RTP ENVIRONMENTAL ASSOCIATES, INC.
AIR • WATER • SOLID WASTE CONSULTANTS
239 U.S. Highway 22 East
Green Brook, New Jersey 08812-1909
(www.rtpenv.com)
(732) 968-9600
Fax: (732) 968-5279

October 24, 2006

J-6
MS-16

Mr. Dennis Lawyer
Licensing Assistant Section
Nuclear Materials Safety Branch
U.S. Nuclear Regulatory Commission, Region I Office
475 Allendale Road
King of Prussia, PA 19406-1415

RECEIVED
REGION 1
2006 OCT 27 PM 1:12

Re: Honeywell International, Inc 101 Columbia Road, Morristown, NJ 07962
License No. 29-00040-10 03011981
Control No. 137670

Dear Mr. Lawyer:

In response to our conference call on July 18, 2006, please find the following listed items and attachments for your review. This continued effort is for the decommissioning of the above referenced licensee.

1. Please refer to the enclosed inventory list for information regarding unsealed licensed materials used at the facility. The unsealed sources table indicates where the materials were used. Please also find details on the (2) lead-lined storage boxes which held material as noted on the inventory list. Please note that facility locations mentioned in your March 29, 2006 letter may have been authorized areas per the original license, but only those locations listed on the enclosed inventory list were used and active under the approved license. No other areas were used for radioactive material.
2. It was suggested that RSC minutes be referred to review which facility locations had been authorized areas per the license, however as stated in the previous response, only those locations that are found in the enclosed list were areas actually used. No other facility areas (regardless if authorized) were used for radioactive material.
3. As stated in item number 1, please refer to the enclosed inventory list for information regarding unsealed licensed material used at the facility. The unsealed sources table identifies the designated areas where material was used. No further documentation regarding the list of designated areas is available for submittal at this time.
4. Per the recommendation of the NRC, 100% scanning of the affected areas was conducted. Using an appropriate radiation detection instrument, a 100% scan of DEV 4, 7 & 8 show there are no elevated radiation levels. Please refer to the attached full report for the scanning survey conducted at the Morristown site. Please also note Room 7 & 8 are continuous, however the attached report identifies these rooms solely as room number 7.
5. Per the request of the NRC, Agilent was contacted for clarification of a final leak test

137670
NMSS/RGNI MATERIALS-002

conducted on December 13, 2003. The report was released by an authorized Agilent employee, Alvin Crews. Please find enclosed a worksheet containing the information printed on the original 12/13/03 report.

6. Question #6 was resolved & removed during the July 18, 2006 conference call.
7. The size of the DEV Building Lab 4 is 550 square feet. The size of Lab 7 & 8 is 1,125 square feet. The DEV building is 26,500 square feet. Additionally, the (2) storage boxes are as follows:
   - CRL G23 (RAD STORAGE BOX) 10.5" x 10.5" x 18.5"
   - HAZARD WASTE STORAGE (LARGE STORAGE BOX) 4' x 2' x 2'

   The area was used for R& D laboratory purposes, which may be characterized as laboratory procedures typically performed on bench tops and in hoods.

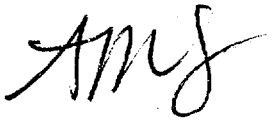
As an additional note, in response to a question regarding the storage box wipe survey, the summary report was checked correctly per the laboratory's wipe analysis technique.

Should you have any questions regarding this submittal or need any additional information; please do not hesitate to call the undersigned at 732-968-9600.

Sincerely,

RTP ENVIRONMENTAL ASSOCIATES, INC.

A. Roger Greenway, QEP, CCM
Principal
Email: greenway@rtpenv.com



Alice M. Schussler
Project Manager
Email: schussler@rtpenv.com

enclosures

c: Peter Jungfer, Honeywell International

Honeywell International
NRC Statement of Use
License Number: 29-00040-10

Unsealed Material Inventory List

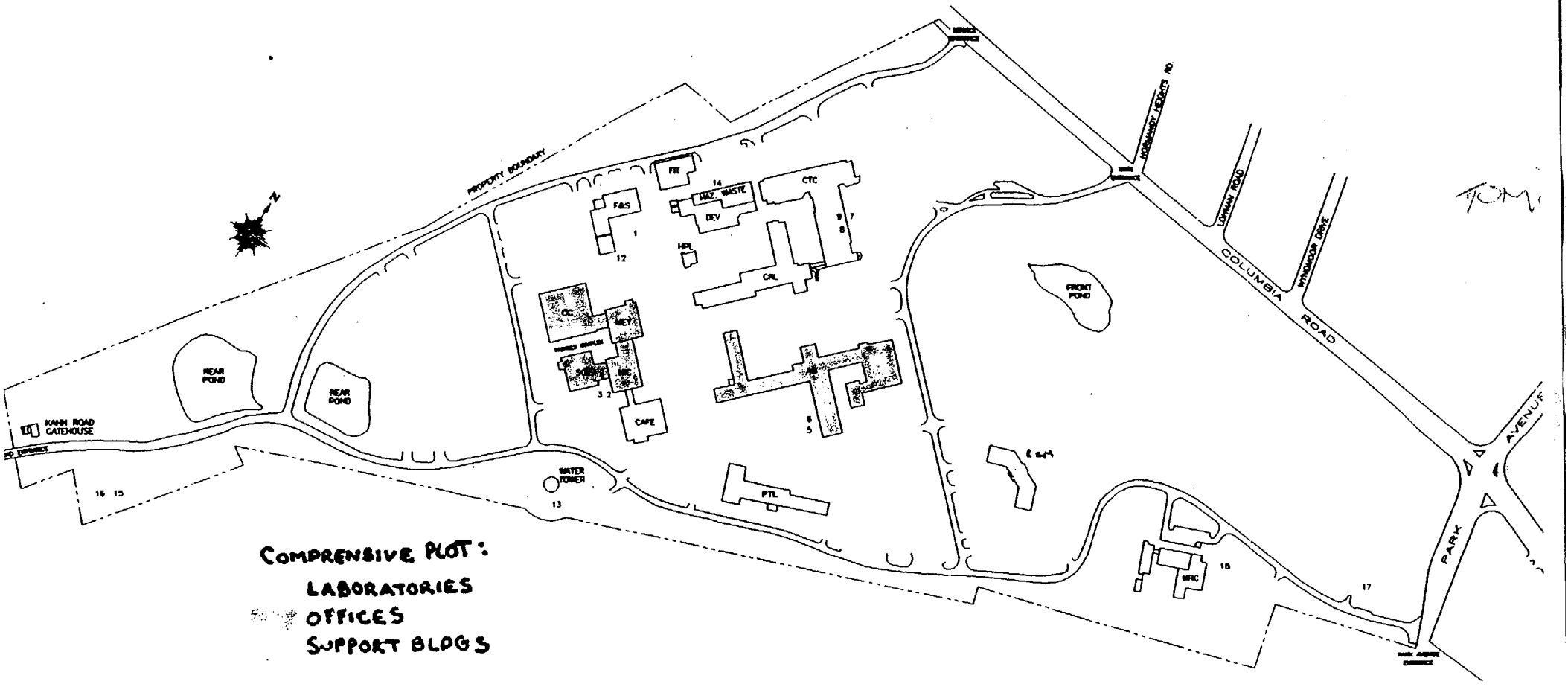
#1

Material Name	Abbrev	Source Type	End Date	Facility Bldg	Additional Notes
Isotope C-14	^{14}C	Unsealed	4/3/1996*	DEV Bldg Lab 4, 7 & 8	Wipe survey conducted 3-29-1995
Isotope H-3	^{3}H	Unsealed	4/3/1996*		
Isotope P-32	^{32}P	Unsealed	12/1/1993		
Isotope S-35	^{35}S	Unsealed	12/1/1993		
Isotope I-125	^{125}I	Unsealed	12/1/1993		

* Reinventory site all remaining material in the radiation waste or storage inventory

Designated usage area at Honeywell
DEV Bldg (Labs 4, 7, & 8)
CRL G23 (RAD STORAGE BOX)
HAZARD WASTE STORAGE (LARGE STORAGE BOX)
See Site Schematic for Building Location

MORRIS TOWNSHIP CENTER
SITE PLAN



COMPRENSIVE PLOT:
LABORATORIES
OFFICES
SUPPORT BLDGS

LEGEND

1 F&S 4000-GALLON GASOLINE TANK
2 NICHOLS 20000-GALLON #6 OIL TANK
3 NICHOLS 1500-GALLON #2 OIL TANK
4 NICHOLS 275-GALLON DIESEL TANK
5 AB 20000-GALLON #6 OIL UST
6 AB 1500-GALLON #2 OIL UST
7 CTC 2000-GALLON DIESEL TANK
8 EMERGENCY GENERATOR 275-GALLON DIESEL TANK
9 FIRE PUMP 275-GALLON DIESEL TANK
10 KAHN ROAD GATEHOUSE 275-GALLON #2 OIL TANK
12 F&S PCB-CONTAMINATED TRANSFORMER
13 WATER TOWER NON-PCB TRANSFORMER
14 DEV NON-PCB TRANSFORMER
15 KAHN ROAD BANK 1 NON-PCB TRANSFORMER
16 KAHN ROAD BANK 2 NON-PCB TRANSFORMER
17 MANHOLE 28 NON-PCB TRANSFORMER
18 MANHOLE 29 NON-PCB TRANSFORMER

AB = Administration Building
Complex = Nichols/Meyer/Solvay Computer Center
L&M = Learning/Meeting Center
CRL = Corporate Research Lab
CTC = Corporate Technology Center
DEV = Development
F&S = Facilities and Services
HPL = High Pressure Lab
H&F = Health & Fitness Center
MRC = Materials Research Center
PTL = Plastics Technology Lab
TPL = Thermal Plastics Lab

SCALE
0 200' 400' 600' 800' 1000'

Agilent Final Leak Test

Cell Serial:	L-1897
Source:	N/A
Group:	Rebuilt EC Cells
Model:	19235-69530

Storage Location:	Off-Site
Released By:	Alvin Crews

Status:	Scrapped
As of:	12/17/2003

Received Date	12/17/2003
Ship Date	

Leak Date	
Final Wipe Date	12/17/2003
Efficiency %	59

Leak Test:	
Final BKG	7
Final Exit	

Final Inlet	35
Final Code	

Final Body	0

Customer	HP ECD LAB
Contact Name	
Order #	

Customer Code	1
Item #	

BARREL #2 ABC

Antkowiak and Mahoney
Enterprises, Inc.

SCANNING SURVEY

Honeywell International, Inc.
Morristown, New Jersey

DEV Building, Rms 4 & 7

Prepared by

Antkowiak and Mahoney
Enterprises, Inc.
3 Valley Court
Chester, NY 10918
845 406-1917

Antkowiak and Mahoney
Enterprises, Inc.

SCANNING SURVEY

Honeywell International, Inc.
Morristown, New Jersey

DEV Building, Rms 4 & 7

Survey Date:

October 3, 2006

Surveys performed by:

Joel Antkowiak
Robert Mahoney

Report prepared by:

Joel Antkowiak

Reviewed and Approved by: Joel Antkowiak Digitally signed by Joel Antkowiak DN: CN = Joel Antkowiak, C = US, O = AME Inc. Date: 2006.10.23 12:09:54 -04'00' Date:_____

Introduction

On October 3, 2006 Antkowiak and Mahoney Enterprises, Inc. (AME) conducted surface scans in the DEV Building, Rooms 4 and 7 of the Honeywell International, Inc. facility in Morristown, New Jersey. The intent of the survey was to document the final radiological conditions in the rooms to augment the decommissioning data already obtained for the areas. This survey report is based on the methods presented in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). MARSSIM provides guidance on determining the number of data points required in each survey unit, the interpretation of survey results, choice of instrumentation, and data reduction. Values for activity to dose conversions are obtained from Regulatory Guide for Decommissioning (NUREG-1500). Much of the Quality Assurance plan is developed based on an EPA document, "Guidance for the Data Quality Objectives Process". (EPA /600/R-96). No sampling for removable activity was performed during this survey.

Radionuclides of Concern

Based on information provided by the Radiation Safety Officer for this site, the nuclides that were previously used in these rooms is carbon-14.

Release Criterion

The TEDE value of 25 mrem/y has been set in Subpart E - Radiological Criteria for License Termination, 10 CFR 20.1402. However, that regulation also invokes the ALARA principle. In NUREG-1500, the statement is made, "...the NRC will consider that the licensee has complied with the ALARA requirement if the licensee can demonstrate that the TEDE to the average member of the critical group does not exceed 3 mrem per year".

This site will be decontaminated such that, at a maximum, the highest Total Effective Dose Equivalent (TEDE) received by an individual occupying the site after release would be 3 millirem. This predicted dose level is based on the building occupancy scenario/model of NUREG/CR5512, which in turn is used to calculate the surface contamination limits presented in Table B-1 of NUREG 1500. Those values for selected nuclides are presented in Table 2, below.

Residual Radioactivity Limits

Residual radioactivity limits are called Derived Concentration Guideline levels (DCGL). These are values of surface contamination or soil concentrations that will deliver the TEDE over the next 1,000 years, under specific use scenarios.

Radionuclide	Surface Concentration dpm/100cm^2
H-3	5,290,000
C-14	158,000

Table 2 - Concentration values which deliver 3 mrem/y under the building occupancy scenario.

Because the detection of surface contamination with current field instrumentation is essentially a "gross beta" measurement, the value of the most restrictive of the listed radionuclides would normally be selected as the DCGL for this project. However, the footnote to Table B-1 states "For most radionuclides, based on ALARA and best practice, it is not necessary to leave contamination in excess of 5,000 dpm/100cm^2 ". Therefore the DCGL for this project will be 5,000 dpm/100cm^2, with the knowledge that this value would deliver a TEDE well below 3 mrem/y.

Survey Units

The following survey units for this project were all designated as Class 2 per the MARSSIM terminology. Classification was based on the RSO's knowledge of the site. The survey units are as follows:

Room 4 Room 7.

Survey Design

The number of data points necessary for a given survey unit in this survey is based on using the one sample Sign test for analysis of the data. This statistical test is appropriate when the contaminant is not present in background, or is present at such a small fraction of the DCGL as to be insignificant. The likely contaminant as identified by Honeywell staff is C-14, which falls into this category of radionuclides. In terms of data reduction, this means the survey units are not compared to a reference (i.e. non-impacted) area, but are compared directly to the DCGL. Equation 5-2 is then used to determine the number of data points in each survey unit as follows:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(\text{sign } p - 0.5)^2}$$

We define each "data point" as a measurement location for both an integrated surface activity count (beta and gamma) and wipe sample. These are in addition to the scanning surveys conducted in each survey unit. The contamination limits for this decommissioning project are less than 5,000 dpm/100 cm^2 for total (fixed and removable) radioactivity. The release limits are called Derived Concentration Guideline Levels (DCGL) in the MARSSIM document.

The first step in determining the number of samples is to define the gray region. The gray region is the range of values where the consequences of making a decision error are minor. Typically the lower boundary of the gray region (LBGR) is one half of the DCGL, therefore the shift or delta (Δ) is equal to DCGL-LBGR. For this project:

$$\Delta = 5{,}000 \text{ dpm}/100\text{cm}^2 - 2{,}500 \text{ dpm}/100\text{cm}^2$$

The next step is to estimate the standard deviation of the measurements of the contaminants. If results from characterization surveys are not available, it is reasonable to assume a relative standard deviation of 30%.

The DCGL and LBGR are expressed in counts per minute based on 3.2% efficiency for the detection of I-125 and a 126 cm^2 probe. This would make the gray region from 202 cpm to 101 cpm. Thirty percent of the DCGL would give a standard deviation of 60.6. The relative shift would then be:

$$\Delta/\sigma = (202\text{-}101)/60.6 = 1.67$$

The value of Sign p as obtained from Table 5.4 in the MARSSIM manual for a relative shift of 1.67 is 0.945201.

The acceptable error rates for this project are 0.10 for a Type I error and 0.05 for a Type II error. That is, there is a 5% chance of releasing a survey unit that, in reality does not meet the release criteria (Type I). Conversely, there is a 90% chance of not releasing a survey unit that truly does meet the release criteria.

The percentiles, $Z_{1-\alpha}$ and $Z_{1-\beta}$ represented by these decision errors are 1.645 and 2.326.

Substituting all the values determined above into equation 5.2 gives the number of data points, N as;

$$N = \frac{(1.645 + 2.326)^2}{4\,(0.945201\text{-}0.5)^2} = 20$$

The number of data points is increased by 20% to account for missing or unusable data, making

$$N = 20 \times 1.2 = 24$$

As a check on this calculation, the number of data points necessary based on the error rates and relative shift was also determined using Table 5.5 in MARSSIM. That value is 24 data points. Therefore, we obtained at least 24 data points in each survey unit. Not included in that number are biased measurements, obtained in areas where professional judgment would suggest contamination could be encountered.

Any contamination in the areas surveyed is most likely isolated spots. Section 5.5.2.4 of MARSSIM states that the preceding statistical tests are most appropriate for uniformly distributed contamination. Specifically, "systematic measurements and sampling, in conjunction with surface scanning, are used to obtain an adequate assurance level that small areas of elevated radioactivity will satisfy the release criterion." The method employed for this survey includes enough randomly located data points to satisfy the statistical test, as well as scanning and a systematic grid measurements to detect small areas of elevated activity.

Equipment

This project will use the following instruments or their equivalent for verification of the presence or absence of radioactive contamination.

Beta/Gamma Surveying

Ludlum Model 12 meter with 44-92 gas proportional probe or other appropriate detector designed to detect beta/gamma radiation. This probe has an active surface area of 126 cm^2 with an open area of 100 cm^2. The floor was surveyed with the same instrument.

Based on the information in MARSSIM Chapter 6, section 6.7, the scanning minimum detectable concentration for these systems can be determined based on the following equation:

$$\textit{Scan}\ \text{MDC} = \text{MDCR} / [p^{1/2} * e_i * e_s * (\text{probe area} / 100\ cm^2)$$

where

MDCR = minimum detectable count rate
e_i = instrument efficiency
e_s = surface efficiency (typically = 0.5)
p = surveyor efficiency (typically = 0.5)

Assuming a background count rate of 300 cpm, the MDCR for the model 43-68 probes for this project is 512 cpm. This is based on a scan rate of 1 probe width per second, with a requirement of 95% correct detections and an acceptable rate of false positives equal to 60%.

The Scan MDC is then as presented in Table 1, assuming typical values of 0.5 for both surveyor efficiency and surface efficiency, and efficiency for carbon-14 of 0.137.

Instrument	**MDCR** (cpm)	**Scan MDC** (dpm/100 cm^2)
Ludlum Model 12 w/Model 43-68 probe	512	3,737

This is below the site specific DCGL of 5,000 dpm/100 cm2 for a dose of 3 mRem/year.

Instrument Scan MDCs

For scaler readings, the minimum detectable activity for each meter-probe combination is dependent on several factors. These include count time, efficiency for each specific isotope, and the radiological content of each different material surveyed (i.e., ceramic tiles will have a higher background than dry wall). Table 2 shows typical MDAs for these survey systems for carbon-14. The actual MDAs will be determined at the time of the surveys. These are determined using the following formula:

$$MDA = \frac{2.71 + 4.65\sqrt{Br \times t}}{t \times E \times A/100}$$

where:

MDA = activity in dpm/100 cm^2
Br = background rate in counts per minute
t = counting time in minutes
E = detector efficiency in counts per disintegration (4π)
A = probe area or area wiped in cm^2

Instrument Scaler MDAs

Instrument	Minimum Detectable Activity
Ludlum Model 12 w/Model 43-68 probe	500-1000 dpm/100 cm^2

Calibration certificates for each meter used are provided.

Statistical Test
of
Measurement Results

Because all samples and readings indicated residual activity below the site specific DCGL, no statistical analysis is required.

Understanding the Appendices

The appendices presenting the results of the surveys show diagrams of each area surveyed. On each diagram, the appendices that present the data from the scaler measurements refer to the numbers of the location on the pictures of Appendix I as appropriate. For example, reading number one taken in Room 4 corresponds to the location represented in the picture. There is a scalar reading for each location noted on the for the room.

Survey Results – Final Status

No direct radioactive contamination was found in the rooms surveyed.

The diagrams of the rooms surveyed showing the locations of the scalar measurements are shown in Appendix I. The final survey results for each of the surveyed areas are presented in Appendix II. Appendix III consists of copies of the meter calibration certificates.

References

U.S. Nuclear Regulatory Commission (NRC), NUREG/CR-5849, *Manual for Conducting Radiological Surveys in Support of License Termination*. Draft Report for Comment, June 1992

U.S. Nuclear Regulatory Commission (NRC), NUREG-1500 *Working Draft Regulatory Guide on Release Criteria for Decommissioning.*. Draft Report for Comment, August 1994

U.S. Nuclear Regulatory Commission (NRC), NUREG-1505 *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*. Draft Report for Comment, August 1995

U.S. Nuclear Regulatory Commission (NRC), NUREG-1506 *Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria*. Draft Report for Comment, August 1995

U.S. Nuclear Regulatory Commission (NRC), NUREG-1507 *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*. Draft Report for Comment, August 1995

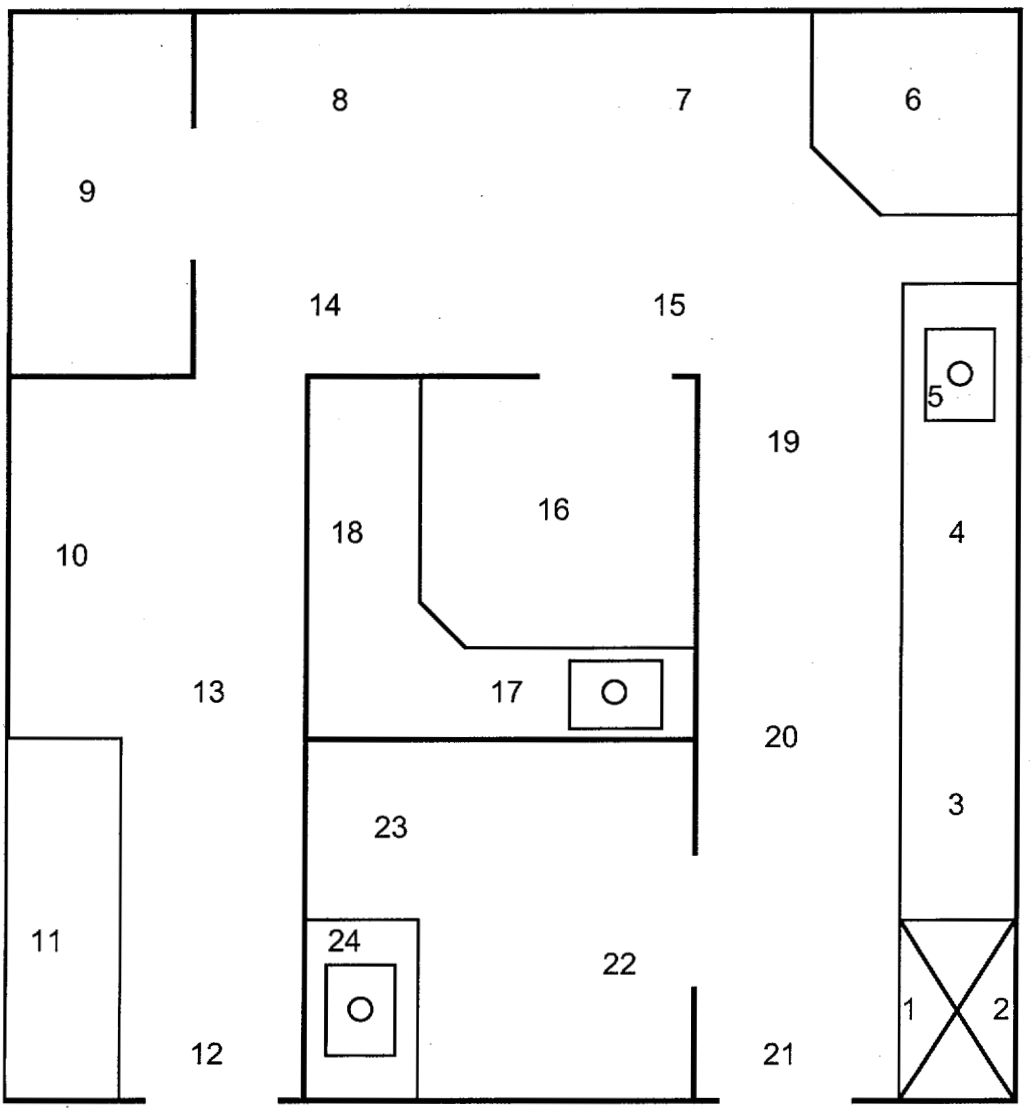
U.S. Nuclear Regulatory Commission (NRC) *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material.*, Policy and Guidance Directive FC 83-23. November1983

Environmental Protection Agency (EPA) EPA 540/G-93/071 *Data Quality Objectives Process for Superfund.* Washington, DC 1994

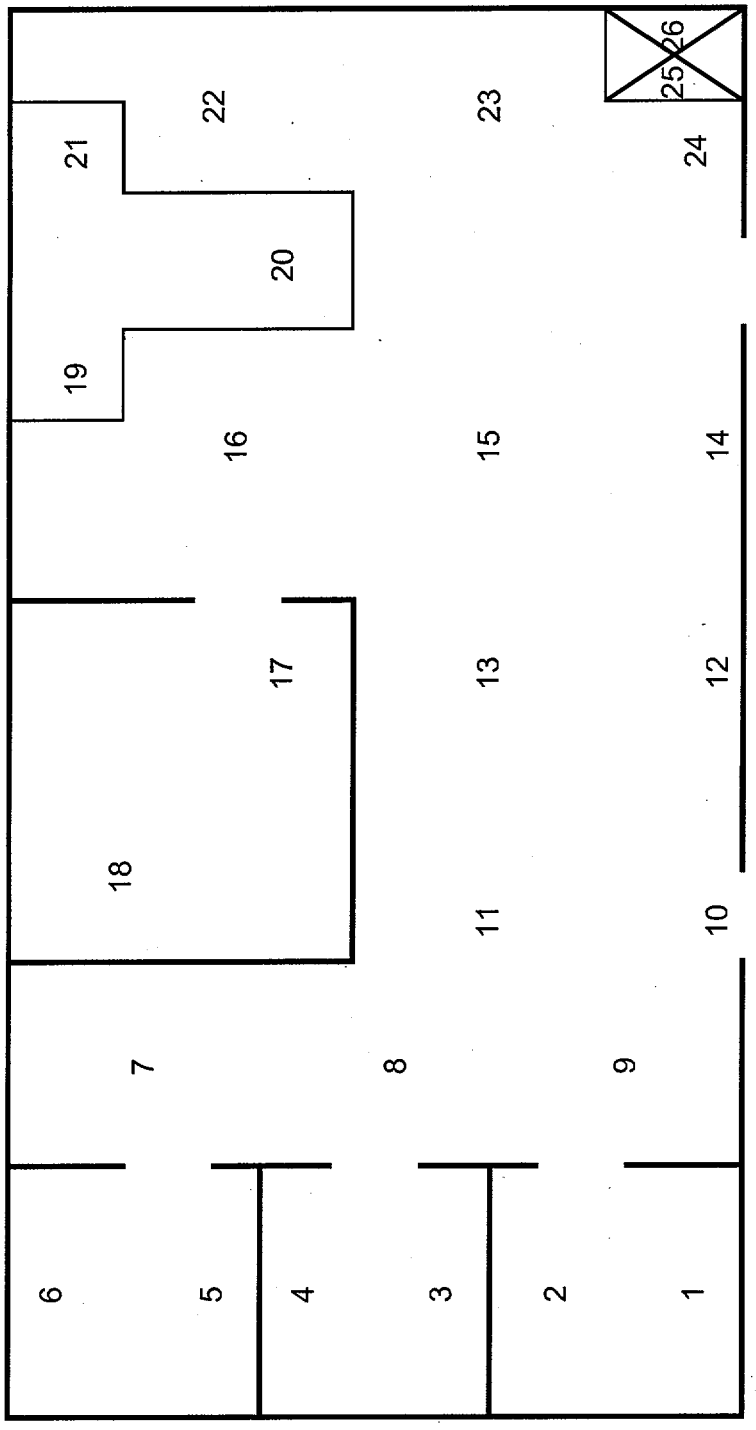
Appendix I

Diagrams

Room 4



Room 7



Appendix II

Scalar Measurements Results

Scalar Measurements – Room 4

Ludlum Model 12, serial no. 193772 Limiting MDA (C-14) = 552 dpm/100 cm^2

Calibrated July 19, 2006

Location	Location	Reading (cpm)	Activity (dpm/100 cm^2)
Room 4	1	289	<MDA
Room 4	2	281	<MDA
Room 4	3	271	<MDA
Room 4	4	263	<MDA
Room 4	5	271	<MDA
Room 4	6	274	<MDA
Room 4	7	276	<MDA
Room 4	8	288	<MDA
Room 4	9	281	<MDA
Room 4	10	284	<MDA
Room 4	11	281	<MDA
Room 4	12	255	<MDA
Room 4	13	258	<MDA
Room 4	14	263	<MDA
Room 4	15	277	<MDA
Room 4	16	239	<MDA
Room 4	17	246	<MDA
Room 4	18	272	<MDA
Room 4	19	294	<MDA
Room 4	20	287	<MDA
Room 4	21	287	<MDA
Room 4	22	267	<MDA
Room 4	23	262	<MDA
Room 4	24	268	<MDA

Scalar Measurements – Room 4

Ludlum Model 12, serial no. 195030 Limiting MDA (C-14) = 666 dpm/100 cm^2

Calibrated July 19, 2006

Location	Location	Reading (cpm)	Activity (dpm/100 cm^2)
Room 7	1	402	<MDA
Room 7	2	406	<MDA
Room 7	3	445	<MDA
Room 7	4	442	<MDA
Room 7	5	454	<MDA
Room 7	6	419	<MDA
Room 7	7	424	<MDA
Room 7	8	397	<MDA
Room 7	9	443	<MDA
Room 7	10	412	<MDA
Room 7	11	369	<MDA
Room 7	12	434	<MDA
Room 7	13	405	<MDA
Room 7	14	460	<MDA
Room 7	15	437	<MDA
Room 7	16	448	<MDA
Room 7	17	365	<MDA
Room 7	18	422	<MDA
Room 7	19	384	<MDA
Room 7	20	391	<MDA
Room 7	21	372	<MDA
Room 7	22	386	<MDA
Room 7	23	458	<MDA
Room 7	24	439	<MDA
Room 7	25	413	<MDA
Room 7	26	438	<MDA

Appendix IV

Calibration Certificates

Certificate of Calibration

Antkowiak and Mahoney Enterprises, Inc.
3 Valley Court
Chester, NY 10918

Company Antkowiak and Mahoney Enterprises, Inc. **Certificate Number:** 1327

Manufacturer Ludlum

Model 12 **Serial Number** 196772

Probe Model 43-68 **Serial Number** AME4368

Calibration Type Linearity and Efficiency Check **Calibration Geometry** 2 Pi

Battery Check Pass **High Voltage** 1650 **v** **Background Reading** 160 **cpm**

Pulse Generator: Ludlum Model 500, serial number 189500 , calibrated September 13, 2005

Scale	Calibration Point (cpm)	As Found (cpm)	Meter Reading (cpm)	Correction Factor
x100	340,000	360,000	340,000	N/A
x100	170,000	180,000	170,000	N/A
x10	34,000	34,000	34,000	N/A
x10	17,000	17,000	17,000	N/A
x1	3,400	3,600	3,300	N/A
x1	1,700	2,100	1,800	N/A
x0.1	340	400	310	N/A
x0.1	170	280	195	N/A

Source Isotope	Source Activity	Source Serial Number	Source Reading	Efficiency
Carbon-14	1.793 kBq	1010-66-2	11,000	0.101
Silicon-32	1.870 kBq	1010-66-3	34,000	0.303

Calibrated by Joel Antkowiak **Calibration Date** July 19, 2006

Approved by _____ **Approval Date** July 19, 2006

Comments

Phone: 845-406-1917 e-mail: healthphysics@optonline.net Fax: 973-831-8998

Certificate of Calibration

Antkowiak and Mahoney Enterprises, Inc.
3 Valley Court
Chester, NY 10918

Company Antkowiak and Mahoney Enterprises, Inc. **Certificate Number:** 1326

Manufacturer Ludlum

Model 12 **Serial Number** 195030

Probe Model 43-68 **Serial Number** PR178507

Calibration Type Linearity and Efficiency Check **Calibration Geometry** 2 Pi

Battery Check Pass **High Voltage** 1750 **v** **Background Reading** 150 **cpm**

Pulse Generator: Ludlum Model 500, serial number 189500 , calibrated September 13, 2005

Scale	Calibration Point (cpm)	As Found (cpm)	Meter Reading (cpm)	Correction Factor
x100	340,000	400,000	340,000	N/A
x100	170,000	230,000	170,000	N/A
x10	34,000	34,000	34,000	N/A
x10	17,000	17,000	17,000	N/A
x1	3,400	3,700	3,200	N/A
x1	1,700	2,300	1,800	N/A
x0.1	340	340	340	N/A
x0.1	170	270	270	N/A

Source Isotope	Source Activity	Source Serial Number	Source Reading	Efficiency
Carbon-14	1.793 kBq	1010-66-2	13,000	0.119
Silicon-32	1.870 kBq	1010-66-3	42,000	0.374

Calibrated by Joel Antkowiak **Calibration Date** July 19, 2006

Approved by _____ **Approval Date** July 19, 2006

Comments x0.1 scale not within +-20%.

Phone: 845-406-1917 e-mail: healthphysics@optonline.net Fax: 973-831-8998