SK Bio-Pharmaceuticals
Division of SK Energy & Chemical, Inc.

NMSB2

June 29, 2006

Licensing Assistance Team
Division of Nuclear Materials Safety
US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

03034092

RE: Amendment Request, NRC License Number 29-30285-01

To whom it may concern,

SK Bio-Pharmaceuticals R&D Center (SKBP) would like to amend its radioactive materials license, number 29-30285-01. SKBP would like to remove the facility located at 140A New Dutch Lane, Fairfield, New Jersey 07004 from the license. All radioactive materials have been disposed of or have been moved to our new facility located at 22-10 State Route 208, Fairlawn, New Jersey 07410-2605 by Onyx Environmental Services, LLC. The Fairfield facility was decommissioned by Antkowiak and Mahoney Enterprises, Inc. under the plan submitted in April, 2006. SKBP is now submitting the decommissioning report for your review.

If you have any questions, please contact Michael DePasquale at 973-885-3119.

Sincerely,

Dr. Lin-Ming Shen
Radiation Safety Officer

139082
NMSS/RGN1 MATERIALS-002

140 A New Dutch Lane, Fairfield, NJ 07004 • Tel: (973) 227-3939 • Fax: (973) 227-4488

Antkowiak and Mahoney
Enterprises, Inc.

29-30285-01

03034092

DECOMMISSIONING SURVEY

SK Biopharmaceuticals Inc.
Fairfield, New Jersey

Prepared by

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3 Valley Court
Chester, NY 10918
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Introduction

During June, 2006 Antkowiak and Mahoney Enterprises, Inc. (AME) conducted decommissioning surveys for SK Biopharmaceuticals, Inc. at their facility in Fairfield, New Jersey. The intent of the survey was to document the final radiological conditions in the radioactive materials use areas prior to free release of the facility. 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)

Radionuclides of Concern

Based on information provided by the Radiation Safety Officer for this site, the nuclides that were previously used in these rooms are tritium and carbon-14. The last use of short lived isotopes that were licensed for the facility had not taken place in a period within 10 half-lives of such isotopes. Therefore, the short-lived isotopes are not of concern here.

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 33 Room 128 Room 131

The following survey units for this project were designated as Class 3 per the MARSSIM terminology. Classification was based on the RSO's knowledge of the site and limited area and activity of isotope usage within these rooms. The survey units are as follows:

Room 31-32 Room 34 Room 122 Room 126

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 contaminants as identified by Bristol Myers Squibb staff are H-3 and C-14, which fall 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 DCGLof 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	500-600 dpm/100 cm^2

Calibration certificates for each meter used are provided.

Sample Analysis

Sampling for removable activity was conducted by wiping approximately 100 cm^2 area with a two inch diameter dry filter paper. The samples were then placed directly into a scintillation vial in a specific location of a uniquely identified rack or tray. The position numbers are then described on the scintillation counter log sheet. The samples remain in the specified container and position throughout sample preparation and analysis. This reduces the risk of mislabeling or cross contamination among the many samples taken during this project.

The samples were analyzed by setting three energy windows on the liquid scintillation counter. The low energy channel (channel 1) is set for optimal tritium efficiency, the second window (channel 2) is set for optimal carbon-14 efficiency, and the third window (channel 3) is set for higher energy beta emitters. Because of the potential for I-125 contamination, the samples were counted for 5 minutes to reduce the minimum detectable activity for the counter.

Each day samples are analyzed, NIST traceable tritium and carbon-14 sources are also analyzed at the end of each "batch". The daily counts for both tritium and carbon-14 were within the specified ranges. The minimum detectable activity (MDA) for the counter used (Beckman model 5000 TD; serial number 7040372) is as follows:

Channel 1 MDA = 102 dpm

Channel 2 MDA = 46 dpm

Channel 3 MDA = 33 dpm

For purposes of free release of the rooms, the removable activity exhibited in all three channels is combined to determine compliance with the release criteria. The results are presented in Appendix I.

Statistical Test
of
Measurement Results

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

Quality Assurance Plan

Providing quality data for a decommissioning project is based on certain key elements as discussed in EPA guidance documents (EPA 504/G-93/071). These are known as PARRC (precision, accuracy, representativeness, completeness, and comparability) parameters. In addition, the sensitivity of measurements, expressed as the Minimum Detectable Activity (MDA) must be sufficiently low to detect contamination $\leq$ 25% of the release criteria (NRC, 1992). The processes for assessing these parameters are discussed below.

Precision

Precision is a test of how closely one can replicate a measurement. Replicate measurements for total beta contamination will be made by obtaining two one minute counts in sequence at the same location. At least 5% of the total measurements will be duplicated in this manner. To replicate the removable activity analysis a second wipe sample will be obtained as close as possible to the original sample. Both the Item Release Survey Log and the Contamination Measurements Log have a reminder to perform this function on every twentieth line. The formula below will be used to determine the relative percent difference (RPD). One can expect measurements of contaminated areas at this site to be reproduced within $\pm$ the RPD for each category (fixed and removable) with similar instrumentation and count times.

Reproducibility of Fixed Location Measurements

$$\text{*Relative Percent Difference} = \frac{\text{Measurement - Replicate Meas.}}{(\text{Measurement + Replicate Meas.})/2} \times 100\%$$

Accuracy

Accuracy is a test of how close the meters response is to a known value. The beta standard used for this project will be a Carbon-14 windowless source, (serial # E948) with a radioactivity level of 215,880 disintegrations per minute as certified by the National Institute of Standards and Testing. AME recognizes contamination on items may be in a geometry different from the calibration standard. (i.e. different size area, or not uniformly distributed). However, the difference between the meters efficiency for a point source and large areas of contamination is estimated to be less than 6% (NRC, 1995a).

To ensure continued accuracy in the field a check log was established at the beginning of the project. This is accomplished by counting the same source multiple times and plotting the average and two and three sigma values. A daily check of the meters, employing a radioactive source of known quantity, serves as the accuracy check. A source check "jig" will be used to ensure the source and meter are always in the same position relative to one another. The value will be plotted on the Quality Control chart against the average and standard deviations as determined previously. Instruments greater than plus or minus three standard deviations will be removed from use, and tagged "out of service" until repaired.

Representativeness

Representative data would be that data which accurately reflects the environment where the measurement was obtained. One measurement of this parameter is to simply compare the number of times the premise the data is intended to show fails, compared to the number of times the premise is tested. For this project, the premise is elevated count rates with the meter indicates contamination. The equation used is:

$$\text{Representativeness} = (1\text{-}F/N) \times 100\%$$

For this project the goal is for data to be 100% representative. To achieve this goal, all hot spots identified during the scanning survey will be verified by a second technician prior to reporting.

Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount that was specified. For the purposes of evaluation, data defined as invalid through a QA review is subtracted from the complete data set to determine the number of valid data points. For this project, completeness greater than 95% is desirable.

Comparability

Comparability is a non quantitative evaluation of the agreement between different types of data sets which should be, intuitively, related to each other. For example, on this project, all metal locations exhibiting elevated fixed beta contamination would also exhibit some removable beta contamination. For firebrick, areas exhibiting elevated beta count rates would show positive beta results for volumetric analysis.

Sensitivity

To determine a meters suitability for a measurement, the minimum detectable activity (MDA) is compared with the project specific release limits. The minimum detectable activity will be calculated using an equation from NUREG-5849, and the average of the daily background and source checks. Meters and count times will be adjusted so that the fixed activity MDA's are less than 20% of the release limits, and removable activity measurements are less than 10% of the release limits. Typical MDA's are presented in the Attachments, which also illustrates the equation used to determine the MDA.

Data Reduction

All data is to be reported at the 95% confidence level. Data will be reviewed by the QA manager and Project Manager before being reported. Basic parameters such as efficiency and background will be evaluated from instrument check logs to determine if the values are within expected ranges. When several transformations of the data is required, a few values will be traced from raw data to reported value to ensure continuity of data, and absence of transcription errors.

All reported data will bear an approval signature. All values of radioactivity (concentration or contamination levels) will be reported with an estimate of the statistical uncertainty. Both values will have the same number of decimal places. Results in disintegration per minute (dpm) will only be reported as a whole number. Surface and removable activity values will be reported in dpm/100 cm2. Volumetric analysis will be reported in picocuries per gram (pCi/g). Concentrations will only be reported to one decimal place. The radioactive decay process is assumed to be normally distributed, so the standard deviation will be estimated using standard statistical methods. Values below the calculated minimum detectable activity (MDA) will be reported as "less than" or " $\leq$ " the MDA.

Computer data reduction will have several values confirmed by hand calculations. Rounding off will not change the reported value from the original by more than 20%. For example, if 0.1635 is reported as 0.16, it differs by 2%. However if the value of 0.2 is reported the difference is 22%. All fractional quantities will be reported as a decimal, preceded by a zero. Commas will be used to separate the 1,000s units for values of 10,000 or greater.

Understanding the Appendices

The appendices presenting the results of the removable contamination surveys show diagrams of each area surveyed. On each diagram, if two smears are shown to be taken on one item (drawers, cabinet, etc.), the odd numbered smear was taken on the outside of the item. The inside is represented by the even numbered smear.

The appendices that present the data from the scaler measurements refer to the numbers of the smear on the pictures of Appendix I as appropriate. For example, reading number one taken in Room K2807 Main View corresponds to the location represented in the picture for the removable activity. There is a scalar reading for each location noted on the main view of the room. If the number of locations was not sufficient to meet the 20 point minimum on the main view, then additional readings were taken on the additional views for that room. Where readings or samples are indicated on drawers and cabinets, the odd numbered reading/sample was taken on the outside of the item, and the even numbered reading represents the inside. For drawers and cabinets, the inside reading was taken inside the drawer, or on the shelf nearest, the location of the number on the diagram.

Survey Results – Final Status

No removable radioactive contamination was found in the rooms surveyed that exceeded 10% of the site specific DCGL of 5,000 dpm/100 cm^2.

No direct radioactive contamination was found in the room surveyed after final cleaning of the room.

No samples for removable activity showed levels above the DCGL for this project. In addition, no readings showed activity above the DCGL for this project. Therefore, no statistical analysis is required.

The final survey results for each of the surveyed areas are presented in Appendices I and II. Appendix III consists of the results of the samples taken from the sink traps. Copies of the meter calibration certificates are presented in Appendix IV.

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

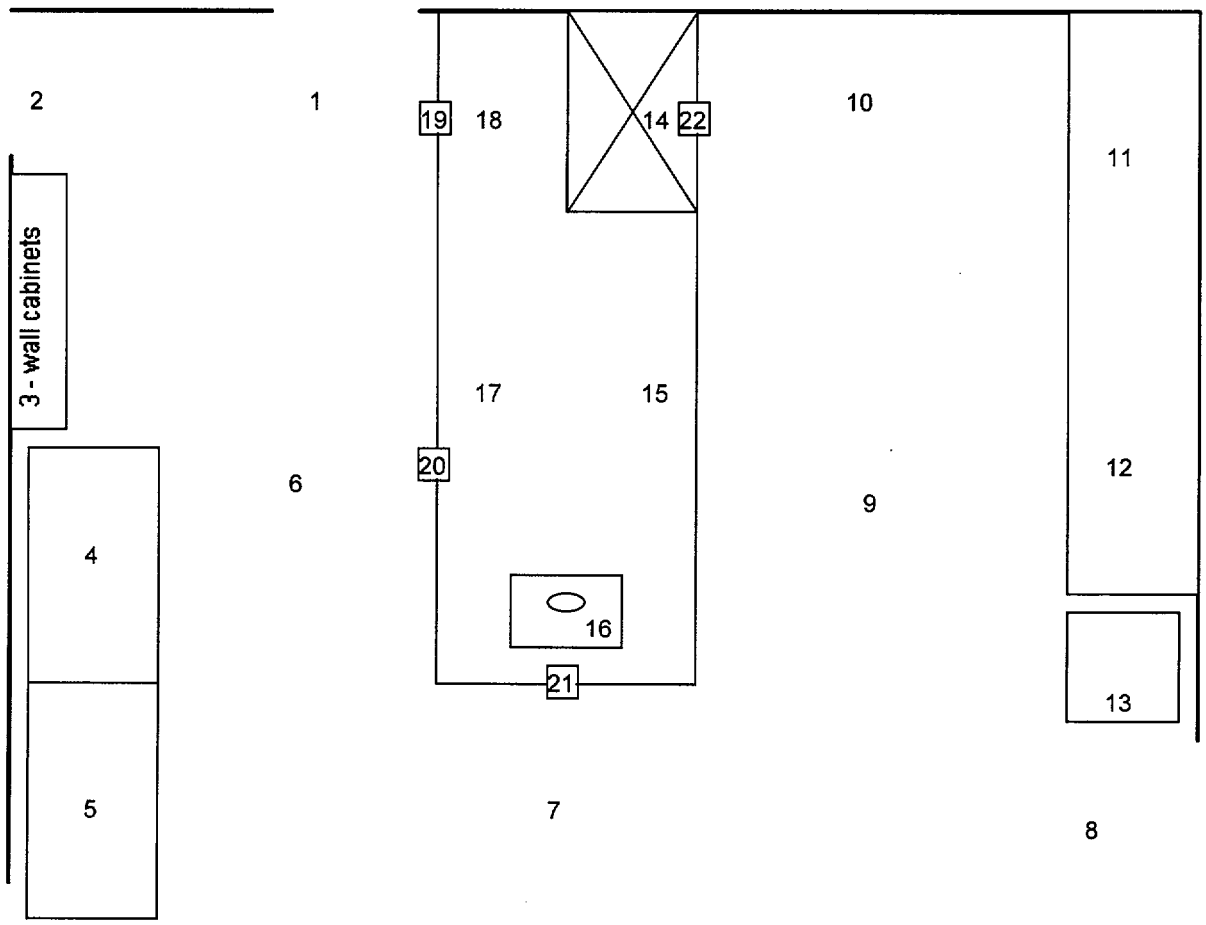
Appendix I

Diagrams and Smear Results

Room: Room 122

Name:

Notes: Part 1. Smears 1 - 20.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

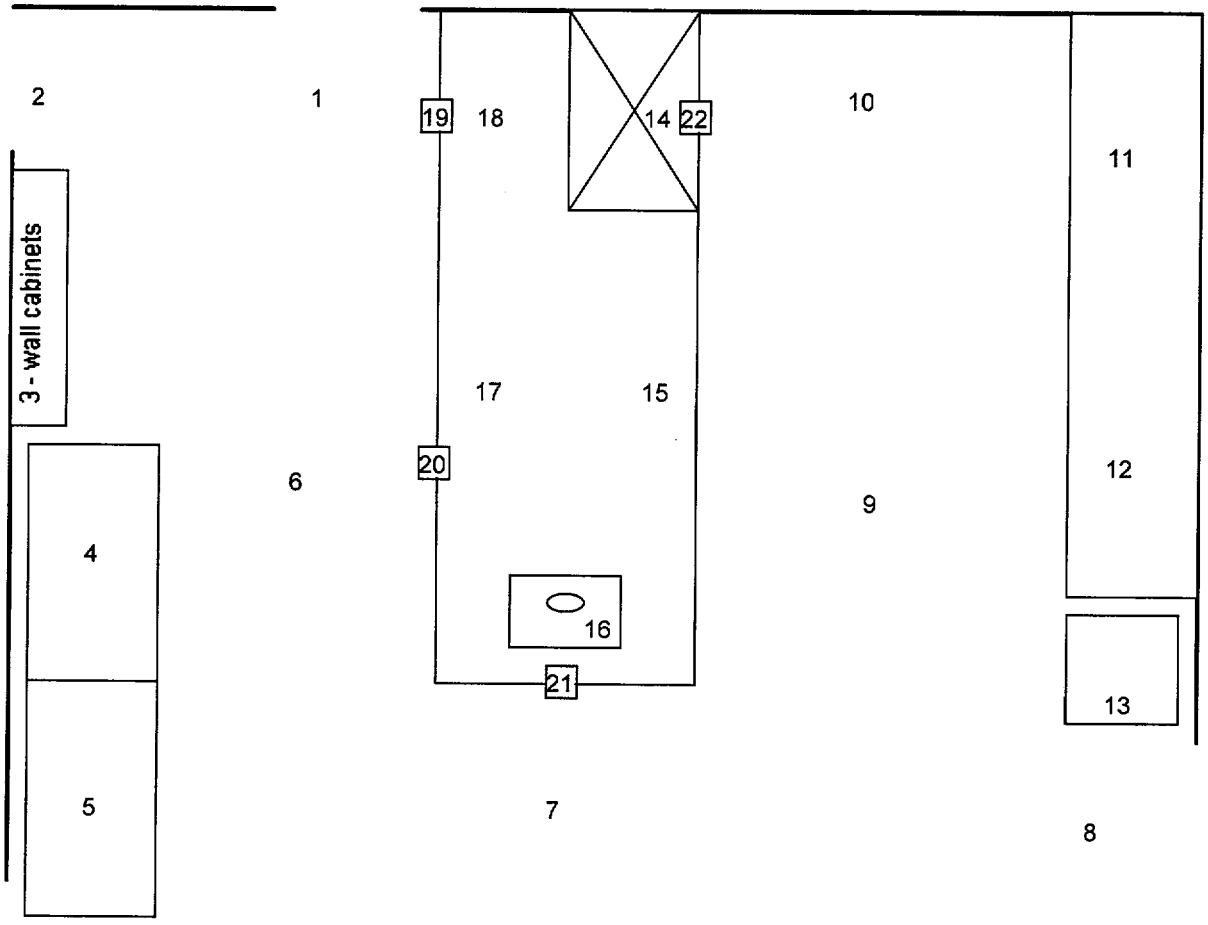
Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA
10	<MDA	<MDA	<MDA

Smear ID	Channel 1	Channel 2	Channel 3
11	<MDA	<MDA	<MDA
12	<MDA	<MDA	<MDA
13	<MDA	<MDA	<MDA
14	<MDA	<MDA	<MDA
15	<MDA	<MDA	<MDA
16	<MDA	<MDA	<MDA
17	<MDA	<MDA	<MDA
18	<MDA	<MDA	<MDA
19	<MDA	<MDA	<MDA
20	<MDA	<MDA	<MDA

Room: Room 122

Name:

Notes: Part 2. Smears 21 - 22.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
21	<MDA	<MDA	<MDA
22	<MDA	<MDA	<MDA

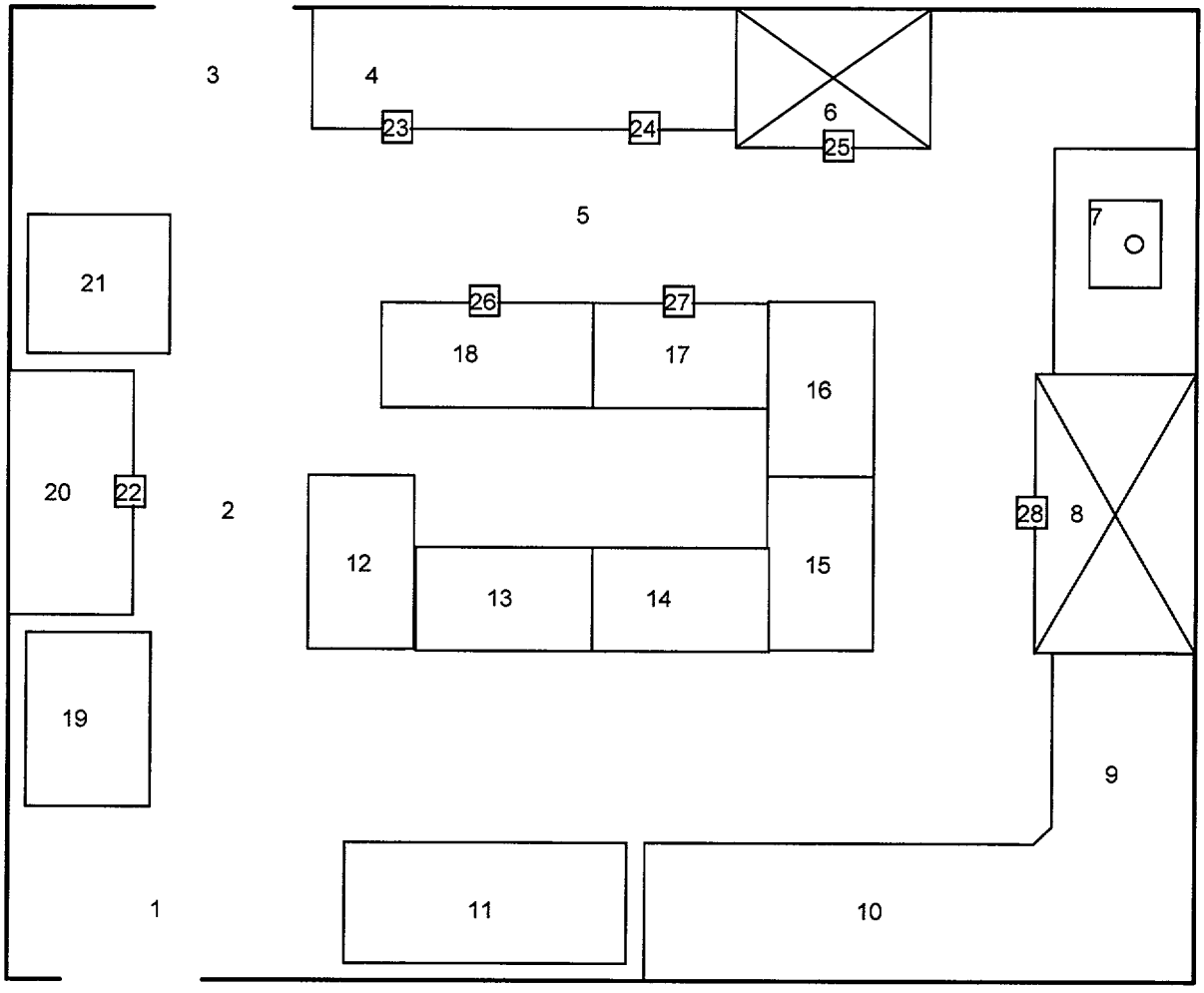
Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 126

Name:

Notes: Part 1. Smears 1 - 20.

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

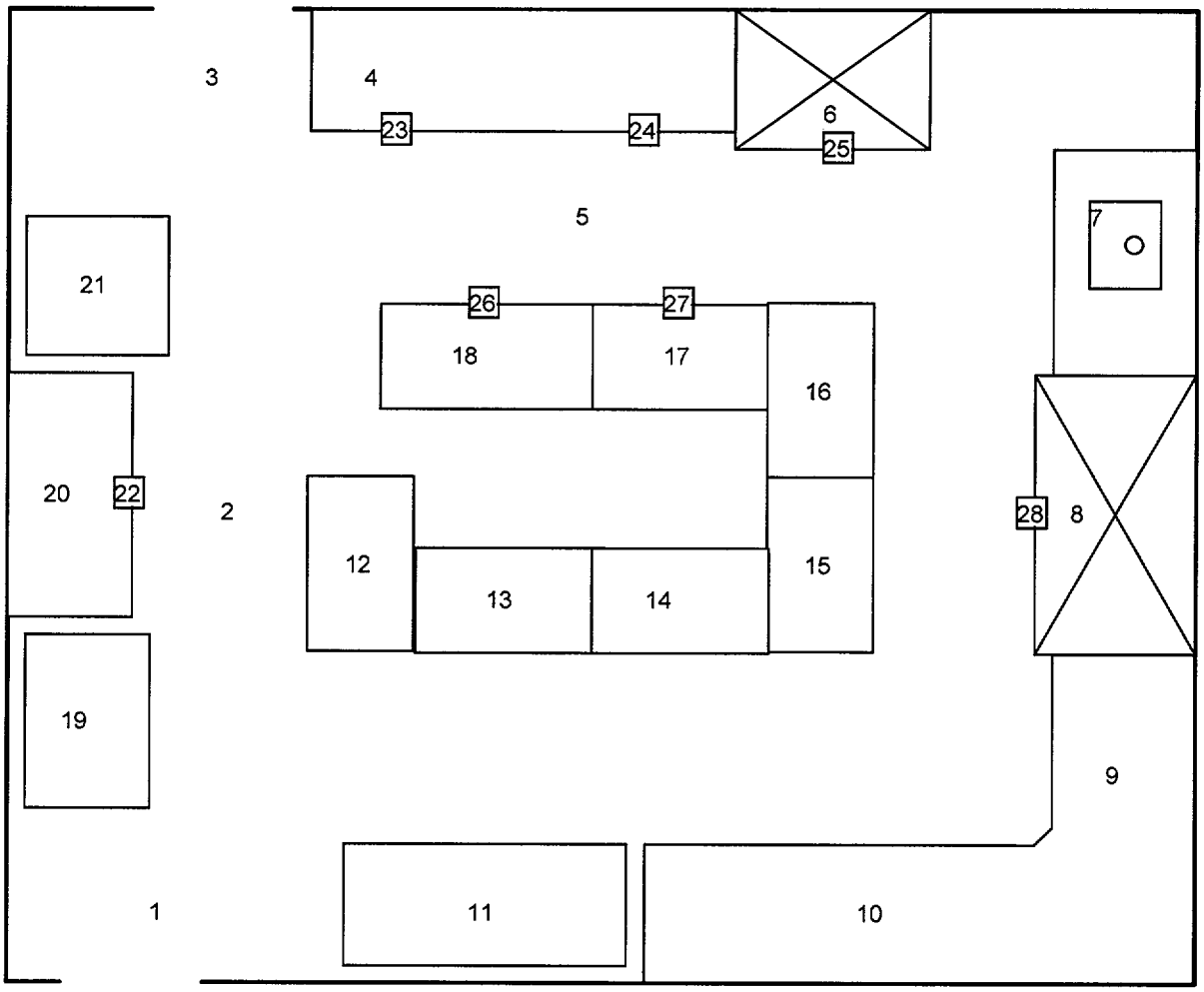
Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA
10	<MDA	<MDA	<MDA

Smear ID	Channel 1	Channel 2	Channel 3
11	<MDA	<MDA	<MDA
12	<MDA	<MDA	<MDA
13	<MDA	<MDA	<MDA
14	<MDA	<MDA	<MDA
15	<MDA	<MDA	<MDA
16	<MDA	<MDA	<MDA
17	<MDA	<MDA	<MDA
18	<MDA	<MDA	<MDA
19	<MDA	<MDA	<MDA
20	<MDA	<MDA	<MDA

Room: Room 126

Name:

Notes: Part 2. Smears 21 - 28.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
21	<MDA	<MDA	<MDA
22	<MDA	<MDA	<MDA
23	<MDA	<MDA	<MDA
24	<MDA	<MDA	<MDA
25	<MDA	<MDA	<MDA
26	<MDA	<MDA	<MDA
27	<MDA	<MDA	<MDA
28	<MDA	<MDA	<MDA

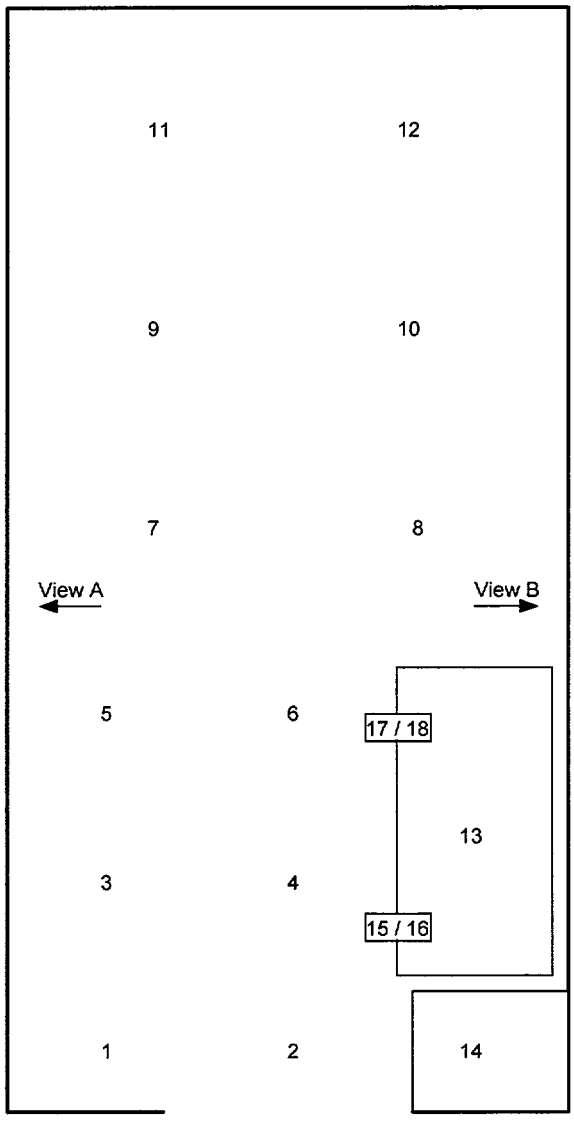
Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 128 Main View

Name:

Notes:

Ankowiak and Mahoney Enterprises, Inc.



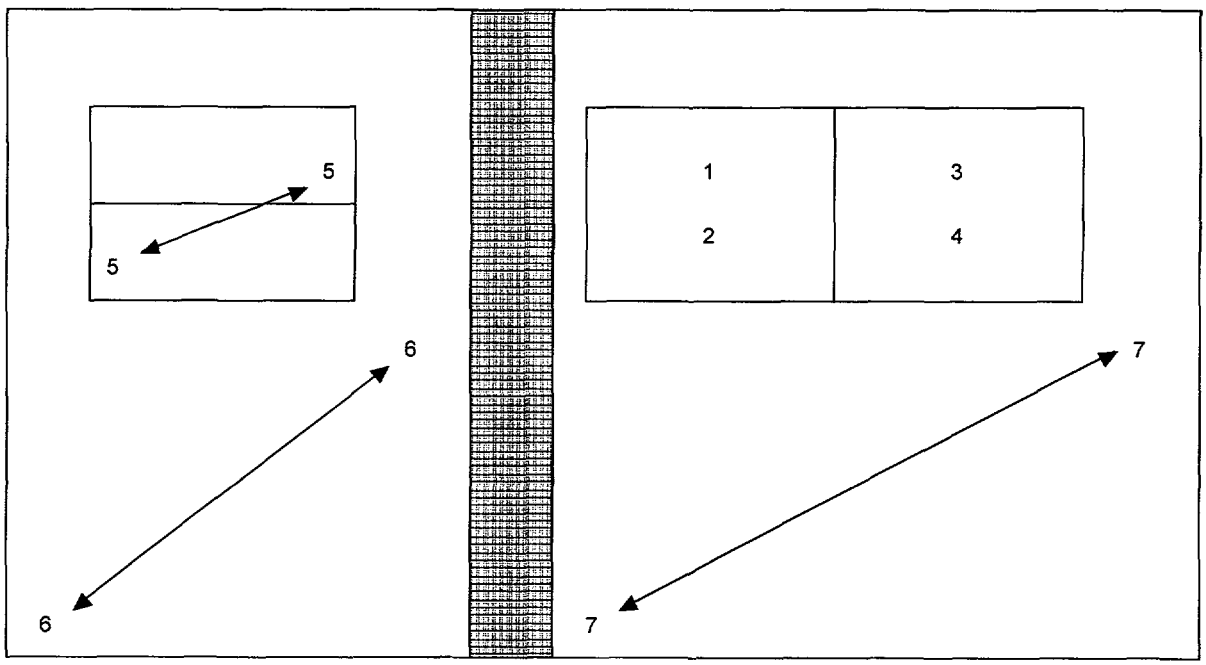
Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA	11	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA	12	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA	13	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA	14	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA	15	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA	16	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA	17	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA	18	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA				
10	<MDA	<MDA	<MDA				

Room: Room 128 View A

Name:

Notes:



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA

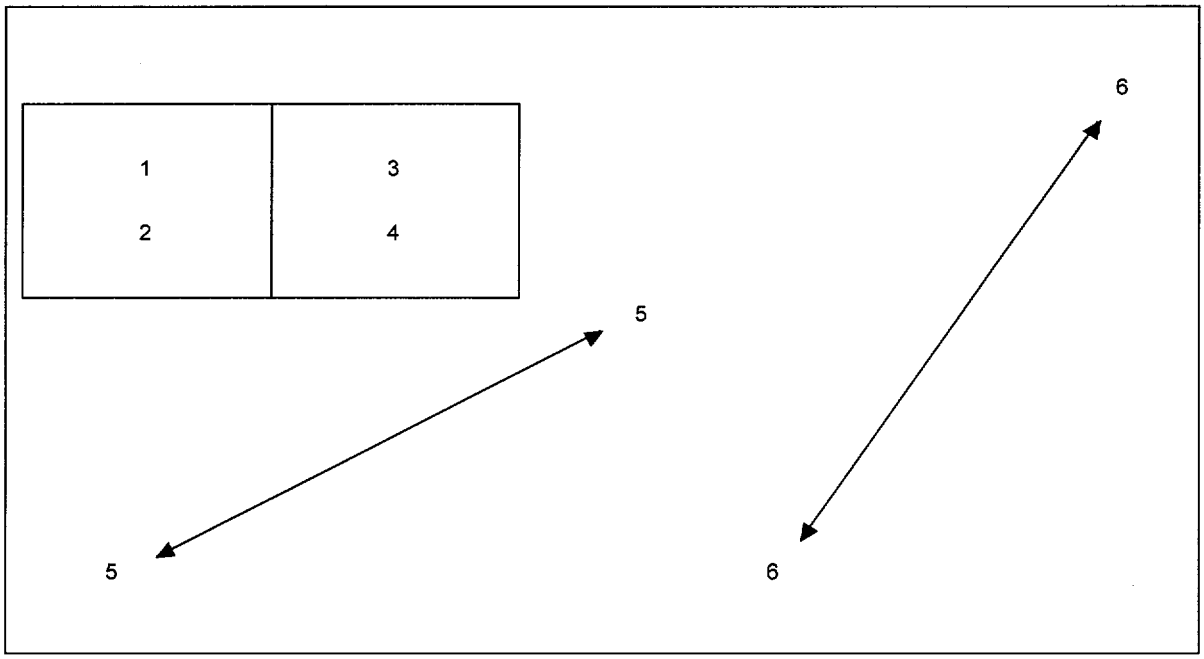
Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 128 View B

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA

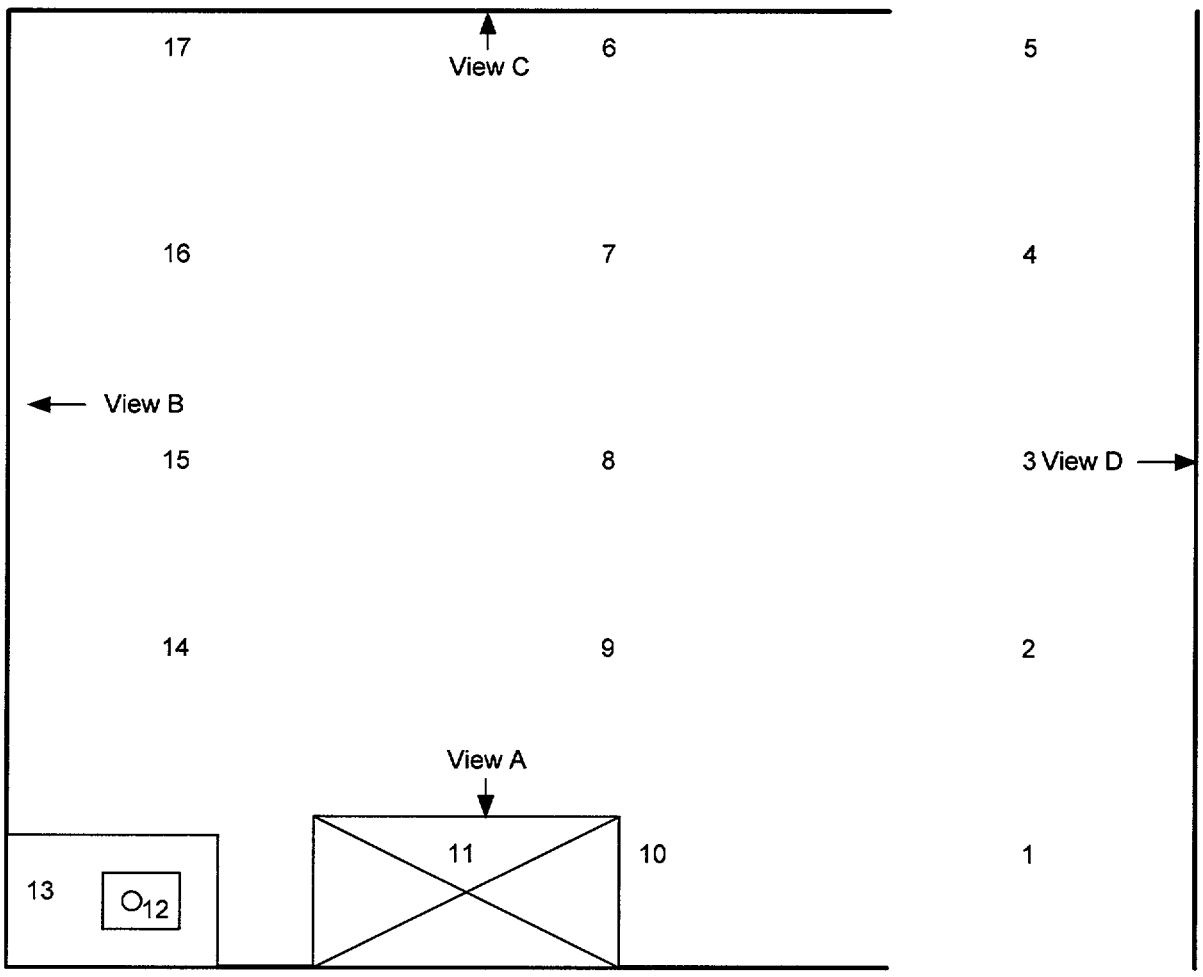
Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 131 Main View

Name:

Notes:

Androwiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

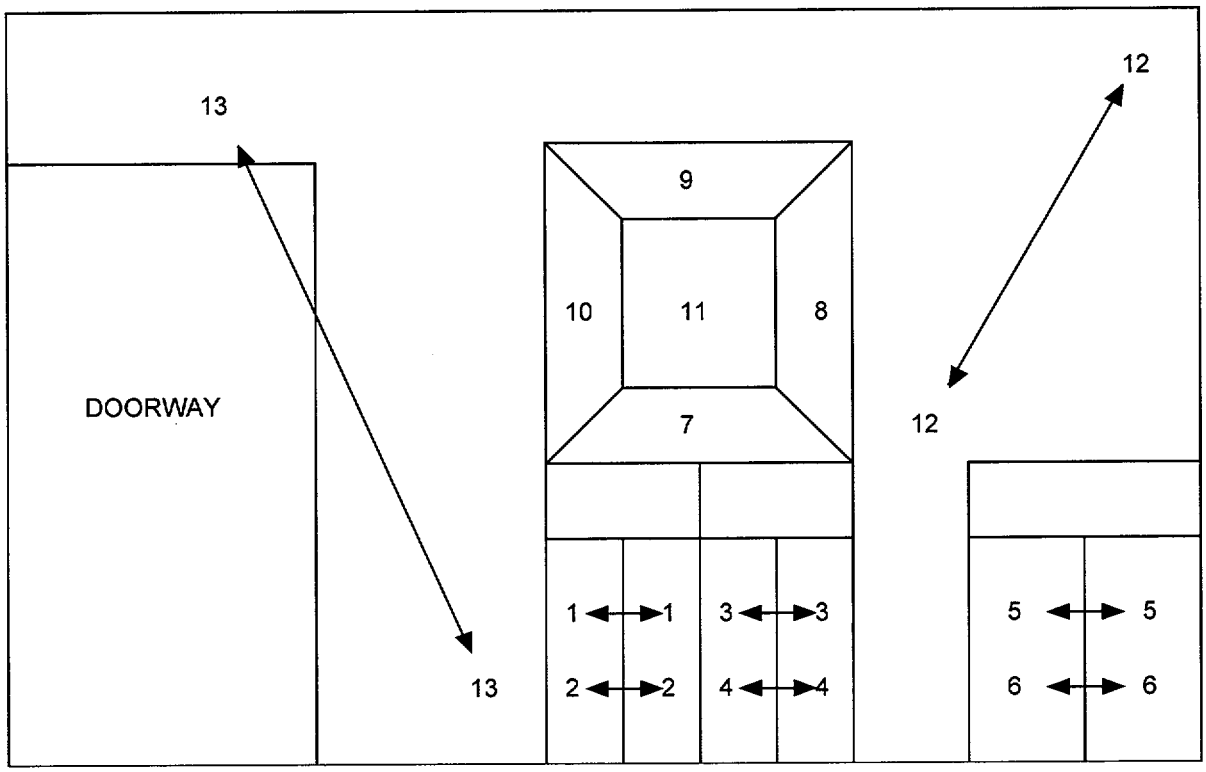
Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA	11	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA	12	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA	13	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA	14	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA	15	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA	16	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA	17	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA				
9	<MDA	<MDA	<MDA				
10	<MDA	<MDA	<MDA				

Room: Room 131 View A

Name:

Notes:

Ankowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

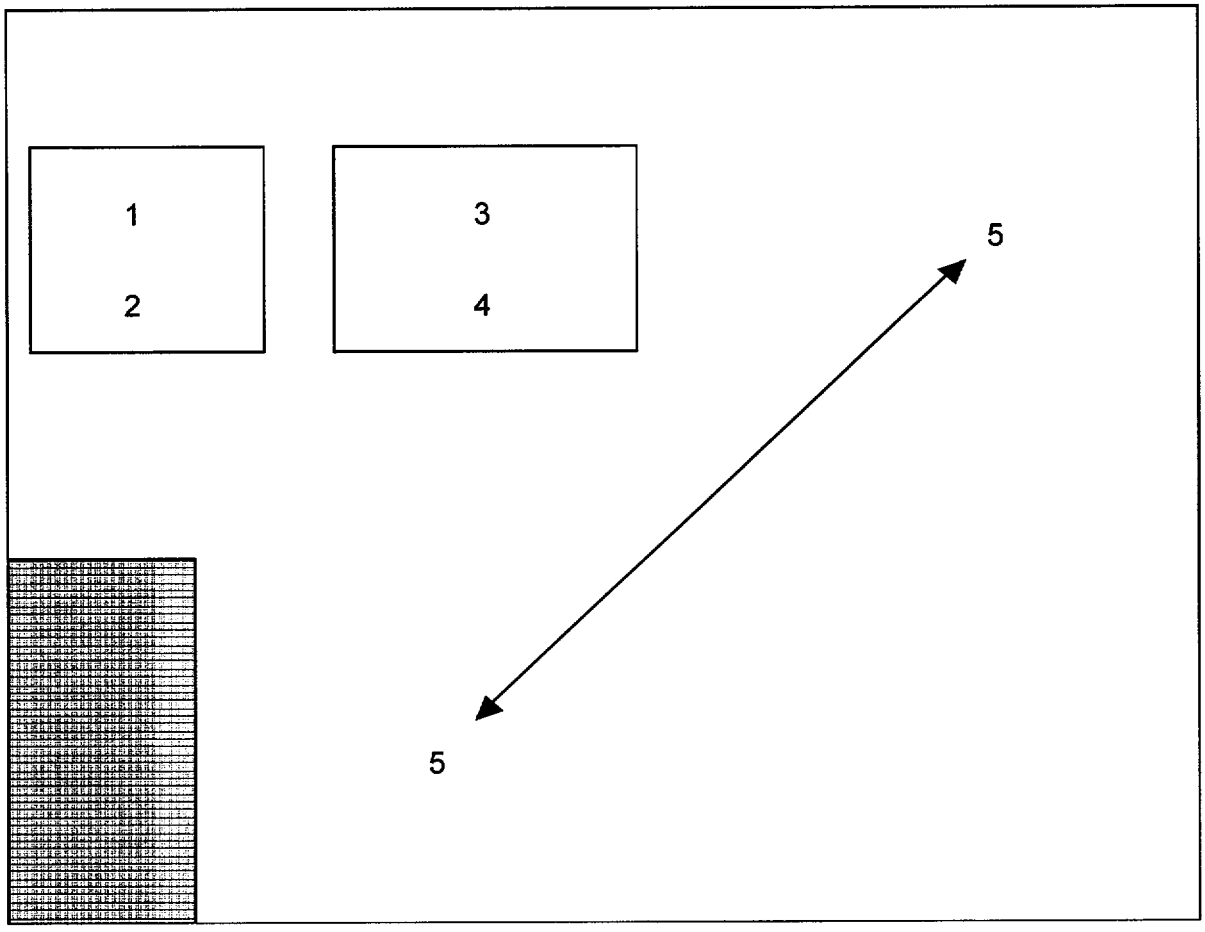
Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA	11	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA	12	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA	13	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA				
5	<MDA	<MDA	<MDA				
6	<MDA	<MDA	<MDA				
7	<MDA	<MDA	<MDA				
8	<MDA	<MDA	<MDA				
9	<MDA	<MDA	<MDA				
10	<MDA	<MDA	<MDA				

Room: Room 131 View B

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

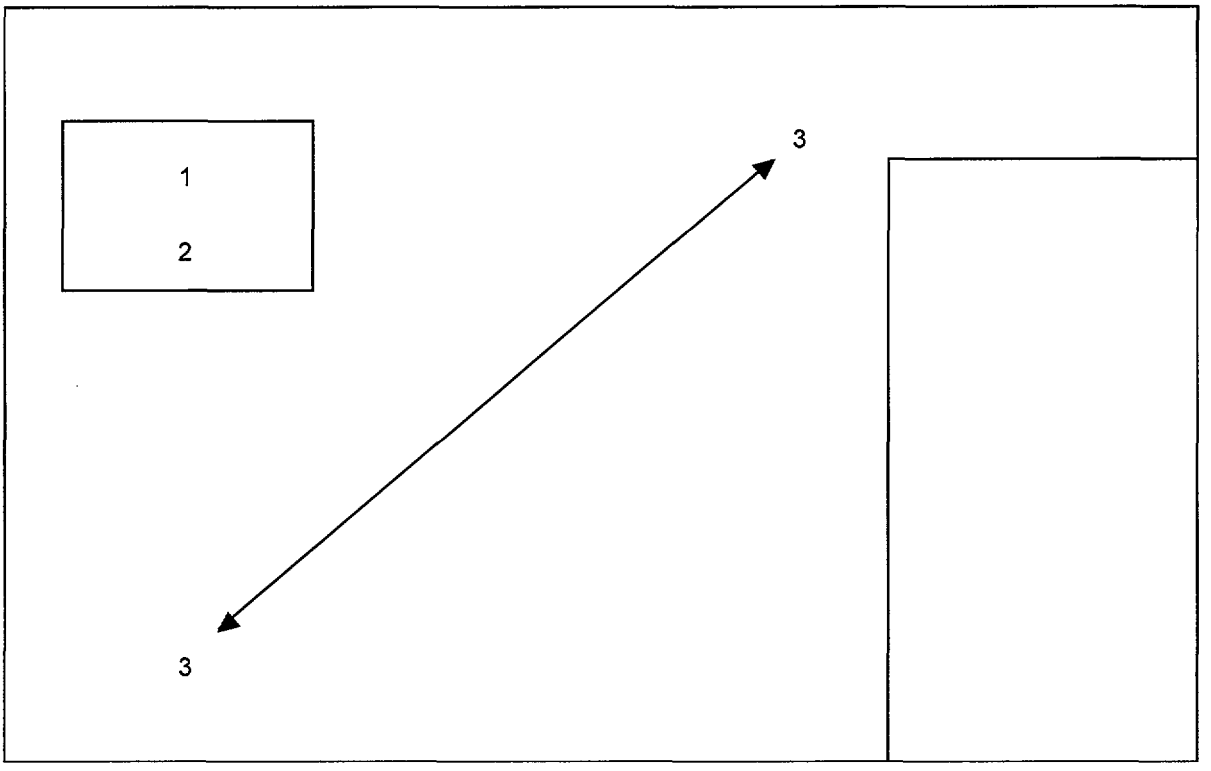
Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA

Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 131 View C

Name:

Notes:



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA

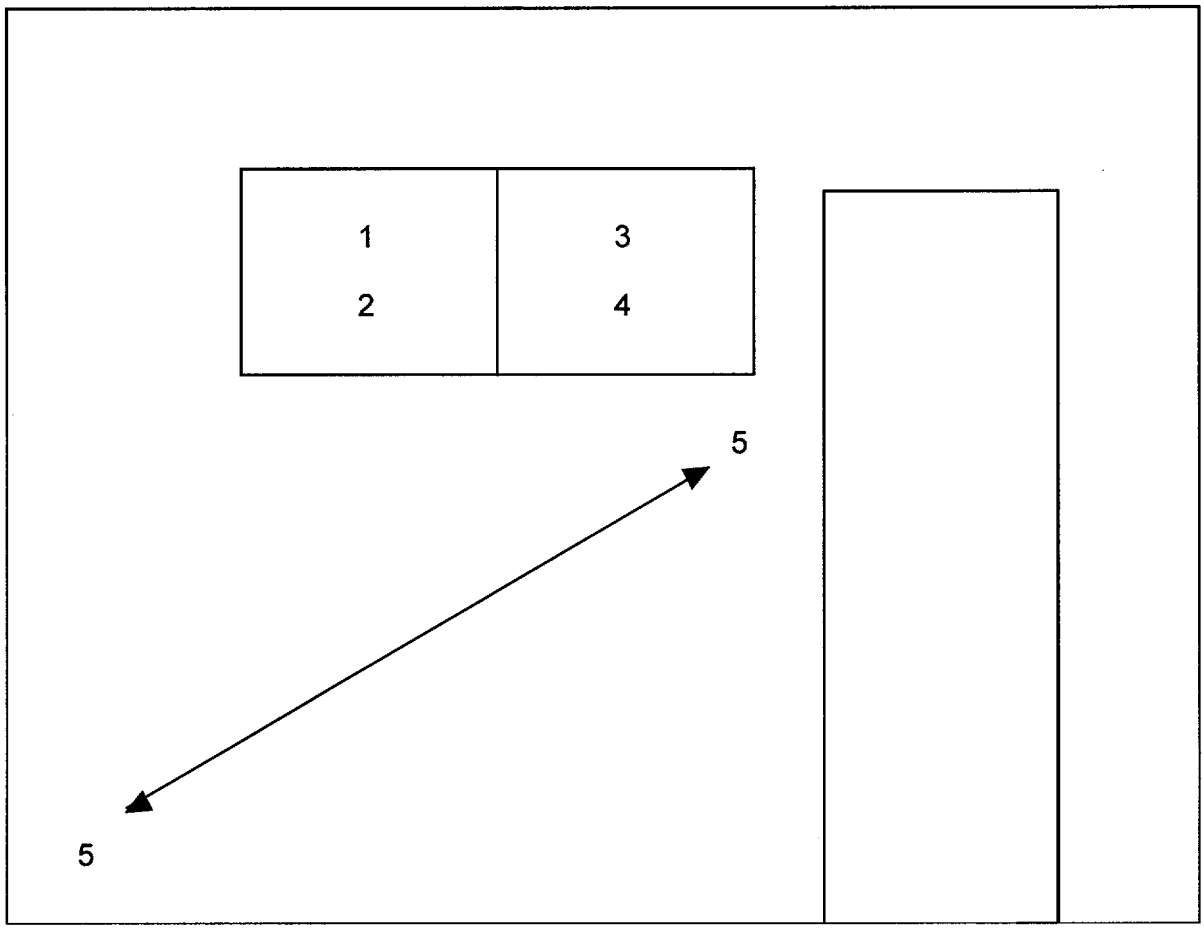
Smear ID	Channel 1	Channel 2	Channel 3

Room: Room 131 View D

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



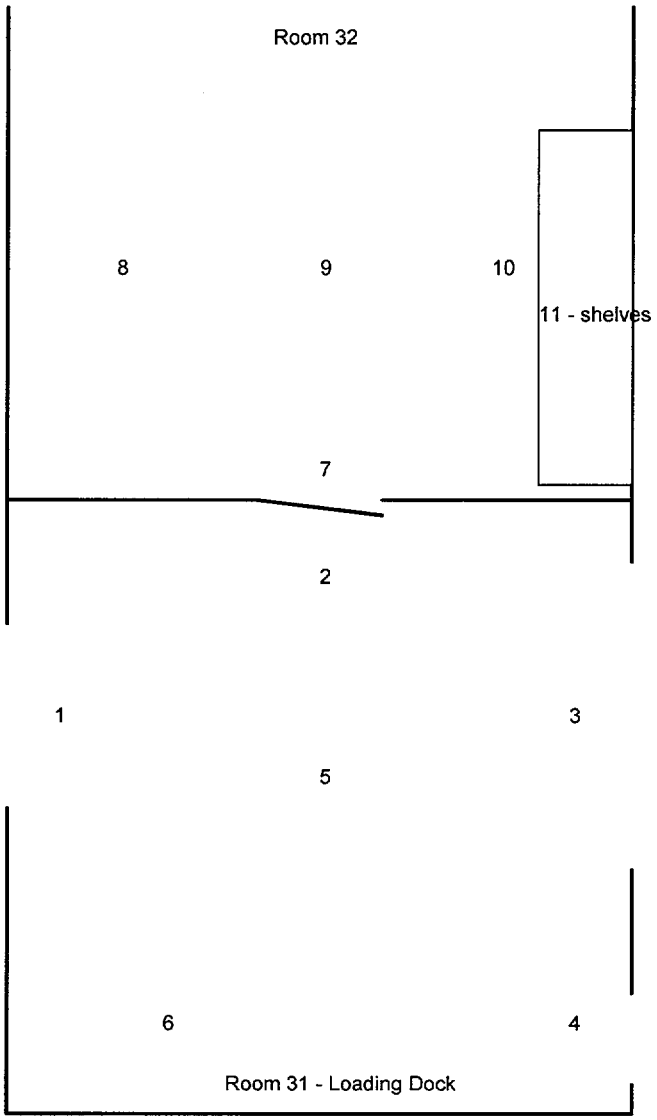
Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA				
2	<MDA	<MDA	<MDA				
3	<MDA	<MDA	<MDA				
4	<MDA	<MDA	<MDA				
5	<MDA	<MDA	<MDA				

Room: Room 31-32

Name:

Notes: Loading Dock - sealed waste drums temporarily stored here before shipment.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

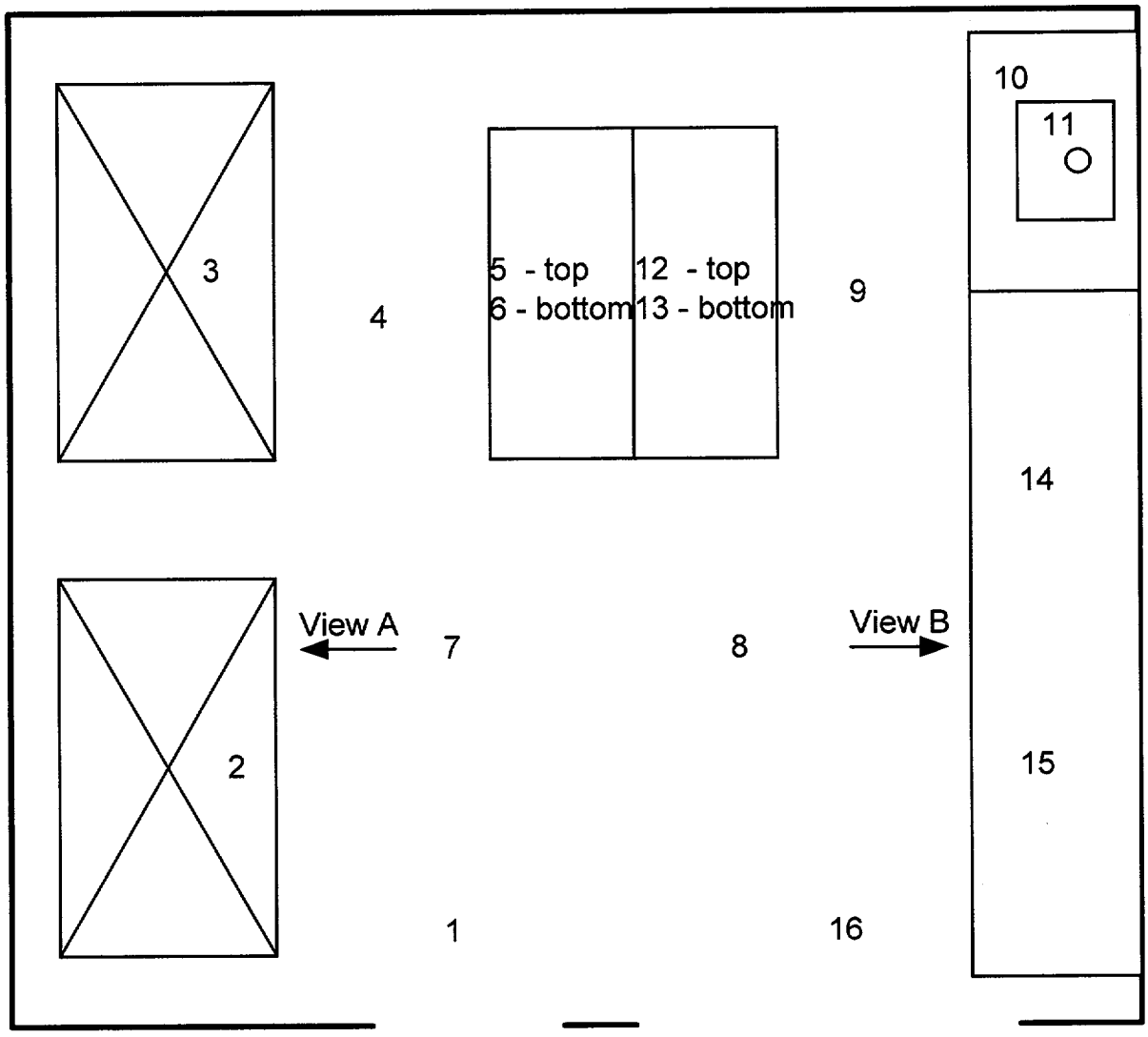
Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA	11	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA				
3	<MDA	<MDA	<MDA				
4	<MDA	<MDA	<MDA				
5	<MDA	<MDA	<MDA				
6	<MDA	<MDA	<MDA				
7	<MDA	<MDA	<MDA				
8	<MDA	<MDA	<MDA				
9	<MDA	<MDA	<MDA				
10	<MDA	<MDA	<MDA				

Room: Room 33 Main View

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA
10	<MDA	<MDA	<MDA

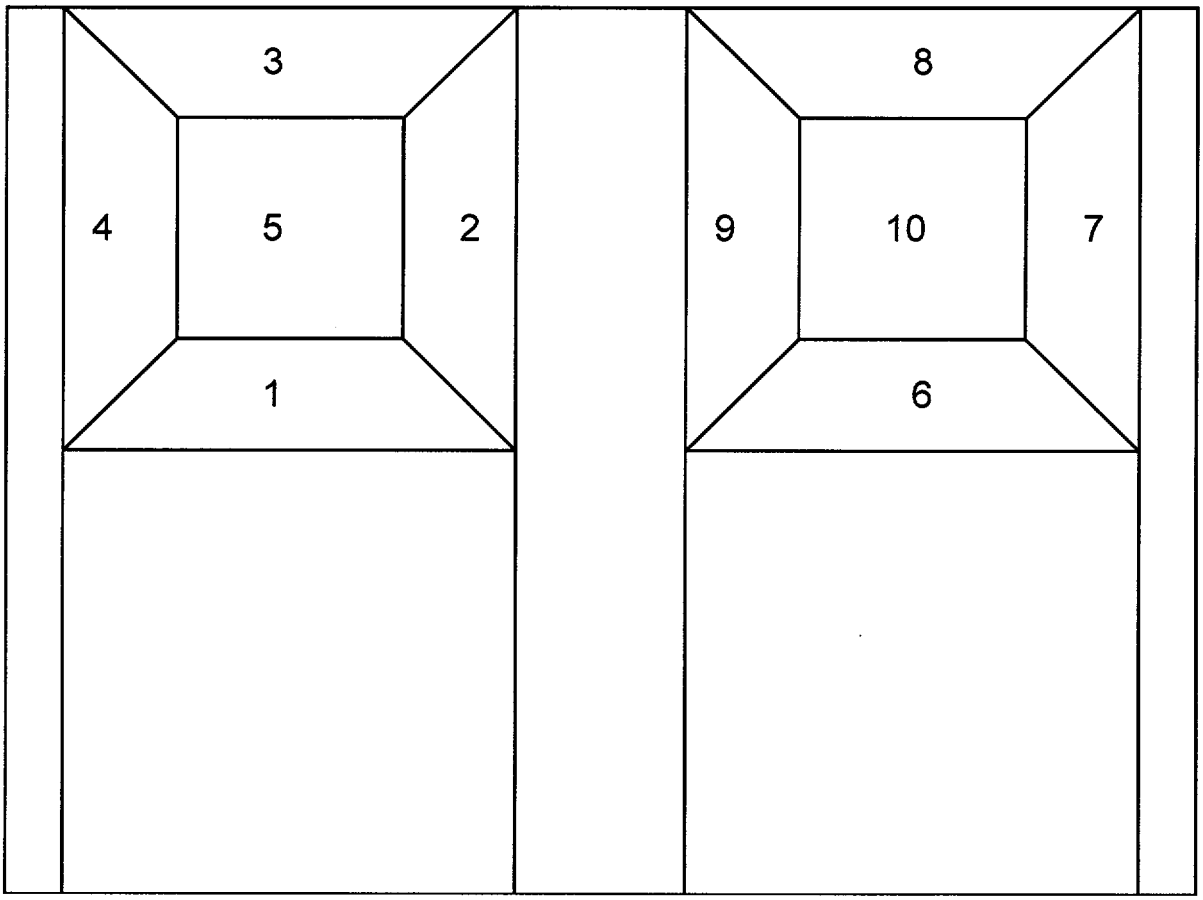
Smear ID	Channel 1	Channel 2	Channel 3
11	<MDA	<MDA	<MDA
12	<MDA	<MDA	<MDA
13	<MDA	<MDA	<MDA
14	<MDA	<MDA	<MDA
15	<MDA	<MDA	<MDA
16	<MDA	<MDA	<MDA

Room: Room 33 View A

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

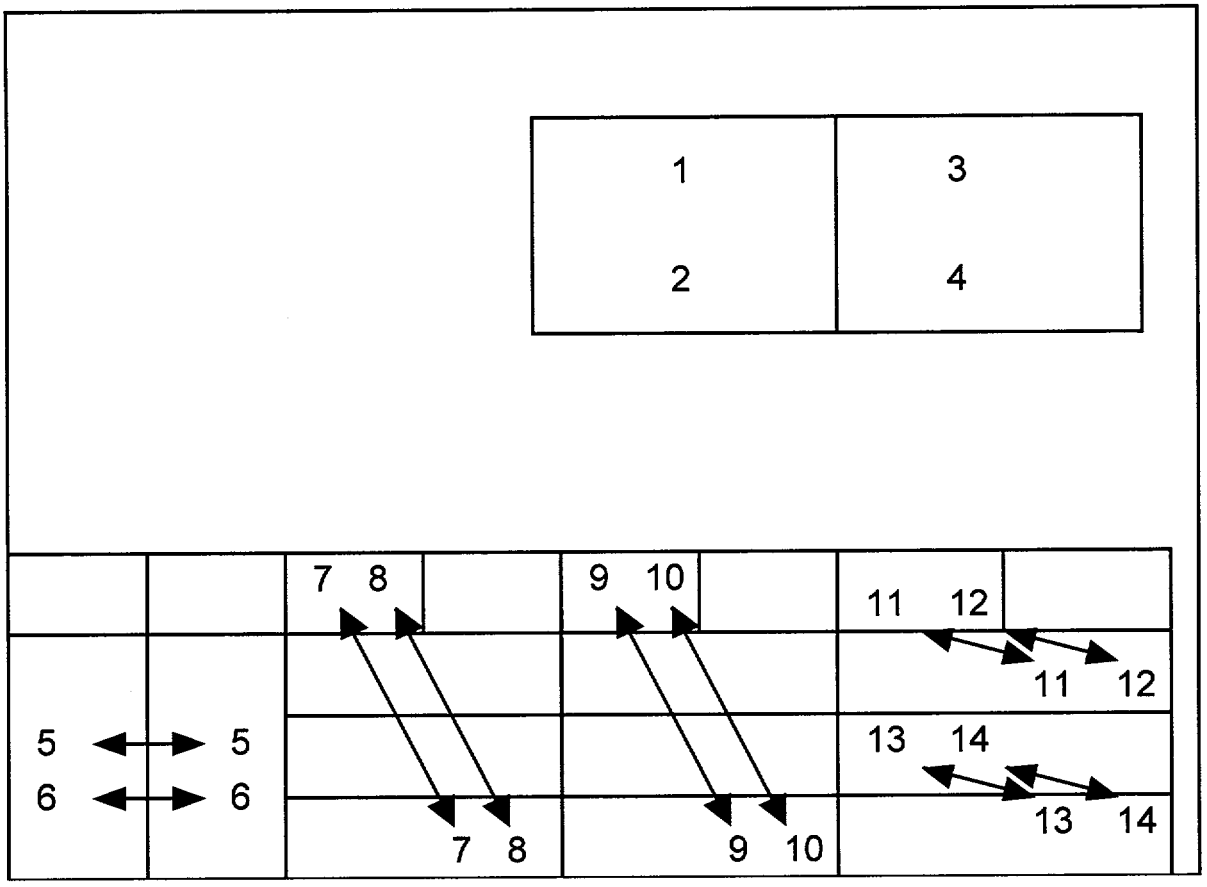
Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA				
2	<MDA	<MDA	<MDA				
3	<MDA	<MDA	<MDA				
4	<MDA	<MDA	<MDA				
5	<MDA	<MDA	<MDA				
6	<MDA	<MDA	<MDA				
7	<MDA	<MDA	<MDA				
8	<MDA	<MDA	<MDA				
9	<MDA	<MDA	<MDA				
10	<MDA	<MDA	<MDA				

Room: Room 33 View B

Name:

Notes:

Antkowiak and Mahoney Enterprises, Inc.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

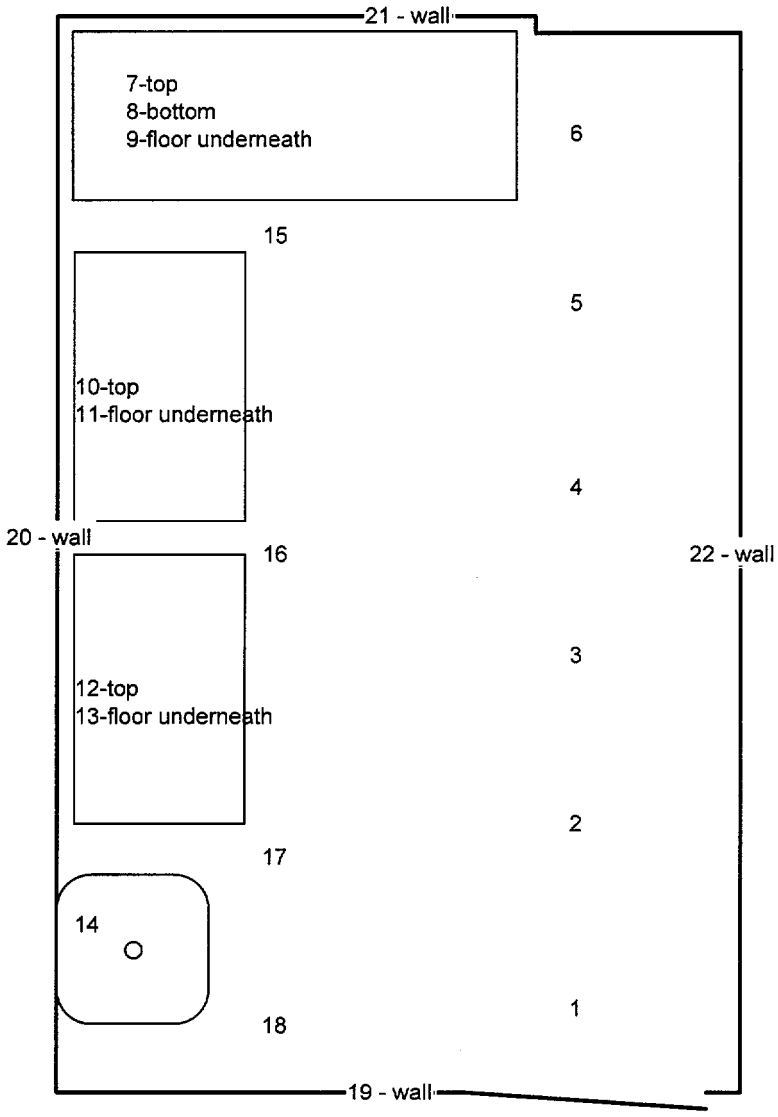
Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA
10	<MDA	<MDA	<MDA

Smear ID	Channel 1	Channel 2	Channel 3
11	<MDA	<MDA	<MDA
12	<MDA	<MDA	<MDA
13	<MDA	<MDA	<MDA
14	<MDA	<MDA	<MDA

Room: Room 34

Name:

Notes: Part 1. Smears 1 - 20.



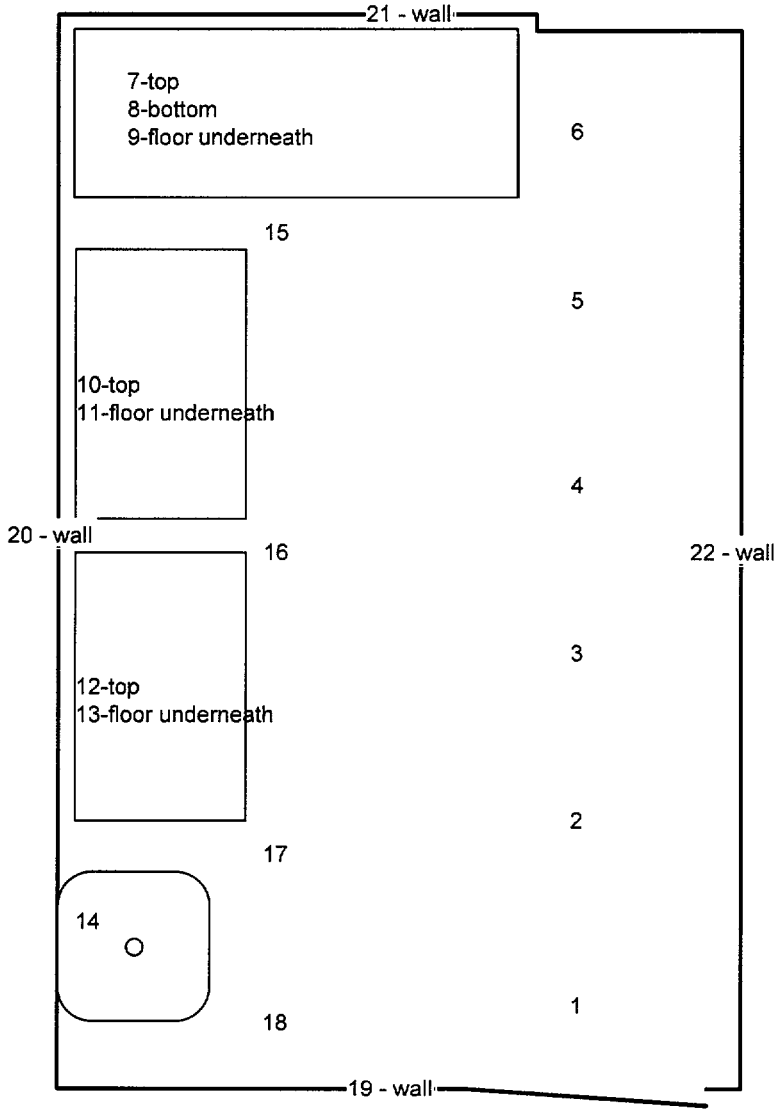
Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
1	<MDA	<MDA	<MDA	11	<MDA	<MDA	<MDA
2	<MDA	<MDA	<MDA	12	<MDA	<MDA	<MDA
3	<MDA	<MDA	<MDA	13	<MDA	<MDA	<MDA
4	<MDA	<MDA	<MDA	14	<MDA	<MDA	<MDA
5	<MDA	<MDA	<MDA	15	<MDA	<MDA	<MDA
6	<MDA	<MDA	<MDA	16	<MDA	<MDA	<MDA
7	<MDA	<MDA	<MDA	17	<MDA	<MDA	<MDA
8	<MDA	<MDA	<MDA	18	<MDA	<MDA	<MDA
9	<MDA	<MDA	<MDA	19	<MDA	<MDA	<MDA
10	<MDA	<MDA	<MDA	20	<MDA	<MDA	<MDA

Room: Room 34

Name:

Notes: Part 2. Smears 21 - 22.



Smear Analysis Results - Analysis by Liquid Scintillation Counting

Smear ID	Channel 1	Channel 2	Channel 3	Smear ID	Channel 1	Channel 2	Channel 3
21	<MDA	<MDA	<MDA				
22	<MDA	<MDA	<MDA				

Appendix II

Scalar Measurements Results
Class II Areas

Scalar Measurements – Room 33

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 575 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 33 - Main View	1	307	<MDA
Room 33 - Main View	2	214	<MDA
Room 33 - Main View	3	199	<MDA
Room 33 - Main View	4	297	<MDA
Room 33 - Main View	5	253	<MDA
Room 33 - Main View	6	262	<MDA
Room 33 - Main View	7	325	<MDA
Room 33 - Main View	8	307	<MDA
Room 33 - Main View	9	375	664
Room 33 - Main View	10	278	<MDA
Room 33 - Main View	11	280	<MDA
Room 33 - Main View	12	284	<MDA
Room 33 - Main View	13	309	<MDA
Room 33 - Main View	14	356	<MDA
Room 33 - Main View	15	325	<MDA
Room 33 - Main View	16	341	<MDA
Room 33 - View A	1	313	<MDA
Room 33 - View A	5	322	<MDA
Room 33 - View A	6	310	<MDA
Room 33 - View A	10	333	<MDA

Scalar Measurements – Room 128

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 575 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 128 - Main View	1	296	<MDA
Room 128 - Main View	2	259	<MDA
Room 128 - Main View	3	261	<MDA
Room 128 - Main View	4	256	<MDA
Room 128 - Main View	5	263	<MDA
Room 128 - Main View	6	269	<MDA
Room 128 - Main View	7	278	<MDA
Room 128 - Main View	8	271	<MDA
Room 128 - Main View	9	280	<MDA
Room 128 - Main View	10	275	<MDA
Room 128 - Main View	11	338	<MDA
Room 128 - Main View	12	280	<MDA
Room 128 - Main View	13	255	<MDA
Room 128 - Main View	14	264	<MDA
Room 128 - Main View	15	279	<MDA
Room 128 - Main View	16	252	<MDA
Room 128 - Main View	17	307	<MDA
Room 128 - Main View	18	283	<MDA
Room 128 - View A	1	288	<MDA
Room 128 - View A	2	283	<MDA

Scalar Measurements – Room 131

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 557 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 131 - Main View	1	278	<MDA
Room 131 - Main View	2	271	<MDA
Room 131 - Main View	3	268	<MDA
Room 131 - Main View	4	277	<MDA
Room 131 - Main View	5	272	<MDA
Room 131 - Main View	6	274	<MDA
Room 131 - Main View	7	277	<MDA
Room 131 - Main View	8	296	<MDA
Room 131 - Main View	9	288	<MDA
Room 131 - Main View	10	294	<MDA
Room 131 - Main View	11	272	<MDA
Room 131 - Main View	12	283	<MDA
Room 131 - Main View	13	260	<MDA
Room 131 - Main View	14	316	<MDA
Room 131 - Main View	15	287	<MDA
Room 131 - Main View	16	293	<MDA
Room 131 - Main View	17	283	<MDA
Room 131 - View A	8	263	<MDA
Room 131 - View A	10	230	<MDA
Room 131 - View A	11	258	<MDA

Appendix III

Scalar Measurements Results
Class III Areas

Scalar Measurements – Room 31-32

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 658 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 31 - Loading Dock	1	325	<MDA
Room 31 - Loading Dock	2	272	<MDA
Room 31 - Loading Dock	3	282	<MDA
Room 31 - Loading Dock	4	338	<MDA
Room 31 - Loading Dock	5	258	<MDA
Room 31 - Loading Dock	6	249	<MDA
Room 32	7	399	<MDA
Room 32	8	460	<MDA
Room 32	9	414	<MDA
Room 32	10	412	<MDA
Room 32	11	272	<MDA

Most readings in this area taken on concrete.

Scalar Measurements - Room 34

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 555 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 34	1	215	<MDA
Room 34	2	229	<MDA
Room 34	3	228	<MDA
Room 34	4	222	<MDA
Room 34	5	235	<MDA
Room 34	6	210	<MDA
Room 34	7	213	<MDA
Room 34	8	205	<MDA
Room 34	9	202	<MDA
Room 34	10	252	<MDA
Room 34	11	201	<MDA
Room 34	12	195	<MDA
Room 34	13	197	<MDA
Room 34	14	171	<MDA
Room 34	15	280	<MDA
Room 34	16	243	<MDA
Room 34	17	245	<MDA
Room 34	18	225	<MDA
Room 34	19	196	<MDA
Room 34	20	195	<MDA
Room 34	21	211	<MDA
Room 34	22	188	<MDA

Scalar Measurements - Room 122

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 555 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 122	1	245	<MDA
Room 122	2	278	<MDA
Room 122	3	273	<MDA
Room 122	4	218	<MDA
Room 122	5	259	<MDA
Room 122	6	241	<MDA
Room 122	7	248	<MDA
Room 122	8	253	<MDA
Room 122	9	268	<MDA
Room 122	10	291	<MDA
Room 122	11	298	<MDA
Room 122	12	227	<MDA
Room 122	13	176	<MDA
Room 122	14	273	<MDA
Room 122	15	279	<MDA
Room 122	16	262	<MDA
Room 122	17	270	<MDA
Room 122	18	257	<MDA
Room 122	19	204	<MDA
Room 122	20	189	<MDA
Room 122	21	203	<MDA
Room 122	22	206	<MDA

Scalar Measurements - Room 126

Ludlum Model 12, serial no. 193772

Limiting MDA (C-14) = 555 dpm/100 cm^2

Location	Smear Number	Reading (cpm)	Activity (dpm/100 cm^2)
Room 126	1	273	<MDA
Room 126	2	286	<MDA
Room 126	3	275	<MDA
Room 126	4	276	<MDA
Room 126	5	278	<MDA
Room 126	6	268	<MDA
Room 126	7	284	<MDA
Room 126	8	211	<MDA
Room 126	9	250	<MDA
Room 126	10	265	<MDA
Room 126	11	247	<MDA
Room 126	12	260	<MDA
Room 126	13	229	<MDA
Room 126	14	262	<MDA
Room 126	15	219	<MDA
Room 126	16	240	<MDA
Room 126	17	253	<MDA
Room 126	18	264	<MDA
Room 126	19	193	<MDA
Room 126	20	259	<MDA
Room 126	21	196	<MDA
Room 126	22	231	<MDA
Room 126	23	181	<MDA
Room 126	24	216	<MDA
Room 126	25	199	<MDA
Room 126	26	220	<MDA
Room 126	27	215	<MDA
Room 126	28	169	<MDA

Appendix IV

Sink Sample Results

Sink Trap Sample Results

Room Location	Channel 1 (dpm/sample)	Channel 2 (dpm/sample)	Channel 3 (dpm/sample)
Room 33	<MDA	<MDA	<MDA
Room 34	<MDA	<MDA	<MDA
Room 122	<MDA	<MDA	<MDA
Room 126	<MDA	<MDA	<MDA
Room 131	<MDA	<MDA	<MDA

Appendix V

Calibration Certificates

Certificate of Calibration

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

Company Antkowiak and Mahoney Enterprises, Inc. **Certificate Number:** 903

Manufacturer Ludlum

Model 12 **Serial Number** 193772

Probe Model 44-92 **Serial Number** PR178541

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

Battery Check Pass **High Voltage** 1600 **v** **Background Reading** 300 **cpm**

Pulse Generator: Ludlum Model 500, serial number 174393 , calibrated August 5, 2005

Scale	Calibration Point (cpm)	As Found (cpm)	Meter Reading (cpm)	Correction Factor
x1000	340,000	340,000	340,000	N/A
x1000	170,000	170,000	170,000	N/A
x100	34,000	34,000	34,000	N/A
x100	17,000	17,000	17,000	N/A
x10	3,400	3,400	3,400	N/A
x10	1,700	1,700	1,700	N/A
x1	340	340	340	N/A
x1	170	170	170	N/A

Source Isotope	Source Activity	Source Serial Number	Source Reading	Efficiency
Carbon-14	1.793 kBq	1010-66-2	5,900	0.052
Silicon-32	1.870 kBq	1010-66-3	22,000	0.196
Iodine-129	1.902 kBq	1010-66-1	5,400	0.047

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

Approved by Joel Antkowiak Digitally signed by Joel Antkowiak DN: CN = Joel Antkowiak, C = US, O = AME Inc. Date: 2006.02.12 21:17:26 -05'00' **Approval Date** January 19, 2006

Comments

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

This is to acknowledge the receipt of your letter/application dated

6/29/2006, and to inform you that the initial processing which includes an administrative review has been performed.

[X] Amendment 29-30285-01 There were no administrative omissions. Your application was 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

---

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** 139082. When calling to inquire about this action, please refer to this control number. You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader