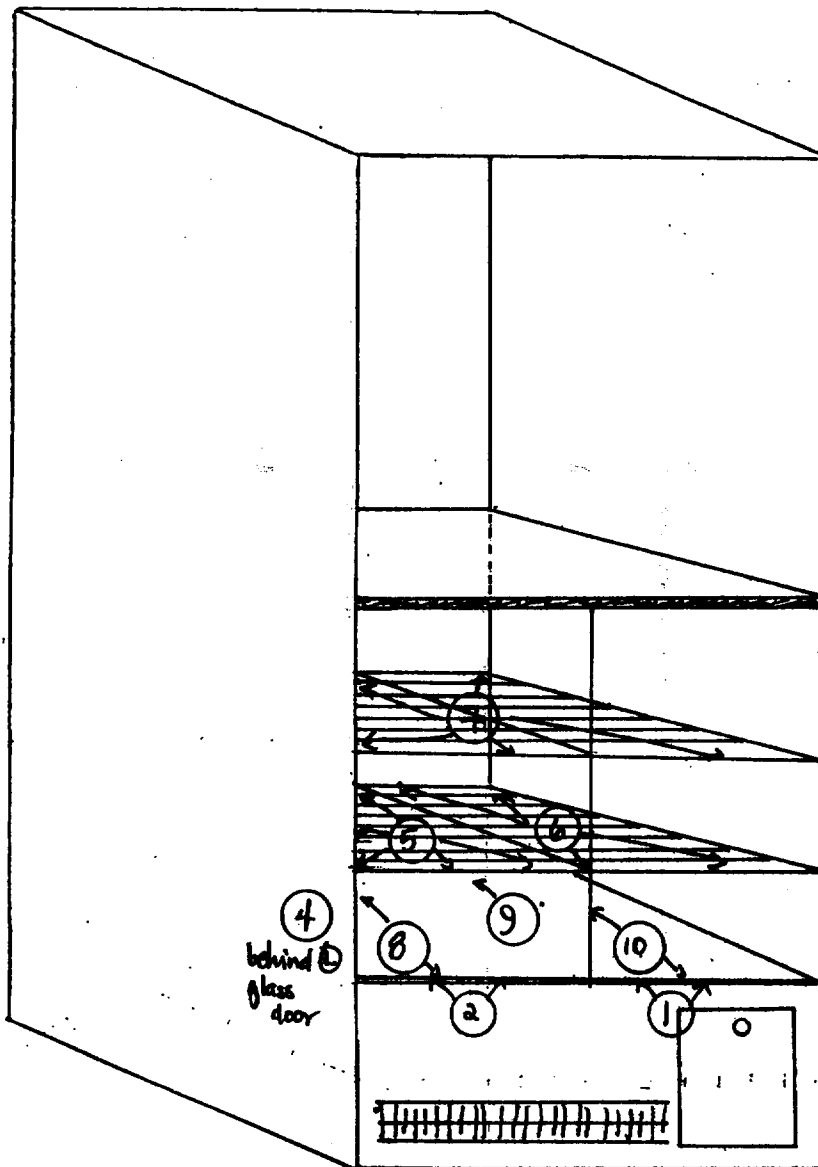
Attachment (4) for Diagram (I)
UH Tower - reswipe results 4

Protocol #:13 Name:H-3 DPM 09-Jul-2004 15:51
 Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Time = 5.00 QIP = tSIE ES Terminator = Count
 ARAKAKI RE-SURVEY 7/9/04
 Conventional DPM
 Nuclide 1 = 253561
 Warning: User program changes may have invalidated DPM calculation

| S# | TIME | CPMA | DPM1 | SIS | tSIE | FLAG |
|----|------|-------|-------|--------|------|--------------|
| 1 | 5.00 | 12.60 | 22.83 | 22.625 | 556. | (background) |
| 2 | 5.00 | 12.84 | 25.06 | 21.893 | 480. | (swipe 69) |
| 3 | 5.00 | 13.00 | 24.82 | 21.334 | 501. | (swipe 65) |

Attachment (4) Diagram (II)
University of Hawaii

UH Tower - Room 717
Isotope Storage Refrigerator



Forma Scientific
Lab Refrigerator
F101QK State of HI - UH

Attachment (4) Diagram(II)
 UH Tower - swipe results
 Room 717
 Isotope Refrigerator

Protocol #: 3 Name:Swipes 02-Jun-04 13:35
 Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Region C: LL-UL= 0.0-2000 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Time = 1.00 QIP = SIS
 Swipe Test

| FID | S# | TIME | CPMA | CPMB | CPMC | 3H DPM | |
|-----|----|------|------|------|--------|--------|-----------|
| 4 | 1 | 1.00 | 37 | 20 | 51.00 | 34 | - Control |
| 4 | 21 | 1.00 | 33 | 16 | 42.00 | 27 | - T2 door |
| 4 | 22 | 1.00 | 27 | 16 | 43.00 | 27 | - T4 door |
| 4 | 23 | 1.00 | 24 | 17 | 34.00 | 29 | - B2 door |
| 4 | 24 | 1.00 | 28 | 24 | 42.00 | 40 | - B4 door |
| 4 | 25 | 1.00 | 44 | 30 | 52.00 | 50 | - rack L |
| 4 | 26 | 1.00 | 138 | 78 | 148.00 | 131 | - Rack R |
| 4 | 27 | 1.00 | 45 | 32 | 60.00 | 54 | - Rack H2 |
| 4 | 28 | 1.00 | 45 | 30 | 59.00 | 50 | B L |
| 4 | 29 | 1.00 | 58 | 44 | 68.00 | 74 | B M |
| 4 | 30 | 1.00 | 80 | 58 | 89.00 | 97 | B R |

Attachment (4) Diagram (I)
Additional Hood Swipes
Room 717

HOOD AREA

Protocol #: 3 Name: Swipes 30-Jun-04 11:48
Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0-2000 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 1.00 QIP = SIS

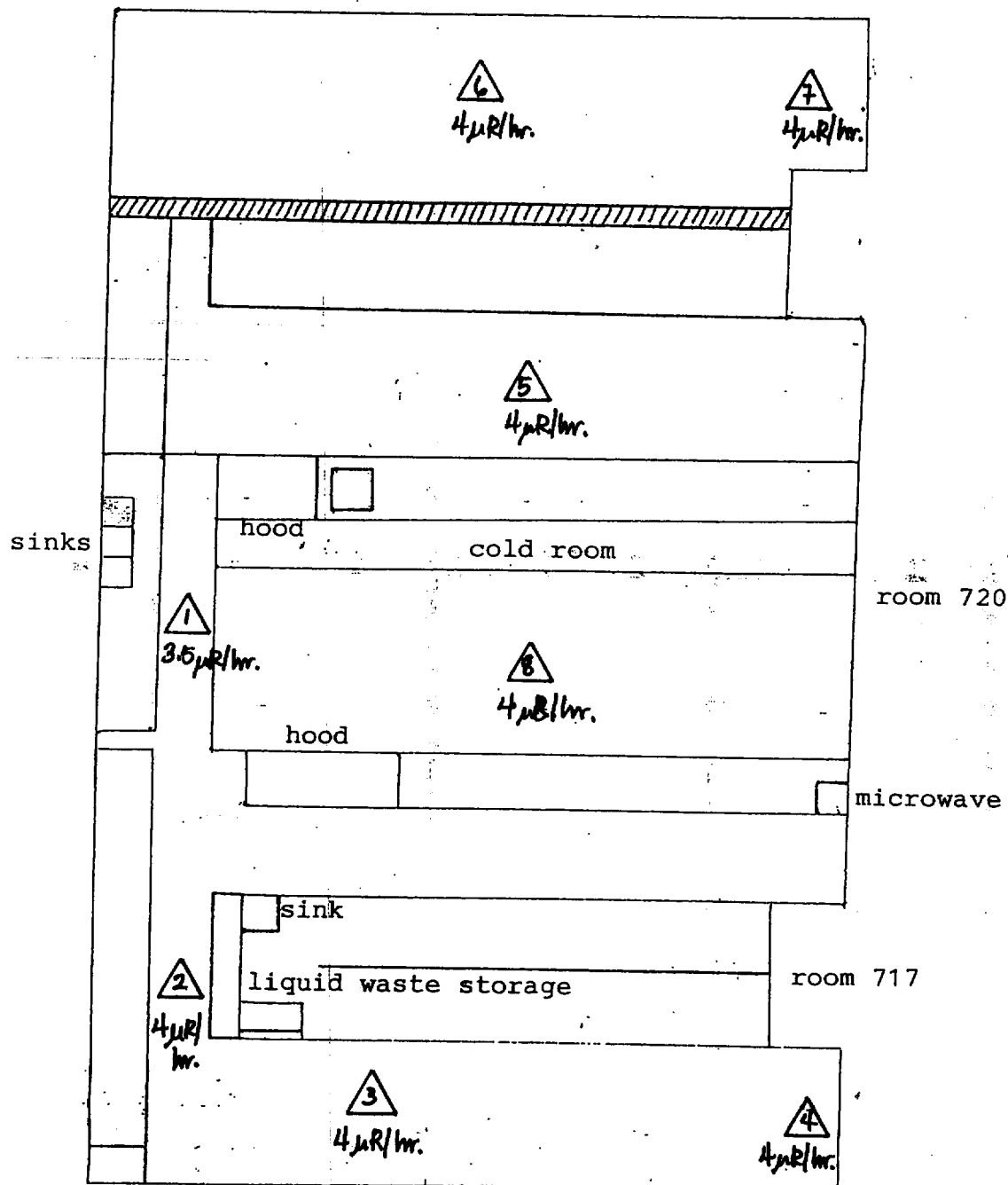
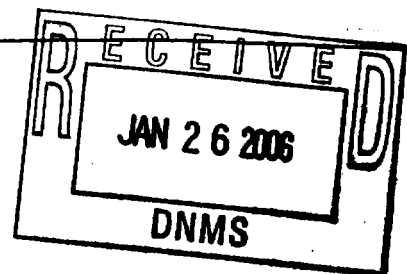
Swipe Test

Warning: Not Normalized

| PID | S# | TIME | CPMA | CPMB | CPMC | 3H DPM | |
|-----|----|------|------|------|---------|--------|---|
| 4 | 1 | 1.00 | 35 | 18 | 47.00 | 30 | <i>sky - 56</i> |
| 4 | 2 | 1.00 | 25 | 14 | 38.00 | 24 | <i>sink - 168</i> |
| 4 | 3 | 1.00 | 55 | 38 | 73.00 | 64 | <i>undersink</i> |
| 4 | 4 | 1.00 | 2953 | 1495 | 3338.00 | 2513 | <i>let cut down } -115</i> |
| 4 | 5 | 1.00 | 37 | 29 | 47.00 | 49 | <i>is cut down }</i> |
| 4 | 6 | 1.00 | 40 | 29 | 48.00 | 49 | <i>let cut down } cabinet doors of</i> |
| 4 | 7 | 1.00 | 41 | 22 | 59.00 | 37 | <i>let cut down } moved</i> |
| 4 | 8 | 1.00 | 28 | 23 | 36.00 | 38 | <i>floor by sink - floor under hot sink</i> |
| 4 | 9 | 1.00 | 32 | 20 | 44.00 | 34 | <i>wall by light - # 103</i> |
| 4 | 10 | 1.00 | 33 | 24 | 48.00 | 40 | <i>wall by chair bar # 22</i> |
| 4 | 11 | 1.00 | 35 | 28 | 44.00 | 47 | <i>floor by counter # 28</i> |

University of Hawaii

University Tower, 7th Floor
1356 Lusitana Street
Room 717, 720, 722



70848

This is to acknowledge the receipt of your letter/application dated 1-19-06, and to inform you that the initial processing, which includes an administrative review, has been performed.

2-8-06
DATE

☒ There were no administrative omissions. Your application will be assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card:

The action you requested is normally processed within 90 days.

☐ A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned Mail Control Number 470848.
When calling to inquire about this action, please refer to this mail control number.
You may call me at 817-860-8103.

Sincerely,

Celleen Murnahan
Licensing Assistant

This pouch is resealable.

Patients only.

Please here. Please here.